Food insecurity in fragile lands:

Philippine cases through the livelihood lens

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Dit onderzoek is uitgevoerd binnen de onderzoeksschool Mansholt Graduate School of Social Sciences

Food Insecurity in Fragile Lands
Philippine Cases through the Livelihood Lens

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Proefschrift
ter verkrijging van de graad van doctor
op gezag van de rector magnificus
van Wageningen Universiteit,
Prof. dr. M.J. Kropff,
in het openbaar te verdedigen
op vrijdag 16 februari 2007
des namiddags te 16.00 uur in de Aula

Food Insecurity in Fragile Lands: Philippine Cases through the Livelihood Lens. PhD Thesis. Wageningen University (2007).

With references – with summaries in English and Dutch

ISBN 90-8504-592-4

Subject headings: less-favored areas, rural households, livelihood, food security, Philippines

Acknowledgement

At about 22:00 hour, 3rd of March, 2001, I received an e-mail message – a fellowship for my PhD program at the Wageningen University and Research Centre (WUR), the Netherlands from professor Anke Niehof. This was indeed an answered prayer. Otherwise, I would most probably have been elsewhere now; outside of my current development work. Five years after, I have struggled on to finish my thesis. I am full of joy and gratefulness to the Invisible Hand Who makes all things possible. And to many, many more!

This thesis is a combined product of the efforts of many, wrought out of the encouragement and support of a number of mentors, friends, colleagues – and the dire state of upland farmers, especially those whom I came in contact with in about one and a half decades of work in the rural areas. Friend-mentors who have provided the much needed motivation and inspiration include Anke Niehof, Gelia Castillo, Antine Hardon, Lisa Price, Hester Moerbeek, Bob Rhoades, Gordon Prain, Dindo Campilan, Liborio Cabanilla, my superiors, colleagues and friends at the Leyte State University, the PhilRootcrops, the UPWARD network, and other agencies. In more ways than one, they gave form and substance to my professional and personal aspirations.

A million thanks to the Wageningen Interdisciplinary Research Fund (INREF) which made possible the RESPONSE program in less favoured areas, a collaboration between the Wageningen University and Research Centre (WUR) and the International Food Policy Research Institute (IFPRI). All this has been greatly instrumental in bringing the inspired plan into reality, through the untiring push of my main promoter Anke Niehof; who also has always been my patient guide and critique. This program was a once-in-a-lifetime chance of learning from the work of experts in food and agriculture as Per-Pinstrup Andersen, John Pender, Howard Bouis, Thomas Reardon, Agnes Quisumbing, Peter Hazell, WUR professors, foremost of whom are Arie Kuyvenhoven, Ruerd Ruben, Arie Oskam, Herman van Keulen; and scores more of scientists and researchers (in my references!) in the fields of agriculture, environment, nutrition, and social sciences. They were awesome and had so much to offer in their respective work. I could only take bits from the depths of their minds to help piece together this thesis. Again, great thanks!

The Neys-van Hoogstraten Foundation generously supported the field research component including data processing, and provided good opportunities for sharing some results in an international conference. There are no words fit to thank the all-out support of the NHF board and staff.

Wageningen has become my home away from home because of people like Kees and Nora van der Does, Clemens and Nardi Verweij, Ton and Eva van Hoef, Merle and Ed Platel, Jan and Rose Ijskes, Franz and Shirley Manders, Jan, Francis and Ella Beltman, Betty Umali, and the *Pinoy* students who braved the seasons and "periods" at WUR. The bounty of *Pinoy* meals (with some Dutch touch) in Dutch-*Pinoy* homes and those in the student flats

were simply great diversions. Also, thanks to the Wednesday, Saturday and flea markets, and Sunday Holy Mass and Christian services– I always looked forward to them as they too provided beautiful experiences. The changing seasons – they were sights to behold! Yes, thanks so much for life away from the islands because they made me realize how peoples connect, how beautiful is home, and how much there really is to be done.

Ja, ja, ja. Veel dank! To the staff, my colleagues and peer students of my host social science group of Sociology of Consumers and Households. It is quite an experience to be there in its last few years stay at the historic Dreijenborgh. Coffee breaks, e-mail invitations for "onder de koepels", and occasional dinners were welcome treats to the daily grind of computer work, lessons, and readings. But work really became more doable because of the ever helping hand of Riet van de Westeringh (who cared for the details of my flat, work, and being foreign), Hedy Munro (ever reliable in administrative matters), and Dinie Verbeek who helped me with the cover design and put together the manuscript. During my last two months, peers and the soothing view from my office window at de Leeuwenborch are really great to cherish.

The farmers, technicians, health workers, local officials, field assistants, enumerators in my two study villages in Leyte – they were my allies, friends, partners, collaborators all rolled into one. They gave precious time and resources to make my stay in the village and all the work needed seem like "productive vacation". There was so much to learn from them, not just the content of my purpose, but more so about the realities of life. Village life is a very rich source of culture, relationships, real friendship, politics; and avenue to exercise patience, humility, perseverance, endurance, and the ability to accept and understand the simple joys of friendship, human suffering, and resilience of the rural poor. It made me feel guilty at times that, seemingly, I got more benefits than them from my two years in the field. But who knows! Something can be done for them. I am also doubly thankful because two masters students who graduated in their respective fields (soils and water, Olivier Saint-Girons at WUR; agriculture economics, Lelit Mazo at LSU), working together in the sites earlier in field, and in doing so, helped me in my work. The experts' help especially of Ruby Laña, formerly of the Food and Nutrition Research Institute (nutrition statistics) and Demelo Lao (statistical analysis); consultation with Vic Asio (soils), and Pat Urgello (nutrition); and the support of PhilRotocrops' staff have been quite helpful. To them my sincerest thanks.

I shall forever be grateful to my family, especially my husband, Nell, who had been very supportive of my professional advancement, and braved the difficulty of being father and mother when I was away, even while he was not physically well at times. To my children, Bindoy and Gay, Dida and Mike, Kakai, grandchildren Natnat and Kaela, who had to bear the consequences of my studies and work for quite some time. The joys and pains of such experiences made all of us better persons. And to my grandparents, parents, Fr. Mel, Sr. Mary Joseph, brods and sis by blood and of the BCBP

community, relatives and friends; all their prayers have been such great support.

Twenty years ago to date, this idea of advanced studies abroad was hatched. It is not accidental that the proper place and time has to be the WUR of the Netherlands at the start of the millennium, under the program on food security and livelihoods. But the waiting was really worth it - because I will always be grateful for my baptism into the art and science of interdisciplinary development anthropology.

J.R. ROA
16 February 2007

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Chapter 1
Introduction

"To ensure full and sustainable food security, it is necessary to understand the operation of the entire food system. ….The purpose of agricultural processes is to produce healthy people, not just food...The concern with the structure and dynamics of larger systems that include both biophysical and socio-economic factors can be justified simply on scientific grounds – to gain a more adequate understanding of how parts and wholes really function."

(Norman Uphoff, 2003:444-445)

1.1 Background and rationale

1.1.1 Purpose

The purpose of this thesis is to examine the nature and scope of the linkages between the resource environments, livelihoods and food security of households and individuals. These are analyzed using the livelihood systems framework with the biophysical environment as the entry point. The biophysical and socio-economic environments are investigated as the conditioning and influencing factors that help define the relationships along the production-consumption continuum. The context is spatial, in this case that of fragile areas, where most of the poor and food insecure live and work. Food security is viewed in a three-dimensional perspective: food availability, food access, and food adequacy.

Food security should be an integrative concept and most pressing because, arguably, none other would shake the global community with 840 million to 1.3 billion people languishing in the dire misery of hunger (FAO, 1999; Senauer and Sur, 2001; Lacy, W.B. *et al*., 2003). In addition, the issue brings closely together humans and the environment. As stressed by a well-known legal expert, "Few human rights have been endorsed with such frequency, unanimity, or urgency as the right to food, yet probably no other human right has been as comprehensively and systematically violated on such scale in recent decades" (Chen and Kates, 1994:199).

1.1.2 The food security challenge: the rationale

Much has been done in addressing food security issues, mainly in a "focused" perspective in order to understand better certain identified impact variables. The issues dealt with are diverse and include among others food supply, food access, food adequacy, or the provision of safety nets to respond to transitory food security crises. For each of these issues, the linkages among them and those with the environment, population, economic growth, poverty have been seriously investigated. Yet a significant gap still exists in relating food security issues at the household and individual levels, particularly that covering the interrelationships from production to consumption, which capture

a comprehensive set of food security indicators (Pender, 1999; Ellis, 2000; Niehof and Price, 2001; Scherr, 2003).

In recent decades, there have been serious efforts by interdisciplinary teams of soil scientists and economists to quantify the extent and severity of soil degradation, and the relationship of soil quality to productivity, and link those changes to policy-relevant outcomes. However, the data sets used have serious limitations because of varying methods used, which made results at times noncomparable or inconsistent. Thus, the results used as empirical bases for drawing policy conclusions remain weak. Standardized methods are needed to compare findings in various sites. Changing soil quality such as that brought about by erosion or nutrient depletion and its consequent effect on productivity on different types of crops grown in different soils remain poorly understood. The high-risk hillsides and drylands are of critical concern because of their degradation-prone soils and the absence or inadequately managed irrigation. These areas rapidly intensify production without the incentives or the appropriate technology for good resource management. "Only a handful of studies evaluated the impact of soil degradation on food consumption or nutrition of poor farmers" (Scherr, 2003:83).

There remains a substantial research challenge concerning fragile lands to answer the critical questions related to the eventual impact of the diminished land quality on the food consumption and nutrient adequacy of households and individuals. For example, soil cannot simply be taken as some given where inputs are added to produce outputs. It has specific properties (e.g. topsoil depth and function, physical and chemical properties), which by themselves are critical factors of production and should be evaluated explicitly. Further conceptual work is needed which should help to distinguish farming areas with different soil types, agro-ecological zones, land use type and intensity, market environment and type of producer (Scherr, 2003). In addition, contextual data that can enrich the elaboration and analysis of quantified relationships would add to the informed and reasoned evaluation of policy-makers and planners, and the local people themselves. There is ever more the pressing need for social scientists and natural scientists to work together to improve methodologies for data collection and analysis that range from soil quality analysis that should enable the articulation of impacts on agriculture, growth and food security.

In this century, the critical challenges of food security, environmental degradation and poverty reduction need to be addressed simultaneously (Vosti and Reardon, 1997). Much analysis has been done starting at the macro-level. While recognizing the critical importance of macro-factors, in this thesis the links at the micro-level are explored among households and individuals in two different types of fragile areas looking at how they eke out their living.

1.2 Conceptualization of the thesis research: integration of concepts

1.2.1 A sketch of the food security issue

The concern about sufficient food resources for the world population was first broached by Malthus in 1798. While some neo-Malthusian environmentalists adhere to Malthus' predictions of population outgrowing food, others contest them because technological advances have brought about increases in agricultural production. However, the success of the Green Revolution did not trickle down to most of the poor in Asia and especially Sub-Saharan Africa because of environmental, socioeconomic and socio-political constraints. While reportedly 60-90 percent of household budget in less developed countries is spent on food, this has not been adequate for a healthy life of many. Global statistics figuring enough calories for everyone has belied the real picture of hunger at the household and individual levels (Boserup, 1965; Jones, 1990; Pinstrup-Andersen, 2004). Thus, the over-all concern for food security remains.

Efforts to address food security have been persistent since its explicit articulation in the mid-1930. The catalysts then (i.e. Stanley Bruce, High Commissioner in London and former Prime Minister of Australia; Frank McDougall, economic adviser to the Australian mission to the League of Nations; Boyd Orr, nutritionist in Aberdeen), who laid the basis in the founding of the Food and Agriculture Organization (FAO) of the United Nations, believed in the marriage of health and agriculture when they wrote the memorandum "The Agricultural and Health Problems". Picked up by Bruce in his address to the League of Nations, this influenced global commitment to address the vital links between agriculture, nutrition and economic development. They argued that failure "to bring together a great unsatisfied need for highly nutritious food and the immense potential production of modern agriculture would amount to a certain bankruptcy of statesmanship". These initial stirrings later led to the founding of the FAO with mandates concerning agriculture, food and nutrition, and ultimately ensure food security (Abbott, 1992).

Various events highlighted the global concern about food insecurity; the latter heightened by the aftermath of the two rounds of oil crises in the early 1970's, and by the famines in Africa and Asia in the earlier 1980's. The World Food Conference was then held in 1974, followed by the first meetings of the World Food Council; and the establishment of the International Food Policy Research Institute in 1975. The results and discussions of programs and systematic investigation were discussed in journals, discussion papers, meetings and conferences. The work of Timmer, Falcon and Pearson (1981) stimulated an era of food policy debates. Public policy to address food security became the order of the day. However, the difficulties of operationalizing the different pathways in achieving food security through concrete actions must have triggered the shift of the food policy debates towards discourses that seek to understand the nebulous concept of food security. Amartya Sen's (1981)

concepts of entitlement and access have channeled the food security debate away from the focus on food production and supply into the various other lines of inquiry, leading on to the current translations in terms of welfare, health and nutrition at the household and individual levels (Maxwell and Slater, 2003).

Several publications dealt with defining and elaborating the concept of food security from the context of food supply, entitlement and access, demand for food and nutrients, adaptive and coping strategies; and making the concept operational through empirical work that tested different indicators. For economists, the calorie-income curve inspired widespread empirical investigation. As incomes increase consumption of energy foods decreases in favor of high-valued foods. Other researchers differentiate process and outcome indicators and how these may be applied (Frankenberger, 1985, 1992, 2001; Maxwell, S., 1990; Maxwell, D., 1996; Maxwell and Slater, 2003). The investigations that followed dealt with studies that identify policy impact variables in terms of price and income effects, related to the commercialization of cash plantation crops, and changes in agriculture-industry patterns. Others looked at the differential impacts on food consumption and nutrient intake arising from welfare effects due to changes in rural infrastructure and institutions, or in ownership and use rights of land. A number of issues on health and nutrition were viewed within the framework of the new household economics, using either the unitary or the bargaining models, in determining intra-household nutrient intake differentials by gender, age, or education (Folbre, 1984; Behrman, 1985; Kennedy, 1988; Haddad, 1990, 1997; Senauer, 1988, 1994; Bouis, 1997; Katz, 2000; Quisumbing, 2000).

For about two decades, in another spectrum of the food security debate, the interdisciplinary field of household sciences applied a different lens that is anchored on grounded theories of the socio-anthropological tradition, which has a long history of theorizing the household as the locus of analysis. Socio-cultural factors largely define structure and function of households ranging from the nuclear family based households to the extended family-based complex households as found in Africa, China and other Asian countries. Households can also be defined in terms of their internal dynamics in the processes of production, consumption, reproduction, and the maintenance of their members' well-being. Whether structure or function-based, empirical studies have purposively defined households based on the objective and context of their investigations (White, 1980; Wilk and Barlett, 1989; Anderson *et al.,* 1994; Rudie, 1995; Hardon-Baars, 1996; Pennartz and Niehof, 1999).

Household-level analysis has been undertaken within a certain framework such as that of sustainable livelihoods, or simply the livelihood framework. Among the different frameworks is the livelihoods approach that enables addressing the relationship between livelihood security and food security (Frankenberger and McCaston, www.fao.org). The livelihood perspective features the multiple objectives of households, both economic and non-economic, in generating income, in reducing vulnerability and risk, and in

managing resources. This strongly integrates gender, age and other socio-cultural factors as crosscutting issues in describing and analyzing household dynamics in various locations and contexts of study (e.g. coping strategies, fragile areas, community-based, indigenous food plants). Particular attention is given to the varying definitions of the household in different socio-cultural settings. The concern for the participants' view pervades the whole range of methodological tools; and the need for a stronger voice of the food insecure is emphasized (Chambers and Conway, 1992; Gittelsohn, 1992; Rudie, 1995; Bryceson, 1999; Ellis, 2000; Niehof and Price, 2001).

Nutrition has had a long history of research of just about every aspect that pertains to health and nutrition of people; with a general tendency to an 'individualistic bias' in early nutrition research. Nutritionists experimented and defined what consists of a balanced diet and adequate nutrients to different people of various characteristics and conditions. Tests and standards of each good and bad element absorbed by the body, their effect on health or sickness have all contributed to the protocols, standards and indicators that determine nutrient adequacy and health (Martorell, 1979; Svedberg, 2000). Nutrition experts mainly conduct the surveys and prepare the nutrition and health data, while the family income and expenditure surveys and the food balance sheets are the main instruments of economists. However, in the last two decades, social scientists became more and more interested in the nutrition problem in the context of food security. The concept of food security, in the sense of food adequacy, draws in large measure from the work of nutritionists and health practitioners. On the other hand, the latter had to draw from the experience and empirical work of social scientists in order to contextualize the technicalities of food and nutrition research.

1.2.2 The population-environment-agriculture dimension

The population-environment-agriculture-poverty interactions are complex and research results on their relationships are rather mixed and ambiguous. In Geertz' ecological approach the issue of these interactions is akin to that of "determining the relationships which obtain between the processes of external physiology, in which man is, in the nature of things, inextricably embedded, and the social and cultural processes in which he is, with equal inextricability, also embedded" (Geertz, 1968:5-6). While this is not to conclude a sense of indeterminateness, the specific contexts of the environment, people, conditions and time need to be distinguished for meaningful and useful analyses.

Two seemingly opposing views on the U-shaped curve of the population-environment relationship, the Malthusian and Boserupian perspectives, could each be true in their own context. On the one hand, the pressure of population growth was taken to fuel the environment degradation-poverty-food insecurity spiral because of the negative impact intensified land use has on land quality (e.g. soil erosion, nutrient depletion), productivity and farm incomes. Malthus posited that the marginal returns to land diminish as more inputs are applied to intensify land use, especially without due regard to

conservation. Human population grows at a geometric rate, the capacity to feed at an arithmetic rate. The other view recognizes the resilience of the social system, and man's ability to respond positively to environmental stresses. This Boserupian view is parallel to Condorcet's (1795) optimism with respect to man's ability to overcome the food-population problem by means of technological innovations and rational choice (Sen, 1994; Tiffen *et al.,* 1994). Two centuries after Condorcet and Malthus, the contemporary empirical evidence shows the striking diversity in land use management by the rural poor and their success in adapting innovations to conserve the environment. Cases in Africa, Asia and Latin America have demonstrated that the appropriate application of indigenous knowledge and resources, the facilitative support of local leadership and institutions, as well as enabling policies, have positively influenced the adoption of resource-conserving technologies, and caused reversals of the vicious cycle (Pender, 1999; Scherr, 2000; Cramb *et al.,* 2000).

Given the mixed evidence, it is clear that the local responses to population pressure, both at the household and collective levels, are different and depend on various location-specific factors. In rural Philippines, for example, the religious and socio-cultural sensibilities among couples still affect negatively on the population management program (Balatibat, 2004). In the absence of a collective response such as local efforts to apply innovations or overcoming socio-cultural constraints, and without the needed organizational and institutional support systems (e.g. clear population program, appropriate extension services, rural infrastructure, improved local governance), the effects of population pressure are more likely to be negative (Pender, 1999; Scherr, 2000; Brons *et al.,* 2006). In the last twenty years, there is evidence of positive impact of progressive population control programs on household size: by compulsion as in China's one child policy or voluntary by enlightened reason as in the cases of Kerala, India and Indonesia (Sen, 1994; Niehof and Lubis, 2003).

A not-necessarily conflicting view holds that poverty and institutional failures are the direct causes of environmental degradation, not population pressure per se. Land degradation results in intensive farming by the poor who do not have the means or the incentive to conserve the natural resources. Their planning horizon for land use tends to be the immediate and short-term ends of production, not long-term sustainability. This view holds that a relatively high population growth is part of the poverty dynamics and is associated with poorer areas. Since the poor do not have physical assets (i.e. land, capital), their most important resource is human capital. Thus, the poor households strategize, and part of that is to have a bigger household size for at least three reasons: provision of farm and home labor, potential income contribution, and support in old age. The poor tend to view increase in the number of children in terms of these positive benefits (Dasgupta *et al.,* 1994). However, the poverty-population nexus is more complicated than that. In a situation of social change and increasing importance of employment outside the agricultural sector, costs of children, in terms of health care and education, will gradually outweigh

their perceived benefits. Caldwell (1982) has called this the 'reversal of the intergenerational flows of wealth'. The shift occurred in Indonesia during the past thirty years, where the saying 'many children, much good fortune' was replaced by 'two children is enough'. One could also refer to this as a shift from an emphasis of number of children to an emphasis on quality, where parents prefer to have fewer though healthy and well-educated children (Niehof and Lubis, 2003). McDonald (2000: 430) points to the importance of gender equity in the family for the transition to lower fertility to take place. This can be illustrated by one of the case studies of Balatibat (2004: 109-110) where the wife could do nothing but accept the veto of her husband and mother-in-law on going to the health center for the contraception she desired.

1.2.3 The agriculture-poverty-food security links

About 70 percent of the poor live in rural areas and are mainly engaged in farming. Thus, the sustainability of the biophysical resource base for agriculture (e.g. soil quality) is one of the most critical issues relating agriculture to poverty. A greater part of the land where the poor live and farm is already degraded or with on-going degradation due, in part, to inappropriate farming practices without the resources or the incentive for conservation, and also partly due to the forces of nature. Worldwide, two billion hectares of land have severe environmental damage with 5-10 million hectares becoming unproductive per year due to severe degradation. About 16 percent of total agricultural land in developing countries is degraded moderately to severely, mainly through soil erosion, nutrient depletion and salinisation. At least 28 countries (i.e. with total population > 300 million) face water stress, and despite contamination, demand for it is growing due to increased agriculture and domestic uses. Agricultural expansion, intensification and de-vegetation are leading causes of species loss and depletion of natural vegetation. These cause declining agricultural productivity, loss of biodiversity, reduced water availability and quality, and diminished livelihood viability of poor farmers in particular (Lal, 1991; Lacy *et al.,* 2003).

The continued intensified farming that results in degradation poses serious challenges to achieve land use improvements, reduce rural poverty, and secure adequate food. The diversity of conditions existing among the poor and food insecure defies simplistic quantitative models because of the complex web of poverty-agriculture-environment interactions. Interest in the spatial context, especially of fragile lands, arose from the evidence that there are indeed real potentials for growth through resource improvements and livelihood security in these areas (Scherr and Hazell, 1994). Improved understanding of the biophysical environment should then be a primary point of concern. The constraints, weaknesses and threats characteristic of fragile areas are limiting factors that households must contend with in their livelihood decisions. Degraded areas are considered fragile lands in this study. The linkages between the spatial conditions of fragile areas, in particular, livelihood strategies and food security need to be explored in full length.

1.2.4 The experiment at integration

My interest in the issues of livelihoods, food security and their interconnectedness was built-up during about fifteen years of working in rootcrop agriculture. In the Philippines, rootcrop farmers are considered the poorest of the poor. They live and till the eroded uplands or the easily flooded rainfed plains, and have meager resources. Their produce reaches only very limited markets, and institutional failures isolate them from available support services such as credit, technology, and marketing infrastructure. They face high nature and market risks, have very limited livelihood options, and thus, are food insecure in some or most parts of the year depending on the circumstances. Fragility of their land is a basic given.

Degradation of the Philippine uplands has long been reported as increasing in seriousness and scope (Fujisaka *et al.,* 1986; World Bank, 1989; Cramb *et al.*, 2000). The uplands refer to the rainfed areas ranging from sloping to hilly and mountainous terrains. In these mostly fragile areas, farming is dominated by permanent or shifting cultivation of annuals (i.e. rainfed rice, corn, rootcrops, sometimes vegetables, tree crops) with or without fallow. The upland farming systems and their biophysical and socio-economic environments are not static, but are continually changing; which then require farmers to adapt to new constraints and opportunities (Cramb, *et al.,* 2000).

This study hopes to contribute to an integrative framework for social science research on food security-producing processes at the household level; drawing from the various literature in agro-ecology, economics, sociology and anthropology, nutrition and food policy. Further development of theory and methods in this area would benefit from empirical research with a multi-disciplinary perspective, and ideally, in an interdisciplinary manner.

Using an eclectic approach, this study is an experimental attempt at an "integrated linkage analysis" of the processes within households, located in fragile lands, as to their food security status via a resource-based livelihoods systems perspective. It may seem rather ambitious at first, but in a country like the Philippines most of the data needed for this type of analysis are collected by various public institutions. Currently, a holistic linkage analysis is not validly possible because the relevant data sets taken by different agencies arise from different frameworks and sampling designs, and are collected at different periods. Various surveys have not considered, at least not consistently, the relevant stratification criteria (e.g. high, moderate or low potential areas, or favoured versus less-favoured or fragile areas) needed to target the most vulnerable and at-risk populations. The results from this study will provide hard evidence and lessons for an integrative food security assessment. Such demonstrated usefulness hopes to influence various officially mandated agencies to coordinate their regular surveys (e.g. food consumption and nutrition, family income and expenditures, agriculture production), and to integrate relevant stratification criteria meaningful for food security analysis, such as indicating the potential of different agro-ecological zones. Further, to show the possibility of an overall framework for data/information management and coordination. Such a framework would allow more cost-

effective data management and – at the same time – integrate specialised fields of inquiry by each agency.

The research in effect tests a framework that forges the links in the environment-agriculture-livelihoods-food security nexus in a holistic manner. Hopefully, this tested framework responds to the need to put together critical concerns about food (in)security especially those of the poorest of the poor, who mostly live in fragile environments.

1.3 Response framework and funding

It is providential that the idea of an integrative micro-level inquiry on the environment-livelihood systems-food security links could actually be funded. Its time did come through my PhD study. This is a fellowship grant and part of the joint programme on the Regional Food Security Policies for Natural Resource Management and Sustainable Economies (RESPONSE) in less-favored areas between the Wageningen University and Research Center (WUR), Wageningen, The Netherlands, and the International Food Policy Research Institute (IFPRI), Washington DC, USA.

The RESPONSE Programme aimed at the following set of research objectives:

- Improved integration of socio-economic and agro-ecological approaches and methodologies for research on sustainable land use and food security;
- Linking analytical approaches for the appraisal of production, consumption, market exchange and resource-use;
- Multi-scale analysis of the effect of market and institutional development on farm-household resource allocation decisions, land use and food security;
- Spatial analysis of the linkages and interactions among resource allocation decisions, exchange transactions, engagement in off/non-farm labor and migration patterns.

While the objectives may be interlocking in certain cases, RESPONSE is broadly grouped into four thematic working programmes. This thesis falls under Working Programme 2 (WP2) on Food Security and Livelihood Systems. WP2 counts two PhD projects of which this thesis represents one with a spatial dimension. The other study looked at the temporal dimension of food security in Bangladesh, noting in particular the roles played by social capital and gender (Ali, 2005).

The Neys-van Hoogstraten Foundation of the Netherlands – a foundation committed to micro-level household studies on budgeting, resource allocation, gender, food security and nutrition - provided adequate support for the fieldwork of about two years in the Philippines. For undertaking research in relation to my PhD thesis, the Foundation grant also effectively supported two MSc students: one from the Wageningen University Research Center,

Department of Environmental Sciences, and the other from the Leyte State University, Philippines, Department of Economics. These two MSc projects resulted in the following theses: "Soil and water management strategies of farmers situated in fragile environments" (Saint-Girons, 2003); and "Economic analysis of rice and coconut production in selected fragile villages of Plaridel, Baybay and Alegre, Dulag, Leyte" (Mazo, 2004).

1.4 Outline of book

For a thesis problem that embraces a "focus on linkages" along the production-consumption chain, and adopts a holistic lens, operationalizing the research and organizing the results in a limited timeframe, have indeed proven to be daunting tasks. Thus, the thesis book has been a demanding engagement for the student and the academic supervisors. The concepts embraced a relatively wide range of disciplines, and care was taken to have the minimum basics to accommodate the breadth of treatment. There is the need to expound on the context and concepts to enable the better understanding of the results. However, the depth and detail of the clarification of concepts and context may not always be up to the expectations of the narrowly discipline-oriented reader. To be comprehensive yet concise was a real test of scientific rigor. The student had to venture in this realm to approximate the reality of the food security problem, and eventually to test the operational feasibility of a holistic livelihood approach.

The thesis is organized, first, to provide the preliminary information needed to contextualize the research country and the research communities. A comprehensive grounding of concepts, framework, and methodology; the discussion of results; and the conclusions together with policy implications follow this. Organized to progressively introduce the problem, conceptual framework and methodology in Chapters 4 and 5, it is the intention that Chapters 1 to 5 spread out the literature review of the various related topics and issues.

Chapters 1 to 3 provide the overall backdrop of the research problem in the Philippine setting. The assumption is that micro-level investigation needs to be placed within the meso-macro environment and the local-global thinking relevant to the problem and the approach taken. Specifically, Chapter 1 is a general introduction and brief background of the thesis problem, which includes a brief historical note on the food security problem and the types of sub-systems linkage research foci investigated in the contemporary past four decades or so. It also places this thesis within the IFPRI-WUR global scientific interest and developmental programme on food security in less-favored areas, which is a collaborative effort between an academic institution and the international research community, including the related studies and logistics support. Chapter 2 presents an overview of Philippine society, economy and agriculture, and introduces the research region. An elaboration of the social, political and economic aspects of Philippine development provides the historical, socio-cultural and politico-economic perspectives.

While Chapter 3 concisely chronicles the discourse on food self-sufficiency versus food security, and the various related policies and public action that sought to address these in the country.

Chapters 4 and 5 detail the research problem and methodology used. Chapter 4 elaborates the main and specific research questions, the context and conceptual framework, and the approach used. Chapter 5 describes the methodological design, that is, the mix of quantitative and qualitative methods and tools used in data collection and analyses. This chapter also defines the variables used in the analyses. It will be noted that in order to address the identified research questions, three main hypothesis statements are expounded. The intention here is to highlight the interconnectedness of relations involved in the production-consumption continuum, and emphasize that such view is vital to an understanding of specific conditions or outcomes (e.g. crop yields, livelihood strategies, nutrient adequacy) that eventually impact on food (in)security as defined in this research: as a composite of food availability, food access, and food adequacy. This methodological approach permits a kind of ordering or patterning of the linkage relationships from decisions at the farm level or production-related question, to livelihoods, then on to the final relationships on food consumption and nutrient adequacy at the household and individual levels. In analyzing the linkage relationships, the specified research questions have been answered in the process.

Chapters 6 to 9 discuss the combined results of the qualitative and quantitative analyses used in addressing the research problem. To have a better understanding of the research settings and to prepare the reader for the discussion of results in Chapters 7 to 9, Chapter 6 details the physical, socio-cultural and socio-economic characteristics of the two research villages that represent two different types of fragile areas. This culminates in the description of farming, livelihoods, and food security of the villages mainly based on qualitative methods. Chapters 7 to 9 discuss the results of the quantitative analyses in relation to the three hypotheses: on farm productivity of main crops (Chapter 7), livelihood decisions and outcomes (Chapter 8), and nutrient adequacy and nutritional status of households and individuals (Chapter 9). Qualitative data (e.g. case studies, focused group discussions) which bear on the three hypotheses, will provide contextual information, enriching the explanation of the variables and posited linkage relationships.

Finally, Chapter 10 summarizes the findings and conclusions, and draws out relevant policy implications. The matrix summary intends to clarify the linkage relations with reference to the hypotheses and the research questions, through the resulting highly significant and important factors that affect farm productivity, livelihoods, and nutritional status. This also stresses the methodological point of having the procedure to be further tested, and to serve as a guiding protocol for any similar research that seeks to address related questions. Policies implied by the findings, methodologies and approach applied are then drawn out. A comprehensive summary brings together the research questions and the results of the three hypotheses related to these questions as well as their policy implications.

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Chapter 2
The Philippines: Geography, Society, Economy, and Agriculture

2.1 Geography

2.1.1 Location and topography

The Philippines, an archipelago of about 7,100 islands, is a Southeast Asian country. It lies between the geographic coordinates 116° 40' and 126° 34' E. longitude, and 4° 40' and 21° 10' N. latitude. Only approximately a thousand of its islands have human settlements, and a little more than half of these islands are less than 2.5 square kilometres. The nine largest islands comprise 90 percent of the total land area of 298,170 square kilometres. The country stretches 1,850 kilometres from about the fifth to the twentieth parallels north latitude and has a total coastline of 36,289 km, claiming an exclusive economic zone (EEZ) of 200 nautical miles from its shores (Nurge, 1965; http://www.wordiq.com/definition/PI 22/10/04; see Figure 2.1).

The three main groups of islands include Luzon in the north, the Visayas in the centre, and Mindanao in the south. The archipelagic topography makes the Philippines a country with one of the longest coastlines in the world. From north to south, it has largely mountainous terrain which either glides or falls sharply into rolling hills, interior valleys and plains, and coastal settlement strips. The depths are more impressive than the heights; to the southeast lies the world's deepest trough descending to 10,430 meters – the Philippine Deep (http://countrystudies.us/31.htm 22/10/04).

2.1.2 Climate and natural phenomena

The country has a tropical marine climate divided into rainy and dry seasons. The northeast monsoon or *amihan* comes in November to April; the southwest monsoon or *habagat* in May to October. The monsoons cause heavy rains and winds in many parts of the islands. Mean annual sea-level temperature is rarely below 27° C. Annual rainfall reaches a maximum of 5,000 mm in the mountainous east coast areas, and less than 1,000 mm in some of the valleys. With the mountain terrains varying in altitude, ruggedness, vegetation and state of (de)forestation, the seasons vary in intensity and distinctness across and within the regions. These tend to create microclimates, and the resulting diversity makes precise weather prediction difficult in certain areas, which affects agriculture production as well.

Its geographic location in the typhoon belt exposes the country to a high frequency of tropical cyclones each year. Dangerous storms lash the country from July through December averaging 19 typhoons per year. In December, 2004, four super-typhoons caused flash floods in the eastern border of Luzon. The Philippines lies in the western Pacific arc system, the "ring of fire", which makes it vulnerable to volcanic activity and earthquakes (http://countrystudies.us/philippines/31.htm, 22/10/04). In the last two

decades, the Philippines suffered severely from natural disasters. In the late 1980's, Central Luzon and many parts of the Visayas were hit by both drought and typhoon which hampered electricity and caused floods in vast tracts of agricultural lands and residential areas including the main metropolis of Manila. In 1990, a major earthquake (intensity 7.0) damaged a wide area in Northern Luzon causing heavy damage to infrastructure, business and agriculture. Then Mt. Pinatubo erupted

Figure 2.1 Map of the Philippines locating the three main groups of islands (Luzon, Visayan Islands and Mindanao), the sea boundaries and Region VIII (in box)

2.2 Philippine society and organization

2.2.1 Identity, ethnicity, and culture

The country was originally named "Filipinas" after the king of Spain, Felipe II, by virtue of its conquest by the Spaniards in 1521. Eventually, it came to be called the "Philippines", understandably after the American occupation (1898-1941), and having been liberated by the Americans from the Spaniards (1898) and the Japanese (1945). The name "Filipinos" originally referred to the Spanish and Spanish-*mestizo* minority. And the natives were called *"indios*", which was rather derogatory. Another group, the *ilustrados*, consisted of the highly educated local elite who came from wealthy families. They went to prestigious schools in Manila, Spain and other European countries, and later led the revolution against Spain (http://countrystudies.us/philippines/1.htm, 22/10/04). These distinctions effectively created social classes to the point of discrimination. However, the educational reforms started during the Spanish rule, and furthered by the granting of freedoms during the American regime, enlarged people's social mobility and enabled them to achieve greater heights in various fields. The name "Filipinos" later became to refer to the whole population.

The Philippines is only about a third of Thailand and a seventh of Indonesia in land area, but is one of the most ethnically and linguistically diverse among Asian countries. Historically, its people are descendants from the various native tribes, foreign traders, settlers and colonial lords. Through intermarriages, the Filipinos became a unique blend of various origins. About 70 percent of the population have Malay roots. The ancestral origins of the remaining 30 percent are Chinese (10%), Indian (5%), other non-Malay tribes (5%), Arab (3%), American (1%), aboriginal Negrito (1%), and all others (5%). At least two local languages (i.e. Tagalog, Cebuano) and about eighty dialects are spoken by people of different ethno-linguistic origins. This is not surprising because of the geographic divisions by mountains and seas, and the absence of road and communications infrastructure in the old days. Through the years, the common desire of the people for oneness led to revolt against any foreign domination and triggered the search for a national identity. Education, improvements in communication and transport, and the drive for a common language (i.e. Pilipino) other than English, largely reduced ethnic, religious and linguistic differences in the recent two decades. Consequently, by the early twenty-first century, the Filipinos have rightfully earned the collective notion of "Philippine culture", especially considering that the people are distributed over thousands of islands (http://www.wordiq.com/definition/PI, 22/10/04). Such culture is an exercise in diversity, and could only mean "unity in diversity", for the present-day Filipino may cling to his ethno-linguistic home identity as may be seen in informal communities in foreign countries, and yet relish being called a "Filipino".

2.2.2 Society and values

Contemporary Philippine society can be differentiated in terms of socio-cultural (e.g. upland tribes, lowland coastal Filipinos), religious (e.g. Muslims, Christians), and urban-rural distinctions rather than ethnic or racial considerations. Filipinos have learned to live within diverse ethno-linguistic and cultural settings. These differences are bound by a common history of foreign conquests, religious tradition (at least 90% are Christians), and the spreading unity in national language (i.e. Pilipino). From the 1970's onwards, improvements in transport and communications in most parts of the country have further reduced ethno-linguistic and regional geographical divisions. Yet, many still find comfort in speaking their respective local language or dialect (Dolan, 1991).

Filipinos value social acceptance, and view education as the main vehicle for upward social mobility. A strong religious faith, respect for authority, a high regard for *amor propio* (self-esteem), and smooth inter-personal relationships are valued deeply. These make for the smooth running of society despite hardships in the socio-economic and political spheres. However, when these characteristics turn into fatalism as they do in certain circumstances, they could stand in the way of socioeconomic advancement.

The Filipinos greatly value family and kinship, and a nuclear family easily expands into a clan (i.e. consisting of a number of families related by blood and affinity, usually explicitly recognized). Loyalty to the family triggers a web of relationships that influences dealings in business, politics and work. Patronage politics and all its negative connotations, for example, are widespread because of the personal alliances arising from kinship ties. Ritual and fictive kinships, such as god-parenthood in baptism, confirmation, marriage, and relatives by affinity, extend to personal alliances where favours and support are sought and given.

Strong bonds of personal relationships colour the life of a Filipino and tend to provide the basis of social behaviour. These bonds are seen in how Filipinos value *utang na loob* (i.e. debt of gratitude), in the *suki system* (i.e. market-exchange partnership usually with preferential relationships), and in various other patron-client relationships. The first implies a perpetual debt of gratitude for a favour extended. A favour reciprocated many times over certainly has implications in the socio-economic and political arenas. In the *suki* system, this holds for regular patronage in buying and selling of goods (e.g. trading) and services (e.g. beauty shops, restaurants) in return for reduced prices, stability of supply, priority service and other benefits. Or in the case of the latter, the reciprocal arrangement formed could be between tenant farmers and their landlords, or between any patron who provides resources and influence in return for the client's personal services and support. This usually involves the patron giving a means of earning a living, help or protection, and the client giving labour or personal favours (i.e. from household tasks to political support) in return. These relationships can evolve into a network of mutual obligations on a long-term basis, and extend beyond the local arena. Urbanization and western acculturation may have eroded some of these

ingrained relationships, but they still are prevalent, and particularly in the rural areas (Nurge, 1965; Dolan, 1991).

The Filipino socio-cultural norms and values, and the centrality of family and religion continue to colour the life in the *barangay* (barrio or village), and towns. The most traditional rural village is one where the set of values discourage change and relies greatly on subsistence farming. The more progressive *barangay* is linked well to the market and/or industrial sites, thus enlarging income opportunities. Here, the attitude of the villagers is less traditional, a bit progressive and more amenable to change. Often, the barrio folks encourage their children to reach outward for a better life – the grass away from the farm is always greener (Nurge, 1965; Dolan, 1991).

The small group of wealthy elite (e.g. landlords, big businessmen, politicians) wield power and influence in the country's social, economic and political circles. Usually residing in the metropolis or bigger cities, many have large land or business bases in the smaller urban and rural areas. Usually adopting western ways, lavish life-styles are seen in expensive homes, cars, exclusive education (locally or abroad), and patronage in high-end shops. The lifestyles of a big middle class group (e.g. businessmen, civil servants, professionals, merchants) range from country to city living. Usually they earned their wealth from entrepreneurship and the exercise of their profession, being well-educated and successful in business or in the acquisition of properties. They are also well respected in their social circles, and may even continue to go up on the economic and political ladder. The poor people, who have neither wealth nor power (except when used by politicians or vested interest groups for mass action, particularly in urban areas), live in the poor sections of the cities, but mainly in the rural areas.

2.2.3 Administrative and social organization

The country is administratively divided into 17 regions, 79 provinces, 67 cities, 1,539 towns or municipalities, and 41,296 *barangays*; each tier administrating and coordinating the next lower level. Each tier has a specific geo-political coverage of functional operations (i.e. executive, legislative, and judicial) and sectors such as agriculture, health, environment, trade and industry (www.wordiq.com/definition/PI, 22/10/04). The Local Autonomy Act of 1991 has largely decentralized these government functions to the regions, provinces, cities, towns and villages.

With about 40 percent of the people living in the rural areas (UNFPA, 2005), the Philippines still has a sizeable rural population, with enclaves of highly urbanized populations living in the metropolis, smaller cities, and urbanized towns. The new cities and towns in the provinces are rurban in character, depicting to some degree the character (i.e. business, commerce and trade, higher education) and lifestyles of the urban areas, but having agriculture as the main land use and source of employment, though not necessarily main income. They are usually well-linked to a metropolis via improved land or sea routes.

In the rural setting, Filipinos live in the barangays. The barangay has its beginning in pre-Hispanic time, which was then the basic geo-political unit of tribal society, and is akin to the prototype of an Asian village. The present barangay government then evolved from this indigenous social and political unit through adaptations made during the Spanish and American regimes (Nurge, 1965). In contemporary times, it has retained the same character of a basic geo-political unit but now a number of barangays are administratively clustered to constitute a town, instead of mainly a tribal community or society. A barangay is divided into *puroks* or *sitios* (i.e. neighbourhoods), clusters of 15 to 30 households or families organized in block(s) of streets, or a section of the upland or mountain terrain. A *barangay* can range from 100 to 800 households. Normally, a *barangay* is complete with an elementary school, a few *sari-sari* stores (small retail stores), a small Roman Catholic chapel, and its own administrative building with a small health centre. Bigger or central trading *barangays* have their own marketplace, private rice or corn mills, warehouses, fuel depot, small service amenities, and improvised cockpits (i.e. for cockfighting). A big *barangay* that is strategically located can even be a parish; the smallest coverage unit in the hierarchy of the Roman Catholic Church. Several parishes make up a vicariate. Bigger churches are found in the towns (the bigger parish, vicariate or diocesan centre) and have a rectory where priests reside. Religion is an important part of life, especially in the rural areas where religion easily meshes up with the social and political lives of the people.

Towns are the administrative, social, economic and political centres. They range from the fifth to the first class depending on the level of income and presence of amenities. The first class has a total annual income of at least 233,000 USD. The population ranges from 20,000 to 100,000 people with the presence of several wholesale and retail stores, a few banks, some small or medium industry and other business establishments, education at least up to the secondary level, a daily or weekly marketplace, a hospital or small clinic, fuel depots, and bigger cockpits. Most landowners, middle-class businessmen and professionals live or maintain homes in the municipality. All towns and most *barangays* are serviced by cooperative electricity and water systems.

2.3 Population

2.3.1 Basic statistics

As of mid-2004, the population has reached 86 million growing at a rate of 1.88 percent, a substantial reduction from the previous 2.5 percent level in 1985 (55 million), and the more than 3 percent level in the 1960's. Life expectancy has gone up to 69.6 years on average: 72.6 years for females and 66.7 years for males. The sex ratio for the age groups up to 65 is just about 100, but tends to be a bit lower for the age groups of 65 and above, due to higher life expectancy of females. Population density has gone to a high 289 person per square kilometre from 182 in 1985 (NSCB, 2004).

The country has a relatively young population with a median age of 22.1 years: 21.6 years for male and 22.6 years for female. Those 65 years and above constitute about 4 percent of the population; 15-64 years, 60.2 percent; below 14 years, 35.8 percent. The total fertility rate is 3.22 children per woman. Infant mortality rate on the average is 24.2 deaths per 1,000 live births. Male deaths are higher than female deaths (i.e. 27.1 > 21.2 per 1000 live births, respectively). A relatively high population growth and a young population have required the doubling in housing, schools, and health facilities every twenty-nine years (NSCB, 2004).

2.3.2 The migrant population: economic and social implications

Other than the pure desire for adventure and making good use of opportunities offered, the economic depression that started in the late 1960's mainly spurred many Filipinos to move out from the rural areas, or out of the country, to seek for productive employment.

Local migration took place in two waves: the flow from rural areas to capital region cities, and the influx to Mindanao. Migration from the villages to the capital cities had put heavy pressure on Manila which posted the population growth at 3.6 percent in the 1980's, up from its internal growth of only 1.9 percent. Quezon and Caloocan cities, now part of Metro Manila, grew at 4.0 and 3.5 percent, respectively for the same reason. This made a quarter of Manila residents a squatter (Dolan, 1991); a situation no better today with the continuous influx of younger people from the rural areas.

Another wave was the migration of agricultural workers and farmers to the Mindanao frontier in the south, which resulted in a reduced average population-land ratio of 0.5 ha per farmer in the 1980's from about 1.0 ha in the 1950's. Half of the twelve (i.e. Sulu, South Cotabato, Misamis Oriental, Surigao del Norte, Agusan del Norte and Sur) fastest growing provinces then were in northern, western and southern Mindanao, growing at the rate of 5-10 percent. Low incomes due to low farm productivity and lack or absence of economic opportunities especially in the poorer Visayas areas forced this wave of migration to the fertile farmlands and employment opportunities in Mindanao, also known as the land of promise. The erratic world prices of copra and abaca, low production due unstable weather conditions (i.e. yearly typhoons, El Niño and La Niña, 1983, 1987-88), and low productivity due to declining fertility with minimal inputs in food crops, brought low and unstable incomes to most farmers in the Visayas. By the 1980s, Mindanao became less promising due to the rising insurgency especially in the southern regions, and the decreasing land availability to new migrants.

Migration to other countries offered yet rosier economic opportunities, and was stimulated by the ease that the United States Immigration Law offered in 1965. By 1990, permanent residents in the U.S. with Filipino ancestry surged to more than 1.4 million. In addition, thousands more are deployed every year reaching 652 thousand in 2003. The land-based contract workers are in the Middle East (43.8%), Asian countries (39%), Europe

(5.8%), the Americas (1.7%), and the rest of the world (13.9%) (http://www.nscb.gov.ph/secstat/d_labor.asp, 9-20-2005).

Over the years, they constitute waves of professionals (e.g. doctors, nurses, engineers, teachers, consultants), skilled workers (e.g. nautical, technical fields, entertainers), and semi-skilled (e.g. domestic workers) workers who migrate to work for a period of time, or settle permanently in foreign lands. There has been an increasing demand for medical workers, caregivers, engineers, teachers and other services in recent years (Camacho, 2003).

The overseas Filipino workers (OFWs) are dubbed as "modern day heroes" because of their significant economic contribution to the country despite the social and emotional pains they suffer when being away from their families for long periods of time. The socio-cultural-psychological milieu by which the migrants work abroad has only recently been subject of formal investigation, e.g. domestic workers in Hongkong (Constable, 2000; Dumont, 2000). The scientific inquiry of the social impacts on families by absentee father, mother, or both has been very limited. Accounts of family breakdowns and children truancy have been the subject of radio dramas, media, counselling clinics, and day-to-day stories. The migrants' positive role in a transition economy like the Philippines has been well recognized. During the martial law years in the mid-1970 to1980's, when just about every sector of the economy posted negative growth, the country's accounts showed that the remittances from overseas workers annually amounted to about 4 billion USD. Certainly a boost to foreign exchange earnings, these have then helped keep the economy afloat. Remittances increased to about 6-7 billion USD in the late 1990s and early 2000s; and about 10.7 billion USD currently (Camacho, 2003; NSCB, 2004; PDI, 2006).

2.4 The general economy

2.4.1 Economic growth

The Philippines has experienced economic downturns since the 1970's especially after the two rounds of oil shocks (i.e. 1972, 1974), and the political turmoil during the martial law years (1971-1987), which had heavy negative impacts on the economy. After having established a new government by People Power in 1986, the country slowly regained signs of growth with continued restructuring of its socio-economic and political systems. Gross domestic product (GDP) bounced back from a -7.3 percent real growth rate in 1985 to 3.0 percent, 4.7 percent and 4.4 percent in 1990, 1995 and 2000-2002; but suffered drawbacks in 1998 (-0.6%) and 2001 (-0.25%) following heavy losses in agriculture growth due to El Niño and political turmoil, respectively. Industrial production growth rate also showed signs of recovery growing at 3.7 percent by the end of the 1990's (NSCB, 2004).

In 1990, real gross national product (GNP) grew annually only 1.8 percent on the average, which was less than the 2.5 percent population increase. The 314.1 USD per capita GNP was below the 1978 level, and

approximately 50 percent of the population lived below the poverty line. Despite the downward trend of the global market and the impact brought about by the El Niño and La Niña phenomena, the Philippine economy showed considerable gains as reflected in the per capita Gross National Product (GNP) from 314.1 USD in 1990 to 969.8 USD in 2002. The country's gross domestic product (GDP) per capita also showed a steady rise from 315.6 USD in 1990 to 909.4 USD in 2002. Take note that the GNP and GDP per capita before the 1987 People Power revolution were only about 60 percent of the 1990 figures (see Table 2.1; NSCB, 2004).

Despite having been less severely affected by the Asian financial crisis in 1998 than its neighbours due to the remittances of about 6 billion USD from overseas workers at the time, the country's GDP declined by 0.6 percent in 1998; but increased by 2.4 percent in 1999, and 4.4 percent in 2000. It slowed to 3.2 percent in 2001 due to the global economic recession, decreased exports, and domestic economy decline arising from political and security factors. GDP growth accelerated to 4.4 percent in 2002, 4.5 percent in 2003, showing signs of a revitalizing economy, continued resilience of the service sector, gains in industrial output, and improved exports. The total GDP purchasing power parity (PPP) posted at 390.7 billion USD and GDP per capita (PPP) at 4,600 USD (NSCB, 2004).

The 1985 unemployment rate of 7.1 percent peaked at 10.2 percent in 2002. The underemployment rate, particularly acute among the poor, less-educated, and elderly people, was approximately twice that of unemployment (NSCB, 2004).

Despite gains in the agriculture sector performance after the 1986 People's Power revolution, still a volatile growth characterizes this sector due to the combined effect of natural conditions and the sensitivity of the traditional export commodities (e.g. copra, sugar) to fluctuating world prices. A fluctuating trend in the volume of agricultural exports was observed from 1994 to 1999; an increasing trend in 1994 to 1996; and a downward trend in 1997 to 1999. Agricultural share in the country's international trade was about 8.6 percent, while agricultural exports vis-à-vis total exports accounted for only less than 10 percent in 1997; the lowest in the 1995-1999 period (Department of Agriculture, 1999). The country's food import trade is 4 percent of total imports while food export trade is about 6 percent, excluding the non-food commodities such as fertilizer and animal feeds. In 1998, even with the total phase out of the provision of food commodities for feeding operations under the US PL 480 Title II program, the country received 11,048 tons of wheat and wheat flour as cereal food aid, which is about 2.6 percent of the total imports of the country. The current database for indices of food production used only selected food commodities with a baseline production of 1988. For 1996-98, the food production index is at 116.8 and the food production index per capita is 99.1 (Department of Agriculture, 1999).

Table 2.1 Selected Philippine socio-economic indicators, 1985-2002

Indicators	1985	1990	1995	1998	1999	2000	2001	2002
Population (in millions)	54.7	62.0	70.3	75.2	76.8	78.4	80.1	81.8
Population density, (per sq. km.)	182	207	234	251	256	261	267	273
Population, annual growth, %	2.5	3.2	2.4	2.2	2.2	2.1	2.1	2.1
Unemployment rate	7.1	8.1	8.4	9.6	9.6	10.1	9.8	10.2
Total employed (in millions)	19.8	22.5	25.7	28.3	27.8	27.8	30.1	30.2
Employment in agriculture, %	49.0	45.2	44.1	39.9	37.8	37.4	37.4	37.4
GDP[a] (Bn USD)	10.4	13.1	14.6	16.1	16.7	17.7	18.2	19.0
GDP growth rate	-7.3	3.0.	4.7	-0.6	3.4	4.4	3.0	4.4
Agriculture	-1.9	0.5	0.9	-6.4	6.5	3.4	3.7	3.3
Industry	-15.7	2.6	6.7	-2.1	0.9	4.9	0.9	3.7
Services	-2.1	4.9	5.0	3.5	4.0	4.4	4.3	5.4
Agriculture share in GDP, %	24.6	22.3	21.5	19.5	20.1	19.8	19.9	19.7
GNP[a] (Bn USD)	10.0	13.0	15.0	17.0	17.6	18.8	19.5	20.4
GDP per capita*	190.2	315.6	493.1	644.7	704.9	794.3	849.9	909.4
GNP per capita*	183.4	314.1	506.7	677.8	742.6	844.3	906.6	969.8

Source: Key economic indicators, Philippines, NCSB 2004

[a] Annual estimates in billions USD are based at 1985 constant prices. For presentation, the estimates are converted using 1 USD/ 55 PHP. Not adjusted to purchasing power parity.

** Actual estimates at current market prices. For presentation, estimates converted using 1 USD/ 55 PHP*

2.4.2 Poverty situation

The government's concern about poverty became more focused after the People's Power Revolution (1986) as stated in the 1987-1992 Medium-Term Plan of the Aquino administration. The succeeding Ramos administration heightened the attention by organizing a series of multi-sectoral "summits" (1993-1995) which included the Anti-Poverty Summit in 1995. These culminated in the formulation of the Social Reform Agenda (1996) and the enactment of the Social Reform and Poverty Alleviation Act in 1998 (Republic Act 8425); all geared to the vision of improving the quality of life

of the ordinary Filipino (Monsod, 1999). Parallel to these government initiatives, four major poverty studies were undertaken which investigated the nature, causes, measurements, and protocols to describe concretely the poverty status of the country. Policy measures and strategic action recommendations were elicited to reduce poverty (Balisacan and Fujisaki, 1999).

These studies provide a composite human face of poor households in rural areas (ca. 65-70% of households), where people are engaged mostly in agriculture and in three or more income-earning activities, though largely underemployed. They usually comprise the lowland small owner-cultivators, landless farm workers, tenants and leaseholders; upland farmers on steeply sloped areas; and small fishermen. The incidence of poverty is still particularly high among the landless farm workers cultivating small plots with sugarcane, rice, corn and coconut. Poor households have a larger than average family size, are male-headed, and the household head is younger than fifty years old. The poor have little or no schooling (72% of the poor having primary education as highest education). The rural poor have very limited access to good land, modern technology, inputs, non-farm income-earning opportunities, clean water supply and social services. They also have little access to the formal labour market, yet figure higher labour force participation than the rest of the people. This can be gleaned from the fact that 67 percent of the males and 75 percent of the females are either self-employed or unpaid family workers. Regions mostly visited by typhoons tend to have a high incidence of poverty like the Eastern Visayas and the Bicol regions. Usually, the poor living in urban areas get their incomes from agriculture, construction work or transport. As a single source of income, many of the urban poor are engaged more in agriculture (i.e. seasonal employment, or peri-urban agriculture) than in construction work or transport. So, in both the rural and the urban areas, the poor are associated with agriculture (Monsod and Monsod, 1999; World Bank, 1995).

A common and easily understood measure of poverty is that of defining a poverty threshold, which consists of the minimum kilocalorie nutritional requirement plus the minimum non-food basic needs for a household of six. This threshold varies across the different regions because of the different food menus and their respective prices. Based on this, population below poverty line decreased to 40 percent in 2001, and down to 28.4 percent in the first quarter of 2004. However, on the average the Gini index continues to deteriorate from 0.447 in 1985 to 0.48 in 2004, which is just about the 0.49 level in 1960. This shows clearly that the benefits of growth have not trickled down to the lower income people, and widens the gap instead. The Gini index[1] for landholding has gone up from 0.53 in 1960 to 0.59 in the 1990's reflecting inequality in landholdings (NSCB: 2004). With land being an important factor

[1] Gini index or coefficient is a measure of inequality of distribution (e.g. income, land) with values ranging from 0 to 1, indicating perfect equality and perfect inequality, respectively. It is derived from the Lorenz curve which graphs the percentage share of income or land against the percentage share of the population (Calhoun, C. 2002).

in agriculture, this also reflects a worsening situation in farming and inequities among rural households.

There is strong reason to believe that this inequity is caused to a large extent by the rural poor since they contribute 65-70 percent to poverty. Also, about 60 percent of the rural poor are landless farming households who are subsistence farmers, landless workers and fisher folks living in less favoured environments. Twenty-nine percent are owner-cultivators, earning meagre incomes; only about 11 percent are above subsistent and non-cultivating landowners. The Visayas, Bicol and Southern Tagalog regions have high proportions of poor households, ranging from 40-50 percent (Putzel, 1992; Virtucio, 1994; NSCB, 2004).

2.5 Agriculture

2.5.1 Size of agricultural land and farms

Of the 30-million hectares of land area, 14.1 million hectares (47%) are used for agriculture. Ninety-three percent of alienable and disposable lands (amounting to 13 million ha.) are classified as agricultural. Food grains (i.e. rice, corn) are grown in 4 million ha. (31%); other food crops (i.e. rootcrops, vegetables, legumes, fruits, coconut, sugarcane, coffee) in 6.8 million ha. (52%); and non-food crops (i.e. abaca, tobacco, rubber, cotton, cut flowers) in 2.2 million ha. (17%). The developed prime farm lands are usually located around urban and high population density areas. Smallholder farming is common, where the average landholding is about two hectares which are owned, tenanted or simply worked on by households ranging from subsistence to market-oriented, partially or fully (Department of Agriculture, 1999). Irrigated land is estimated at 15,500 sq km (Dolan, 1991). In 2001-2003, about 1.39 million hectares were irrigated which were just about 44.3 percent to total potential irrigable area (http://bas.gov.ph/accntsindicator.php 14-02-2005).

Population growth reduced the amount of arable land per person employed in agriculture from about one hectare during the 1950s to about 0.5 ha. in mid-1980s, and to 0.12 ha. in 2003. Mindanao, which has a higher than average land per capita (i.e. ca. 3 ha), is a lagging frontier due to social unrest. Agricultural output growth came more from intensification (e.g. mixed or multi-cropping, sequential or seasonal rotation) and, to a variable degree, increasing yields.

2.5.2 Agriculture share and growth

The performance of the agriculture sector has been uneven just as agriculture policies vacillated over time. Currently, the agriculture sector accounts for about 20 percent of the country's GDP, down from about 30 percent in the 1980s. For a decade, the sector's share to total economy did not change significantly despite the policy thrust of agro-industrialization; recording instead a decrease from 24.6 percent in 1985 to about 19.7 percent in 2002. About 35 percent of the population are dependent on agriculture and about

37.4 percent are employed in the sector showing a declining trend in employment from 49 percent in 1985 (NSCB, 2004; http://bas.gov.ph/accntsindicator.php 14-02-2005). This trend tends to follow the usual growth pattern of economic growth where the relative contribution to the economy of the agricultural sector, in terms of output and employment, becomes less important.

Over the years, agricultural lands have become degraded due to their misuse, abuse and investment inadequacies. Forests were over cut seriously in the 1960's (Scholz, 1986). About 60 percent of the primary forest (>10 million hectares) disappeared from 1938 to 1990, with deforestation continuing at the rate of about 100,000 hectares per year. Also, upland farmers extended farming to the forests in ways that led to high rates of erosion. Similar destruction has occurred in coastal areas with almost 70 percent of mangrove forests destroyed since 1918 (about 300,000 hectares), through over-harvesting for fuel wood, at times replaced by fish ponds. The continued extraction and degradation of natural resources in rural areas have been quite severe (World Bank, 1995). These limited the opportunities of the small farmers and fisher folks who had to encroach on some of the forest due to dwindling arable land per capita. This remains a continuing challenge as poverty is largely associated with the rural areas and farming. This vulnerability equation of the rural and small farm households could be reflected in their food insecurity.

In the past decade, the agriculture sector showed signs of recovery due largely to the gains resulting from the policy reforms started by the Aquino government in 1986. The growth rate of gross value added ranged from 2.0 to 6.6 percent with some substantial drawback in 1998 (-6.6%) because of severe drought that ravaged the country during 1997-1998. The reduced growth rates were contributed mainly by the crops sub-sector, largely from reduced production of the cereals, coconut and sugarcane. The peak growth rate in 1999 was attributed to relatively good weather conditions, availability and use of better seeds in the crop sector, and the continuing uptrend in the production of livestock, poultry and eggs, and fishery (see Table 2.2).

The agriculture sector consists of the crops, livestock, poultry and dairy, and fishery sub-sectors, which share an estimated 55, 12, 10 and 13 percent of agriculture output for the period 1993 to 2002. The rest is contributed by related services. Major crops such as rice, corn, coconut, sugarcane, banana and pineapple among others have always been vulnerable to extreme weather conditions. From 1993-2002, the crops sector grew only by about 1.2 percent annually in production mainly due to spells of incentives from low-price periods. The commercial crops such as corn, coffee, certain vegetables and spices (e.g. onion, tomato, eggplant, mungbean, cassava) suffered in severe drought (i.e. El Niño)[2] and floods (i.e. La Niña)[2] in the 1997-1998 growing seasons. Coconut and sugarcane also suffered setbacks from climatic causes

[2] El Niño and La Niña are extreme climatic conditions marked by severe drought and very heavy rainfall, respectively.

(e.g. flood in central Luzon reduced sugar production, drought affected coconut yields) and because of weather conditions in their respective areas.

Table 2.2 Agricultural production and gross value added growth rate in the Philippines, 1993-2002

Volume of production (in million MT)	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
CROPS	65.8	68.5	62.2	69.1	68.3	57.9	67.2	68.1	73.1	72.7
A. Cereals										
Rice	9.4	10.5	10.5	11.3	11.3	8.6	11.8	12.4	13.0	13.3
Corn	4.8	4.5	4.13	4.15	4.3	3.8	4.6	4.5	4.5	4.3
B. Major Crops	11.3	11.2	12.2	11.4	12.1	11.6	10.5	13.0	13.2	13.7
Coconut	22.9	24.7	17.8	23.1	22.3	17.3	22.9	24.5	28.5	27.2
Sugarcane	17.3	17.6	17.5	19.2	18.3	17.3	17.4	13.7	13.9	14.2
Other crops										
LIVESTOCK	1.5	1.5	1.6	1.7	1.8	1.9	1.9	2.0	2.0	2.1
POULTRY	0.7	0.8	0.8	0.9	1.0	1.0	1.2	1.0	1.2	1.2
EGGS	0.2	0.2	0.2	0.3	0.3	0.3	0.5	0.3	0.3	0.3
FISHERY	2.6	2.7	2.8	2.8	2.8	2.8	2.9	3.0	3.2	3.4
Growth Rate Gross Value Added GVA(%)	2.6	3.0	1.7	3.5	2.9	-6.6	6.2	3.5	4.0	3.7

Source: Bureau of Agricultural Statistics and NSCB Yearbook, Philippines, 1998; http://www.da.gov.ph/performance/1996-2002/main.html 14-02-2005

Some corn lands in the Visayas and Mindanao regions were shifted to the cultivation of drought-tolerant crops like cassava, the latter having increased industrial demand for alcohol. Abaca suffered reductions in yield and area due to pest and disease. The livestock (i.e. carabao, cattle, hog, goat), poultry and dairy (i.e. chicken and duck industries), reflected significant gains with a growth rate of about 5.0, 7.8, and 3.2 percent on the average, respectively. The fishery sub-sector (i.e. commercial, municipal, aquaculture) was able to recover from a negative growth (-2.7%) in 1995-1996 period to some 6-7 percent in recent years, which were attributed to the expansion of inland fishery and increased production of seaweeds (http://www.da.gov.ph/ performance/ 1996-200214-02-2005).

The agriculture sector showed signs of resilience amidst pro-industry policy-biases (especially in the post-war years to the 1970s), and extreme

climatic conditions. Growth, however, had been largely contributed by the commercial sector in all the sub-sectors. For example in Table 2.3, the crop yields varied widely between relatively bigger farms (i.e. with the medium to high input), and small farms (i.e. the semi-commercial and subsistent). Similar patterns are found in the livestock, poultry and fishery sub-sectors, where rural backyard raisers and small fisher folks produce mainly for home consumption or social purposes. The ubiquitous backyard pig raising is mainly a form of piggy-bank to rural people: a kind of buffer for some future social event (e.g. fiesta, birthday, wedding) or for bad times, rather than a profit-oriented venture.

Table 2.3 Estimated crop yields (in tons per hectare) for selected crops by medium- high input and subsistent farms

Farm type	Rice	Corn	Coco-nut	Abaca	Cassava	Sweet-potato	Potato
Medium-high input	4-5	5-7	2.5-4.0	0.8-1.2	20-60	15-30	20-30
Semi-comm'l/ subsistent	<2	<3	0.5-<1.0	<0.5	15 or less	10 or less	<10
National average	2.8	3.0	1.0	0.6-0.8	8	4.5	10

Source: Department of Agriculture, 2004; Philippine Rootcrop Research and Training Center, cassava and sweetpotato reports, 1990s

2.5.3 Land tenure and tenancy

The high concentration of land ownership in a few families is a remnant of the feudalistic *encomienda* system during the three-century Spanish regime (1521-1898). During this period, the village chiefs were granted vast tracts of land making them the landed nobility. This wielded local socio-political authority in addition to the high economic status of the few landowners. Most of the landless rural people became the tenants who tilled the *haciendas (i.e*. large farms) in such an arrangement that tended to perpetuate widening the wealth gap between the landowning class and the tenants. The former elite left the rural areas to live in the urban centres and became absentee landlords, leaving the management of the *hacienda* in the hands of local overseers. The non-interventionist American regime (1898-1941) did not alter this system of property ownership and land tenure arrangements (Dolan, 1991). Thus, the economic, geographic and socio-cultural separation between the elite and the increasing numbers of tenant-cultivators continued.

After end of the Japanese occupation (1941-1945), the American-based Philippine political system then became dominated by the landowning elite who had the resources and power to win elections. This established a hard core landlord-tenant relationship. In the early years after independence, the

government encouraged the people to establish homesteads in the vast frontier lands in Mindanao, which spread Christian settlers throughout the southeast, central and northern parts; to a smaller extent in the south and southwest Muslim-dominated areas. Throughout the country, several presidential terms launched land reform programs to enhance agricultural and rural development, promote equity and maintain social stability in the countryside. Poor design, lack of sustained political will as well as landlord resistance, severely limited the impact of various initiatives. The different regions had their distinct arrangements and different distribution of tenants and small owner-cultivators. But the sharecropper system was the most common arrangement, particularly in the rice-growing areas of Central Luzon and the Visayan regions. In this system, landowners supplied the seed and cash needed to tide farmers over during the planting season, while the farmers provided labour, tools, work animals, and, at times, a portion of the production expense. Usually, owner and sharecropper each took one-half of the harvest after the former deducted expenses. But farmers were usually deeply indebted due to the advances made by the landowner which often had hidden high interest rates. This created a class of serfs wherein debts are inherited over generations. The tenancy terms are unwritten and to the advantage of landowners (Dolan, 1991).

Foremost among the land reform programs was that of President Marcos' in 1972 and President Aquino's Comprehensive Agrarian Reform Program (CARP) also known as Republic Act 6687. One of Marcos' initial moves in martial law was to declare the whole country as land reform area through Presidential Decree No. 27. Applied only to rice and corn lands, it was quite comprehensive, providing for only seven-hectare retention, and parcelling out three hectares to individual tenants who would pay-off the value of the land over a fifteen-year period. This succeeded in breaking down many haciendas in the Central Luzon region. But at the end of his term, only 20 percent of rice and corn lands were covered; and only 6 percent of farming households received a certificate of land transfer (Dolan, 1991; Aldaba, 1997).

President Aquino's banner campaign and priority program brought the passage of the CARP which covered more than 80 percent of cultivated land and 65 percent of farming households in a phased process. Landlords claimed it went too far and peasants said it did not go far enough. With details left to the legislative body to work out, it was doomed to fail. Congress, the legislative body concerned, was filled with scions of the land-owning political dynasties. The final version, passed in June 1988, provided for a five-hectare retention limit plus three hectares for each heir at least fifteen years of age. The phased program allowed for the gradual decrease of land retention, and the option of a non-land-transfer profit-sharing scheme instead of actual land transfer. With the latter, large landowners can transfer a part of the corporative estate's total assets equivalent in value to its land assets, as an alternative to the land transfer to tenants and farm workers. This stock-ownership option is open for adoption by the big landlords and agro-corporations and has been criticized by the proponents of effective land transfer (Dolan, 1991; Aldaba, 1997).

The provisions of CARP itself are complex and allow loopholes. Its implementation has been difficult. To date, targets have not been met due to inadequacy of resources and personnel, and complexity of administration partly because of logistic difficulties arising from the devolution of sectoral functions to local government (e.g. agriculture, environment and natural resources, health), as well as complicated procedures. Redistribution lagged most with large estates and plantation crops (e.g. sugarcane, coconut) where land inequity is worst. What remains of the budget is only 5 percent of what is required to accomplish implementation (Aldaba, 1997; Gono, 1997). The tenancy situation still persists in the study villages and has serious implications for access to resources, motivation and productivity.

2.6 The Situation in the Research Region: Leyte Province in Region VIII

For three main reasons, Region VIII and Leyte were purposively selected as the research region and province. The first reason relates to poverty incidence since food insecurity is strongly associated with poverty. Both have a poverty incidence higher than the national average. Secondly, with Leyte in particular, it is home to diverse types of fragile areas ranging from the flood-prone plains (but moisture-deficient in some parts of the year), to the eroded uplands, and highlands which are exposed to wind and water erosion. Without sacrificing representativeness, the selection of study villages near to the institutional base proved convenient given the usual limitations of a PhD research. Thirdly, Leyte is home to the Leyte State University, LSU (formerly Visayas State College of Agriculture, or ViSCA), which is the zonal agricultural university of the Visayan regions also serving Mindanao. Based here are two national agricultural research centres (i.e. rootcrops and abaca) and four regional research centres (i.e. coconut, carabao, social research, farming systems) which collaborate with local and international agencies to address the challenges of rural development, poverty, and livelihood development through the knowledge, communications and innovations sciences, as well as diffusion programs. Any developmental outgrowth from this research could be facilitated through these agencies.

2.6.1 Location

Research was conducted in two *barangays* in Leyte, one of the provinces of Region VIII or Eastern Visayas, a group of island provinces located in central Philippines (see Figure 2.1, in box). The region is the fourth largest in terms of land area: 21,432 sq. km., which is 7.1 percent of the country's total. It lies in the mid-eastern border of the archipelago with its two main islands, Leyte and Samar, connected by San Juanico Bridge. This bridge is part of the Maharlika highway which connects Luzon and Mindanao.

Leyte is the largest of the six provinces in the region with an area of 5,713 sq. km (see Figure 2.1, shaded area). It is situated southwest and

northeast of the provinces of Samar and Bohol, respectively. To the east is Leyte Gulf and to the west spread Ormoc Bay and the Visayas Sea. In history it is remembered as the site where the Americans liberated the Philippines from the three-year Japanese occupation during World War II. The American troops led by General Douglas McArthur and Commonwealth President Sergio Osmeña landed in Palo, Leyte on October 20, 1944. Its pyrrhic victory led to Philippine independence in 1945.

2.6.2 The Leyte province: a brief

Leyte was where the Spanish colonizers first met the natives of the Philippines. In one of the islands, Limasawa, the first seed of Christianity was sown with the first mass celebrated on 31 March, 1521. A blood compact was done two days earlier with Rajah Kolambu, the head of a tribal community. The Spanish navigator, Ruy Lopez de Villalobos, named Leyte "Felipina" after Prince Felipe of Spain in 1543. As said, this name was later applied to the whole archipelago, and became "Filipinas".

Leyte was first placed under the jurisdiction of Cebu which the Spaniards considered to be more central and strategic. Only in 1735 was Leyte made a separate politico-military province with the whole island of Samar under it. Samar became a separate province later, in 1768. Under the American regime, Leyte was formally created as a province on 10 March, 1917. May 22nd 1959, the southern part became a separate province, Southern Leyte (http://home.online.no/~erfalch/leyteprovincea.htm 23-2-2005).

2.6.3 Ethnicity, society and culture

The Central Cordillera mountain range which runs from north to south of the archipelago divides the island of Leyte into the Leyte valley to the east, and the Ormoc valley to the west. This helped fashioning the settlement in the island, and naturally can explain the east-west ethno-linguistic differences. The eastern valley was settled by the Waray-waray groups from the sister province of Samar; the west from the neighbouring province of Cebu; and the southwest part mostly by settlers from nearby Bohol island. Thus, the current people in eastern Leyte speak the Waray-waray dialect; central west to northwest, Cebuano; and the southern part, a Cebuano-Boholano mix. Although these dialects are related and form part of the whole Visayan language, the variations in tone, and differences in a letter or word can be quite distinct.

Contrary to what many uninitiated would know, Leyte, as the rest of the country, was inhabited by various tribal communities, with their own laws, tradition and culture long before the Spanish conquest. The coastal communities (e.g. Dulag, one of the research village sites) had long been trading with China, Siam (now Thailand), and Vietnam. Archaeological research in many places yielded artefacts (e.g. porcelains, iron vases, fabrics) that can be traced back to the Ming Dynasty (13th-17th centuries). The unearthing of human skeletal remains in large earthenware jars proved that jar-

burial was long practiced in the area. Agriculture was a thriving livelihood with products such as coconut, mats, betel nuts, cattle, fowl and hogs used for barter trade. Rare shells were also important barter goods. Metal smelting and small shipbuilding (i.e. small boats used by fishermen) were also common activities (Justimbaste, 2004).

Settlements called *barangays* (numbering 30 to 100 families) thrived along the coastal strips, and gravitated around a central settlement which later became *municipios* or towns during the Spanish time. But the pre-Spanish villages were usually much bigger in area compared to today's standard. One of bigger villages, for example, consisted of the five present-day towns south of Baybay (i.e. the other research site). Each *barangay* existed independently of each other and was headed by a *datu,* whoever was most powerful. Each had an armed camp ready for any hostility, robbery, or other aggressive acts. Villages were formed in mutual assistance to align themselves in joint defence against hostile outsiders. There were no formal tribal agreements but blood compacts were common to signify friendship and alliance (Justimbaste, 2004).

The tribal society had three social classes which were usually hereditary. The nobles consisted of the chieftain, or *datus* or *rajahs* and their families. Nobility was handed down through generations, which were gained at first either by wealth, power or sheer industry or wisdom. They were the privileged class with a high society status, though some were abusive and cruel to the lower classes. The *datu* ruled the community who exercised all governmental responsibilities: ruler, lawmaker and judge rolled into one. Leyte did not have a tyrannical *datu* but tribal wars were not uncommon. A slave could become a *datu* through cunning, bravery and wisdom (e.g. Datu Malakala of Hilongos, Leyte). The natives treated the *datu* with respect, and were usually ready to pay homage and service. Then there was the freeman or *timawa,* who was born to freedom or conquered freedom from slavery through hard work or by rendering commendable service to the *datus*, especially by serving the armed force and fighting their battles. The slaves were of two types: the *mamalay* and the *halom.* The *mamalays* were like unpaid hired helpers who worked part-time, lived in their own homes and obliged to do domestic work in their masters' homes. They also included landless farm workers. The *haloms* lived harsher conditions and disposed at the masters' will; even killed with the master as tradition dictated. The most common cause of slavery was indebtedness, which never really got paid, because any small offense (e.g not observing silence for the dead, passing in front of a bathing noble woman, not liking to fight for the master) of the slave was a cause for further enslavement. And some masters were cruel as the number of slaves indicated wealth. In these pre-Spanish times, people lived the ordinary business of life as tradition and local cultural norms dictated, and as to the rules that the *datu* imposed (Schwarz, 2002; Justimbaste, 2004).

The Spanish rule changed greatly the socio-political system in Leyte as was true with the rest of the country. The Church and state were not separate and the responsibility for the conversion of the natives to Christianity was assigned to different mission groups The Spanish missionaries (e.g. Jesuits,

Agustinians, Franciscans) in fact influenced the location of town centers according to where they established parishes with the big churches built of masonry. For example, the capital of Leyte at first was the town of Carigara, the first stronghold of the Jesuits in the north. Tacloban later became the capital because of its strategic location. (Schwarz, 2002).

Local governance evolved from the traditional village organization, which co-opted the local leaders and created a system of indirect rule. This created the upper class known as the *principalia* (i.e. the principal ones) who had wealth and prestige, and were conferred titles as members. They received privileges such as appointment to local offices and tax exemption. This class was more influential than the pre-conquest nobles and preceded the system of oligarchy. An important legacy was the changed concept of communal ownership of land to that of private ownership (Justimbaste, 2004).

Trading and intermarriages were most influential in cross-cultural mixes across the islands which were inhabited by different ethno-linguistic groups. The divisions by high mountains and seas could explain the existence of these distinct groupings in pre-Hispanic times. During the Spanish era, and hastened during the American regime, western ideas of economic growth and social mobility made people move to various places to trade, search for better employment, or settle elsewhere because of marriage. The earlier movements and settlements to Leyte from neighbouring provinces or islands were based on geographical proximity. Thus, people from Samar of the Waray-waray ethno-linguistic group came to settle in the eastern areas; Cebuanos and Boholanos to the western side of the island.

The oldest people in the village research sites could tell stories which were echoed through generations, of how rigid the social structure was during the Spanish times, and how such standards as practised by their great grandparents were carried over in their youth. Foremost was the rigid puritan morale among Christians, the strict prayer times at dawn and the evening Angelus in Latin. One of the lasting impacts was among women and children who were more docile to such practices. Accordingly, women were trained to be good mothers and wives, and thus, responsible to keep the home properly organized. This called for the woman to take charge of domestic affairs: house order, food, care of children and husbands. Men were the main breadwinners, the main farmhand, and leaders of the community. There could have been distinctions in sub-cultures among the different pre-Hispanic tribal societies, as the practice of introduced norms of behaviour varied in some ways among the different ethno-linguistic groups as evidenced in today's contemporary life. For example, the current Waray-waray village folks in Dulag are more traditionalist than the Cebuano-influenced Plaridel villagers; the roles of women and children as they were in the old days are still more apparent among villagers of the former.

The most senior people in the villages could still well recount vivid memories of war atrocities and destruction during the Japanese occupation. In Dulag, which was a stronghold of Japanese occupation in Leyte, not many were positive to the Japanese plan of establishing a coastal "silver city" in the

mid-1990s, of a modern 180-hectare residence-commercial-recreation complex. This did not materialize for lack of interest of the Dulag people to sell their lands. They could also recount the good old days during the American occupation when schooling was encouraged at a high level. Schoolchildren would walk tens of miles, many barefooted, to attend to the nearest school. One who reached sixth grade could already speak the English language quite well, the better ones could even help teach (personal communication: from interviews with older people). Religion and morals were strongly inculcated by the Spaniards; education, by the Americans; and the Japanese reminded them never again to succumb to foreign domination.

2.6.4 Population characteristics

Leyte is the most populous province with 44 percent of the 3.6 million persons in the region, and growing at a rate of 1.6 percent. About 50 percent of women are of the child-bearing age (i.e. 15-49 years). The growth rate is lower than the national average partly because of out-migration, particularly of young adults, to Manila, Cebu, Davao, or outside the country. The median age is nineteen years. Its population density of 279 persons per sq. km. is higher than the regional average. If the current annual growth rate continues, the population of Leyte will double in 62 years. The number of households correspondingly increased to 322,579, which shows an increase of 21,421 households more than in 1995. Household size averaged 4.92 persons, slightly lower than the national average of 5.0. Tacloban City, the provincial capital, shared the largest population in Leyte, contributing 11.22 percent; followed by Ormoc City (9.69 percent), and Baybay (6.01 percent). The least populous was Tunga (0.38 percent). At 2.45 percent, the town of Dulag had the fastest growth rate among the 41 municipalities and 2 cities in Leyte. The municipalities of Baybay and Dulag are about fifty kilometers apart, where the two research villages are part of, respectively.

In 2000, about 56 percent of the population in Leyte belonged to the economically active population (i.e. 15 to 64 yrs). About 40 percent are young dependents (0 to 14 yrs), and about 5 percent old dependents (65 yrs and above). The overall dependency ratio is 80.2, lower than the 1995 ratio of 83.4. For every 100 persons aged 15 to 64 years, 80 are dependents, i.e., 72 young dependents and 8 old dependents. Simple literacy is relatively high for both males and females, about 91 percent; and functional literacy at about 80 percent. Most of those at working age are employed (92.8%), which implies a lower unemployment rate than the national one at 10 percent (see Table 2.3).

Females tend to have higher levels of education. Of the total children, 52 percent completed or attended elementary education; 23 percent, high school; 8 percent, college undergraduates; and 4 percent academic degree holders.

Table 2.4 Selected socio-economic indicators in Leyte, Region VIII and the Philippines, 2000- 2004

Particulars	Philippines	Region 8	Leyte
Total land area (sq. km)	298,170	21,431.7	5,712.8
Population (millions)/2000	81.1 (2004)	3.61	1.59
Population density (per sq. km)/2004	289	173	279
Population growth rate	1.88%	1.49%	1.61%
Literacy rate: simple		90.86%	90.6%
Male/female	93.9 (1994)	89.2/ 92.7	88.9/ 92.3
Functional		79.7%	79.5%
Male/ female	83.8 (1994)	75.7/ 84.2	74.1/ 85.1
Labour force participation rate	66.7	66.5	66.6
Employment rate	88.6	92.8	92.8
Real per capita income (2000)	21,104 Php	12,262 Php	13,267 Php
Poverty threshold per capita/2000	11,605 Php	9,623 Php	9,790 Php
Poverty incidence/2003	28.4	37.8	36.1
Urban (2000)	15.0	19.6	12.6
Rural (2000)	41.4	44.9	47.6
Gross domestic product; 1985 constant prices ('000 Php)	13,475 billion Php	20,653,711 Php	n.a.
Agric/fish/forestry		31.0%	
Industry		34.5%	
Service		34.5%	
GRDP growth rate/ 2003	6.4%	5.2%	n.a.
Human Development Index/2000	0.629	0.549	0.563
Life Expectancy/2000	68.9	66.0	67.6
Functional literacy	83.8	80.3	79.4

Source: National Statistics and Coordination Board; National Economic Development Authority, Region 8.2004; n.a.= not available by province

2.6.5 An overview of the regional economy

Economic growth and quality of life

Gross regional domestic product grew at the rate of 5.2 percent in 2003, doubling 2002 growth largely due to the strong performance of the agriculture, fishery, forestry and services sectors, and the recovery of the industry sector. Generally, 2002-2003 was a good year for agriculture, fishery and forestry sectors due to good weather, adequate rainfall, availability of quality seeds,

fertilizer discounts, expansion of irrigated areas, development of a mariculture zone (i.e. Calbayog city, Samar) and better surveillance of illegal fishing such that GRDP grew at 7.1 percent, almost doubling the previous year.

Industry figured a turnaround from a negative to two percent growth due to the accelerated performance of the manufacturing sub-sector (6.9%) and electricity and water (3.6%). Manufacturing accounts for 20.0 percent of the region's GDP and growth was due mainly to increased activity and revenue in small industries. The services sector decelerated from 8.4 percent in 2002 to 6.3 percent in 2003. The improved growth in the finance, housing and real estate, and private services was countered by the slower growth in government services, trade and transport, communication and storage. The substantial reduction in government budgetary allocation reduced operations and services. The banking sector registered increased assets pushing a 6.6 percent growth.

Table 2.5 Gross Regional Domestic Product growth rates by sector in Eastern Visayas, 2000-2003, at constant prices

Sector	2000-2001	2001-2002	2002-2003
Agriculture, fishery, forestry sector	***4.9***	***3.6***	***7.1***
a. Agriculture and Fishery	5.4	4.9	7.1
b. Forestry	(23.8)	(95.6)	152.8
Industry sector	***(0.7)***	***(4.2)***	***2.0***
a. Mining	(6.1)	17.2	(2.1)
b. Manufacturing	3.2	(0.3)	6.9
c. Construction	(7.2)	(16.8)	(11.2)
d. Electricity and Water	1.4	2.4	3.6
Service sector	***2.2***	***8.4***	***6.3***
a. Transport, Comm., Storage	8.4	9.8	7.8
b. Trade	6.7	8.7	5.3
c. Finance	2.1	2.6	6.6
d. Dwellings & Real Estate	(1.1)	3.7	4.2
e. Private Services	3.7	6.7	6.8
f. Government Services	(1.7)	15.3	8.7
GRDP growth rate	2.0	2.6	5.2

Source: National Statistics Coordination Board, 2004

The level of development of the region and Leyte as indicated by the composite human development index, HDI[3] (0.549 and 0.563, respectively)

[3] The Human Development Index (HDI) is a composite index consisting of three basic dimensions: healthy life (life expectancy at birth), education (adult literacy, combined primary, secondary and tertiary gross enrolment ratio), and decent standard of living (GDP per capita at purchasing power parity in USD). It is a comparative measure of well-being and used by the United Nations

are lower than the national average (0.629) on all three counts: in terms of the real per capita income, life expectancy and functional literacy (see Table 2.3).

Family income and poverty incidence

The average annual income of families in the region was estimated at 1,664 USD in 2000, higher by 35.0 percent than the 1,232 USD in 1997, growing at a rate of 10.5 percent in 1997. Families in the region were reported to have the lowest average annual income in the country. Regional real per capita income is only 58 percent of national average, that of Leyte about 63 percent.

Five out of six provinces of Region VIII, including Leyte, are among the 44 poorest provinces in 2000. Poverty incidence in both the region and the province is about 38 percent, which is higher than the national average of about 28 percent. A disturbing situation is seen in the rural areas with poverty incidence for the region at 44.5 percent; worse still in Leyte at 47.6 percent (NSCB, 2004).

So, in a capsule, taking the national macro-economy as backdrop, the regional meso-economy depicts some respectable growth in all sectors (i.e. agriculture, manufacturing and services) in recent years. Nevertheless, it is disturbing to note that the research area features a human development index that is lower than the national average, a relatively high poverty incidence particularly in the rural areas, and average family incomes lowest in the country. Real per capita income is only about 58 percent of national average even as the employment rate is high at 92.8 percent, a labour force participation rate of 67 percent, and a high literacy rate (simple literacy, 90.8%; functional literacy, about 80%).

Development Programme in its annual Human Development Report. A higher value up to a maximum of 1.0 reflects better development.

Chapter 3
Streams of Ideas and Action on Food Security in the Philippines

Food, health and nutrition have always been important social concerns of the government as evidenced by the early founding of government agencies to address them in the 1940s (NNC, 1995; FNRI, 2004). In the last three decades, the issues received substantial interest from scientists, researchers, and policy makers. How far these concerns have been brought to fruition is another story. To assess the actions and their impact on these concerns is not the objective of this chapter. But a narration of how food security has been perceived and implemented by successive administrations, or investigated by scientists and researchers in the country will help provide a perspective for the rationale, and some of the conclusions and implications of this thesis.

It is understood that food, nutrients and the environment relate in a synergistic way and result in some status of nutrition and health of people. Nutrition, as an abstraction, can only be understood in terms of food. And eating enough food is the main action in order to have adequate nutrients for a healthy body. In the Philippines, the twin goals (and often loosely used terms) of food security and nutrition security, and the public action to achieve these have been fraught with not so straightforward perceptions and interpretation in the scientific, policy, and practical sense. This chapter explores some of the ideas and public initiatives on food security and related concerns.

As elaborated in Chapters 4 and 5, this thesis highlights the three different dimensions of food security: food availability, food access, and food adequacy. Food security being a composite concept of these dimensions is perhaps the reason why it has been misunderstood and loosely analyzed in many cases, particularly in the area of policy. Especially in the Philippine setting where ideas and appropriate action can be muddled up by the sheer politics of policy making and implementation.

3.1 Food security versus food self-sufficiency

In Philippine policies in the past food security has often been equated with food self-sufficiency, particularly of the traditional staples rice and corn. This is evident in the consistently huge research and development budget allocation for rice and in the emphasis on irrigation that could only benefit mostly rice lands. This is understandable since government administrations had to grapple with a fast growing population, which grew yearly at a rate of 3.0-3.2 percent. Consistent with inward-looking policies which various administrations pursued in the past, the State understood that to be able to feed its vast population it is fundamental to respond to the basic human right to live, to be able to have adequate food. In this sense, food self-sufficiency was perceived

largely as the key to food security. The emphasis on self-sufficiency of staples has created lopsided policies and programs, which are biased in favor of calories and disfavor other nutrients. However, food self-sufficiency is more a political goal that does not necessarily lead to food security. The shortsighted and narrow approach complied with politically-motivated policies, making rice a political crop.

Experts agreed that food security and food self-sufficiency are policy objectives which have been erroneously perceived by policymakers in the past. This misinterpretation, with self-sufficiency being the dominant guiding principle, caused conflicting strategies and resulted in ingrained inefficiencies in Philippine agriculture, like rice being continued to be grown in areas where other crops would have been more viable. Contemporary academicians and scientists in the Philippines are clear on this distinction. That food is available and that people have enough income to buy it in adequate amounts, at whichever market it is bought or produced, is what food security is about. Food self-sufficiency simply means adequate own-production of food. Food self-sufficiency is basically a supply issue. Food security recognizes the importance of food production, and of income generation, in order to access the needed nutrients adequately. At the macro level, the latter implies that a country does not have to produce all the food it needs but can procure it in the world market. At the micro level, households are food secure even if they do not produce any or all of their food, but have enough purchasing power to access and afford what is available in the different markets. A country can project national food self-sufficiency though many households cannot meet required nutrients (Cabanilla and Paunlagui, 1999).

The rising criticisms in the nineties on the imbalanced development in agriculture could have brought about the articulation of "food security" in the Agricultural and Fisheries Modernization Act (AFMA). This landmark in legislation defines food security as "the policy objective, plan and strategy of meeting the food requirements of the present and future generations of Filipinos in substantial quantity, ensuring the availability and affordability of food to all, either through local production or importation, or both, based on the country's existing and potential resource endowment and related production advantages, and consistent with the overall national development objectives and policies. However, sufficiency in rice and white corn should be pursued" (DA, AO-2, Republic Act 8435, 1998 Section 4:4). Even then, the ending statement still stipulates for self-sufficiency in the staple foods as Section 2 of the same act provides that the production of these staples be optimized to meet local consumption and should be supported by the state. Despite the sophisticated trappings of the AFMA, if food security were to lose its real context, and policies and associated budgets revert to the old perception, poverty and the accompanying food security problem will persist.

Food (in)security is a concrete indicator of poverty. The risk of going hungry is high for the poor. In this sense, a food security approach is practically useful for government to use in development planning. First, because food security indicators (i.e. food consumption and nutritional status)

could be more meaningful poverty measures than incomes as they can be disaggregated into intra-household distribution and over time, in relation to changes in price and food accessibility. Second, it helps in improving the quality of action-oriented analysis because the relationships and processes of why and what makes people poor and vulnerable, and how to assist them can be facilitated (Huddleston, 1990). This approach as endorsed by the Food and Agriculture Organization (FAO) in addressing rural development and poverty in the 1980s has been embraced by countries and many development organizations. However, this does not make it any easier to address these tasks, particularly in the Philippines which, despite the avowed adoption of food security as both a policy goal and planning strategy, still clings to the food self-sufficiency interpretation.

3.2 Micro-level studies on food, health and nutrition

In the 1970s, interest in the human resource sciences (i.e. food and nutrition, human ecology, economics) was clearly evident in the University of the Philippines System, in the Diliman and Laguna colleges. This was paralleled by the reorganization and revitalization of the mandate given by the government to the current Food and Nutrition Research Institute, which actually evolved a number of times over its postwar predecessors. The latter led to the conduct of the first national nutrition survey in 1978, conducted every 5-6 years thereafter.

Since then, the literature devoted to food, health and nutrition studies in the Philippines have flourished and ranged from the technicalities of food and nutrition research (e.g. RDAs, nutrient composition of foods, food composition tables, food enrichment, nutrient-health relationships) to analysis of the intra-household distribution of food and nutrient in relation to income, time allocation and socio-demographic variables (FNRI, 1970-2003 annual reports). Scientific work focusing on micro-level studies on intra-household analysis of food and nutrient intake is summarized in the following sections. Apparently, while these studies had varying objectives (i.e. from methodological to identifying factors, and defining or measuring relationships), they have proven that a significant number of the population can be malnourished despite an excess in aggregate food supply. Studies also showed that there are differential inadequacies within the household with various nutrients especially the at-risk and vulnerable individuals (i.e. children, pregnant and lactating women).

3.2.1 Evenson *et al*. study

One of the earliest set of studies, spearheaded by the School of Economics of the University of the Philippines, was the Laguna multipurpose survey in the mid-1970's, which built on the 1963 sample of rural households. It aimed to identify and understand the determinants and consequences of household behavior pertaining to fertility, health, poverty, time allocation, and home and

market production. The 1975-76 analysis used the neoclassical economic perspective of the household.

Some findings included a correlation study by Herrera (Evenson *et al.,* 1977) which found that diet quality is positively correlated with income, wealth, mother's education, and that the mother prepares food. But diet quality is inversely related to household size, employment of the mother and distance from the town center. Valenzuela (Evenson *et al.,* 1977) investigated age and sex biases in dietary intake, and regressed the nutrient adequacy ratio (i.e. intake/RDA) with age-sex dummy variables plus interaction variables. There was no sufficient evidence of age-sex biases, but instead it was found that mother's education and time spent on food preparation increase nutrient intake, holding food expenditures constant. This negative food expenditure-time interaction supports the interpretation that nutrients are in some way produced in the household. While Ybañez-Gonzalo (Evenson *et al.,* 1977) studied the derived demand for nutrients, and found that income and wealth are determinants of nutrient intake, but not nutrients per se, due to the influence of food preference.

3.2.2 Folbre study

Using the Laguna survey data, Folbre used the bargaining power perspective in the analysis of income distribution and leisure time within the household, and noted the importance of income flows from the older children to parents. She argued that differences in income flows may be related to differences in wealth, and that decreases in parental wealth relative to children's income reduces the bargaining power of parents with children. She found some evidence of sex-related inequality in the distribution of goods and leisure time within households. Women share more of the time costs in rearing children. Inequality arose from bargaining power variables which tended to influence women's bargaining power. The opportunity cost of time is the most important component of the total cost of children. Non-market household production is quite significant; and the decision to have children depends on how much they are valued (Folbre, 1984)

In the neoclassical sense, the family or household is a historical given with altruistic objectives. The alternative view treats the family as a socially constructed institution that differs between groups and evolves over time. Thus, it is important to go beyond the assumption of altruism and analyze factors affecting the role of men, women and children in household decision-making. While parental authority over young children goes with the benevolent dictator theory of household decision-making, there is significant cross-cultural evidence of adult children having some kind of bargaining power relative to their contribution to household income and wealth. Those living outside are no longer fully within the altruistic power of the household head. As bargaining power of children increases, the power of parents over children decreases. Thus, households need not be exogenous cultural givens as

the household decision-making process could change over time with increased economic power of children (Folbre, 1984).

Sex-related changes in the distribution of goods and leisure time within the household may also affect decisions. Women may opt to spend more time in home production or to work outside the home. There could also be unequal participation in decision-making. The Laguna surveys found men's nutrient intake to be more than the recommended daily allowance (RDA), while that of women, less. But no significant evidence on a age-sex bias was found.

3.2.3 Popkin study

In the mid-1970's, Popkin's thesis centered on the mother's labor force behavior as an important determinant of a young child's health and nutritional status, at a time when there was not much empirical evidence on this complex relationship. The mother's entry into the labor force effectively poses a trade-off between her contribution to household income and her time available for child care. Evidence from two rural areas in the Philippines was that the mother's market employment increased household income and food expenditures, but reduced the health and nutritional status of younger children.

With women as major contributors to direct welfare goods such as health and nutritional status, how productively and efficiently they allocate their labor time (i.e. home and market) are crucial. This is especially true in low income households where direct welfare goods are likely to be more time intensive and the availability of goods/services substitutes (e.g. day care, convenient water) for time are likely to be low. Thus, a lowered family income may force women to work for wages resulting in reduced child welfare. The extent and nature of child welfare decline depends on the trade-off between welfare and economic factors in the household as revealed in how women use time (Popkin, 1975).

There could be interactions between consumption, household size, composition and labor supply. Popkin's model showed a systematic set of relations between household size and composition, consumption and female labor force participation, which reflect interactions between economic and welfare factors. Consumption and household size are related in the sense that the ages and number of children are likely to be important determinants of consumption, that is, both the intensities of time and goods. The time intensity of household production is inversely related to children's age. The younger the child, the higher would be the intensity of mother's time needed (Popkin, 1975).

The Cebu study in Central Philippines included two ecological zones (i.e. coastal and hinterland semi-mountainous; 3 villages each) which represented two major economic and nutritional groups in terms of diet, market access, sanitation, labor markets, etc. Sampling of 100 children of 1-6 years and 50 children 7-16 years brought a sample population of 847 children among 306 sample families.

Coastal households had higher income per capita; higher percentage of mothers working for wages (36% vs. 26%); the latter tending to be significantly higher when households had children aged 7-12 years old. Those with children 0-3 years showed possible trade-off between the mother working and child care.

Market and non-market labor. Garden hours spent by mothers was regressed on father's garden time, and showed that father's garden time went with that of the mother's. For every hour the father spent on the garden, mother spent a little more than half an hour, though it is not clear whether the garden tasks of both were joint or complementary. The study also showed that an additional child aged 7-12 and 13+ years was associated with a decrease in market labor force participation of the mother and an increase in her time for home gardening. With total household size as additional variable, an overall substitution was found between each additional household member and mother's garden time in the coastal area; but the reverse relationship was found in hinterland villages. Such differences could be due to differences in the trade-off between market and non-market consumption (Popkin, 1975).

Food consumption and nutrient intake. A trade-off between own-produced (i.e. in gardens) and market-bought food consumed relative to family composition was most interesting. Hinterland households consumed more garden food annually than coastal households (i.e. ca. 25 vs. 11 USD). In coastal households, the addition of children 0-3 years was associated with a decreased household food expense; the opposite was true for hinterland households. The unexpected relation of the former could be due to underreporting of incomes.

The household size effect is most interesting as the increase in food expense is not as responsive to each additional member of the household, which is even less in hinterland households (elasticity of expenditure=0.7 and 0.07, respectively). Yet the opposite relationship was found with mother's garden time. This implied that hinterland mothers work much more in the garden for each additional member and purchased much less food for each additional member. Popkin attributed this to the probable slight inverse decline in the contribution to gardening by household members outside the nuclear family among hinterland households. Simply put, the availability of garden fields in the hinterland is an opportunity to produce for home consumption, and having such food supply decreases purchases. This is particularly so among the hinterland households whose per capita income is lower than the coastal households (Popkin, 1975).

The positive relationship between the mother's market labor time and food expenditures showed the trade-off between income and child welfare. Various health and nutritional factors were analyzed to understand some of the effects of the mother's labor force entry on child's welfare, and relationships were quite complex. Age factors were found to be important but more likely to vary between different environments. The Cebu survey showed that calorie, protein, iron and vitamin A intakes of children of working mothers were lower. This could be because the goods provided by the mother from added

income are not perfectly substitutable to her time devoted to child care. Or it could be a goods constraint, or that meals given to the child and their quality varied (Popkin, 1975).

On the whole, the study showed a greater probability that children in rural areas have lower health and nutritional status when mothers spend more time working outside the home, unless mother's forgone child care time is adequately substituted.

3.2.4 Tan study

Tan noted that the deficiencies in the Filipino diet vary widely among nutrients and across regions, reflecting differences in taste, relative prices of substitute food, income and knowledge of nutrition. The severe inadequacies are with micro-nutrients and fats. Energy food and requirement are much more known to people, and its deficiency is easily shown as physical weakness. In the early 1970s, neither the requirements nor deficiency of other nutrients for an individual were much known. This resulted in varied compliance of the different nutrient requirements despite nutrition education initiatives (Tan, 1974).

The study looked at the determinants of food preferences with variables such as local tradition, demonstration effect, nutrition education, and income considered. Local tradition was assumed to vary by the available variety of the food crop, available technology, and food habits, thereby isolating the effects of knowledge of nutrition and taste. Nutrition education refers to the dissemination of basic knowledge of nutrition (i.e. major nutrients, their function and the quantities required by different types of individuals). This is expected to influence food choice where food is valued for its contribution to health, and may change certain food dislikes and habits (Tan, 1974).

Income is another important determinant. Higher income households consume more food quantitatively and qualitatively, and are more likely to meet the nutrient requirements. With varied diets, they are more likely to have a greater variety of nutrients though some food may not have the needed nutrient. Households face the constraints in income and set of recommended nutrient requirements. Thus, two factors prevent the meeting of adequacy: low income and lack of knowledge of basic nutrition. Either or both can explain poor nutrition.

Using linear regression, the nutritional level of the household depends on the food basket, which in turn is associated with such factors as taste, relative prices of available substitute food, and income. The model was tested for calories and nine other nutrients. This simple model used some kind of nutrient rating (i.e. defined as the ratio of the recommended nutrient for the particular household) as the dependent variable with per capita food consumption (proxy for income), and years of schooling of household head (i.e. proxy for nutrition knowledge) as determinants. Findings showed that education was not a significant determinant of nutritional status except for fats. Per capita consumption was highly significant, with a positive sign for

each of the 10 nutrients. But the explanatory power of per capita consumption is not very high and varied among nutrients, ranging from an explained variance as low as 2 percent for thiamine. But the explained variance of 41 percent for protein is relatively high. Income elasticities are all less than one. The generally low explained variance and low income elasticities indicate that income is a limited indicator of nutrition level in the Philippines. This also implied the potential of nutrition education to improve nutritional status. Nutritious food needs not to be costly, if only people know how to plan their meals (Tan, 1974).

A significant correlation between the recommended and actual intake for thiamine and niacin was found for education. But this could be due to traditional eating habits which include foods rich in thiamine and niacin. Overall, the results did not show some significant relationship between recommended and actual intake. This is either due to a lack of or ineffectiveness of nutrition knowledge.

3.2.5 IFPRI initiatives

The ***Senauer and Garcia study*** was an IFPRI-supported research project designed to assess the impact of a food subsidy program (i.e. targeted discounts on rice and cooking oil in 14 poor rural villages) on the intra-household allocation of food given the availability of data on food consumption. A short panel of 4 visits spread over 18 months was conducted with 840 households; only 134 households were surveyed for the individual food consumption data for practical reasons. For subsidised households, the food subsidy was equivalent to 19 percent of food expenditures though the discount was 50 percent on rice and 33 percent on cooking oil.

Findings showed that households consumed only on the average 70 percent of calorie requirement, a figure that was even lower for pre-schoolers: 55 and 60 percent for girls and boys, respectively. Households consumed 91 percent of RDA for protein, but less for teenagers: 69 and 75 percent for girls and boys, respectively. Although iron was 88 percent of RDA, 19-39 year old women only had 59 percent. The adequacy ratios showed inequity in intra-household nutrient distribution.

Factors causing this inequity were analyzed using multivariate regressions. On the whole, the value of time of husbands and wives (i.e. as reflected in the wage rate) was found to affect intra-household food distribution. For calorie intake, husband's wage rate was found to have a positive effect on his and his wife's share, but negatively on children's food share. But wife's wage rate is related positively with her and children's share, and negatively with husband's share.

Analyses of intra-household nutrient distribution could be a useful evaluation tool for impact of food and nutrition assistance programs. However, impact analyses only at the household level could hide significant intra-household inequities which are crucial in assistance targeting especially

the most vulnerable and at-risk members of the household (Senauer *et al.,* 1988)

The ***Bouis and Peña study*** used panel data from 4 surveys in Bukidnon province in southern Philippines, spread over 1984-1985, factors that determine welfare of adolescents were analyzed. This from the observation that poor parents had to rely to a large extent on their teenage children's contribution to household welfare either by helping in farm work, care of younger children, or non-farm wage employment. Parents could not afford their children an education higher than the free basic primary public schools, nor provide them with enough food to have adequate nutrients to improve their productivity in work, school and a healthy life (Bouis and Peña, 1997).

Findings showed that adolescent boys and girls have different contributions to household welfare via their different work division either domestic or farm which have some long-ingrained socio-cultural reasons. This may affect decisions or household behavior to invest in education and health, or allocate resources such as food.

To measure inequities in nutrient distribution among household members, a new indicator was used, the food share-calorie share ratio. This is the ratio of the individual's share of household micronutrient intake to his/her share of household calorie intake. It is assumed that even low income-households tend to increase the intake of non-staples as income increases, and that increases in calories come from non-staple sources. The study argued that calorie intakes could not be indicative of inequity because as a necessity, calories tend to be more fairly distributed than non-necessities. The individual calorie intake is then used as the denominator. There were no significant differences in ratios by sex or age indicating equitable distribution of food and nutrients (Bouis and Peña, 1997).

3.2.6 Rola *et al*. study

Conducted by the College of Public Affairs' Institute of Strategic Planning and Public Policy (formerly Center for Policy and Development Studies, University of the Philippines Los Baños, Laguna), this is one of the most recent Philippine university-based food security studies. This sustained interest on food security issues by the Institute was built up from the food and nutrition studies in the 1970s-1980s. These led to the holding of the Nutrition and Welfare Workshop, and later the publication of the book "Food Security in the Philippines" (Cabanilla and Paunlagui, 1999).

At the outset, the study stressed the need to understand and implement food security policies in the proper context since past experiences with government policies erroneously mixed-up food security with food self-sufficiency. In particular, the study sought to analyze the factors affecting household food security in the context of changing development in two villages: one, from agriculture-based to industry-based economy; the other, maintained its agriculture-based status for the period 1970s-1990s. The Laguna panel data from 1985-1998 were used. Data from 1975 were not used

as they were incomplete. One of the villages became more industry-based as a result of the development of an industrial processing zone in the nearby area cluster, the CALABARZON. This was an industrial estate project in the 1990s which encouraged industrial investments in contiguous areas in Cavite, Laguna, Batangas, Rizal and Quezon. This also fostered related service and commercial establishments but had differential impact on the neighboring villages (Rola *et al.,* 2000).

The two villages had more or less the same agricultural status up to the 1980s with similar institutions and facilities, but with the roads and electricity of Type I village a bit more advanced. Towards the end of the 1990s, Type 1 remained mainly agricultural, but Type II became industrial. Industrial zoning infused dramatic changes to the economic structure of Type II village as it was nearer the modernizing industrial sites. Farmlands reduced from 87 to 36 percent in Type II village, and converted into building sites. This re-zoning policy encouraged the conversion of about 49 hectares into residential, commercial or industrial purposes, and further reduced agriculture land to only 11 percent (Rola *et al.,* 2002).

Nutritional status was used as an indicator for food security at household and community levels. The empirical model used as dependent variable the real value of food consumed by the household per week (i.e. proxy for nutritional status) for household food security; while the percentage of pre-school children normal in weight (i.e. proxy for nutritional status) was used at the community level. The explanatory variables included the mean education of husband and wife, mean age of children under 18 years, real incomes (decomposed into farm and non-farm), percent of productive time by household members aged 13 years and above to total productive time allocation, household size and agricultural land area. Two village dummy variables to indicate the different development paths were used.

The multivariate model in log linear form was used to test four hypotheses: that higher education means higher value of food consumed at home; that younger children will demand more food expenditure; that both farm and non-farm incomes will lead to more food security; and that agricultural land size will have a positive effect on food security. Findings showed that the value of food consumed at home is positively and significantly related to land holdings of the household, the mean education of the parents, household size, and real non-farm income. While not significant, the mean age of children is negatively related to household nutritional status. The open trade regime did not result in higher value of food consumed at home as compared to the previous years, and even had a negative impact though not statistically significant. Results also showed that Type II village had higher value of food consumed at home as compared to Type I. This proved the point that a village can be food secure even if it does not own-produce its food needs if households have the purchasing ability to access food in the market (Rola *et al.,* 2002).

The share of productive time of household members aged 13 and above was also considered to be a determinant of household food security. The

higher the share of productive time compared to reproductive and leisure time, the more food secure is the household. The coefficient of this variable though was not found to be significant, which is likely due to multi-collinearity with the income and the education variables. The real income variable, expressed in total values, was not found to be significant yet the non-farm income source was found to be a slightly significant and positive determinant of household food security (Rola *et al.,* 2002).

The study concluded that food self-sufficiency does not necessarily imply food security. The Type II village had higher value of food consumed though less in farm production area and production than Type I. Food security of village II was achieved via more access to capital, labor and output markets. Non-farm incomes have increasingly played a more dominant role in food security. Land conversion to non-agricultural uses (e.g. commercial, industrial) will have negative impact on food self-sufficiency, but the inflow of goods and services from external sources will most likely increase. This enabled the people to access income earning opportunities, and the ability to secure food.

3.2.7 Recent work

These three decades of micro-level studies on food and nutrition in the country have helped trigger the growing recognition that food security, both as an approach and indicator of development, is a critically serious area of scientific interest. Its strong association with poverty in rural areas and the farming population, in particular, are explicitly recognized by its defined inclusion in the AFMA. These further stimulated a series of more recent studies (e.g. socio-demographic and economic factors, improving measurements) on food and nutrition security in both the basic and developmental fields (FNRI, 2002, 2004).

It may be noted that early on in the 1980s, an IRRI study looked into the nutrient adequacy of farming households (i.e. households, not individuals as level of analysis) in association with production among rice-based farming systems. Findings showed the role of different cropping systems in the ability of households to have energy and protein sources from own production. The seasonality of food crops production in particular was associated with the fluctuations of intake of various nutrients, but across seasons the adequacy levels of calories and protein were met by accessing food in the market. Other factors such as income, land tenure, and market access by descriptive association were pointed out as most likely having an impact on nutritional status, although these were not particularly correlated. Households, however, could not meet adequacy levels of micronutrients such as calcium, thiamine and riboflavin. Children, even of rich households, were malnourished, which showed that income is not enough to explain nutritional deficiency. The results, though preliminary, gave insights into production-related nutrition problems and urged further empirical work on nutritional status in relation to the production-consumption chain (Paris and Unnevehr, 1987).

Nutrient allocation has been investigated with respect to various age and sex groups in relation to different types of rural households (i.e. farmers, processors, non-farmers), and how crops (e.g. sweetpotato) contribute to some degree to the intake of commonly deficient micro-nutrients among children such as vitamin A and C, iron and calcium. Education and occupation of parents were significant factors affecting nutrient intake; there was no significant correlation with sex. Nutrition education was highlighted as having a critical role in improving food and nutrient intake (Narciso, 2001; FNRI, 2004; Gayao *et al.,* 2004).

Food security has various dimensions, and attempts to measure it through food and nutrient adequacy has had quite a history in the country. But few attempts have been made in linking food security with livelihood security, and coping strategies at times of chronic or temporary insecurity, or disaster. Victims of disaster, such as those affected by the eruption of Mt. Pinatubo in Central Luzon, had to cope by adapting their crop production strategies (e.g. direct rice seeding in lieu of the transplantng technique) as well as intensifying the production of some traditional subsistent crop (e.g. sweetpotato, bananas) for the market due to changed ecological environment and market opportunities. Altered livelihoods also meant that they had to learn to mobilize their local resources in ways that adapt to changed circumstances (Mula, 1999). A recent thesis attempted to link food security, nutrition security (i.e. using the standard adequacy measures and food intake), and livelihood security in coastal and hinterland parts of the country. With both areas having relatively high poverty incidence, a greater percentage of households were found short of the nutrient adequacy recommendations. Children were particularly vulnerable. Gender differences in perceiving food security were important as these affect the coping behavior of men and women, and the way additional incomes were spent. Like other studies, increases in women's income usually meant increases in food expenditures that tended to benefit the children. The study pointed out that although livelihood security is important for food security (i.e. supply side), it does not necessarily translate into nutrition security (Balatibat, 2004).

Food security in relation to livelihoods is a current area of interest of the UPWARD (i.e. User's Perspective with Agricultural Research and Development) network within the context of rootcrop agriculture. Small rootcrop control growers usually till the uplands which are of varying states of degradation using non-intensive techniques. Their resource-poor minimally productive conditions drive them to strategize at the margin, and thus engage in a number of economic activities in order to survive. Their food security is threatened by their fragile physical environment, poor resources and very limited opportunities. The goal of enabling development workers to address poverty and food security among rootcrop growers drives the network to further empirical work on the various types and dimensions of livelihoods, which may be alternative or complementary (UPWARD, 2002).

3.3 Food and nutrition: the role and action of government

The 1987 Philippine Constitution provides that "The State shall promote a just and dynamic social order that will ensure the prosperity and independence of the nation and free the people from poverty through policies that provide adequate social services, promote full employment, rising standard of living, and an improved quality of life for all" (Article 11, Section 9). Further, it stipulates that "The State shall defend the right of children to assistance, including proper care and nutrition" (Article XV, Section 3 Constitution of the Philippines, 1987). The constitution, in its various versions, has always been explicit that society provides for the adequacy of the basics: social services, quality of life, freedom from poverty and hunger.

There has been some traditional segregation of ministerial administration on the concerns of food, nutrition and health. Food concerns are mainly delegated to the Department of Agriculture (DA) reflecting the emphasis on food supply to ensure increased production for a rapidly increasing population. The nutrient technicalities of food and related health concerns are under the responsibility of the Food and Nutrition Research Institute (FNRI) of the Department of Science and Technology. The agency evolved through several changes in its organization, and modes of coordination and leadership corresponding to the changing perceptions, emphasis or scope of food and nutrition. Health matters have been the domain of the Department of Health. As three ministries take leadership regarding food, nutrition and health, respectively, policy making, coordination and local level implementation has often led to duplication of efforts and the thin spread of an already low public budget on social services. The effectiveness of efforts to achieve desired outcomes, and efficiency of investment at various levels (i.e. national, local, public, private) are quite difficult to assess. Critics of this situation are not few (World Bank, 1995; Florencio, 2003).

3.3.1 The food and nutrition program: history and coordination

Formerly known as the Research Institute (RI), the Institute of Nutrition (IN) was created in 1947 under the Office of the President through Executive Order 94, Sec. 30. In 1951, it was transferred to the Department of Health (DOH) under EO 392, and thus, institutionalized the nutrition program. Tackling the breadth and technicalities of nutrition concerns faced limitations placed under the health ministry. The Institute was then reorganized in 1958 by Republic Act 2058, and named Food and Nutrition Research Center (FNRC) and attached to the National Science Development Board (NSDB) under the National Institute of Science and Technology (NIST). The experiences over the years proved that health and nutrition could not be addressed by a single agency. Thus, the multi-agency National Coordinating Council on Food and Nutrition (NCCFN) was organized in 1960 with members from both the public and private sectors (NNC, 1995; FNRI, 2004).

Nutrients are basically derived from food, and ensuring adequate food production for the country brings to the core the relationship with agriculture.

Thus in 1971, the coordination of nutrition-related programs was designated to the National Food and Agriculture Council (NFAC) of the Department of Agriculture (DA), per Executive Order (EO) 285. Effectively, NCCFN was merged with NFAC (NNC, 1995)

The martial law years (1971-1986) saw a period of government restructuring when the executive and legislative powers merged. In 1973, FNRC attained its full research agency status under Presidential Decree (PD) 233. In 1975 under PD 733, it was renamed Food and Nutrition Research Institute (FNRI) as it is known today. FNRI's mother ministry, NSDB, was restructured and became the National Science and Technology Authority (NSTA) in 1983 (EO 784); and NSTA later reorganized to become the Department of Science and Technology (DOST).

FNRI is currently the lead agency in food and nutrition research and development that seeks to provide accurate data, information and innovative technologies to address nutrition problems. It is mandated to periodically assess the food intake and nutrition status of households and individuals. Six national surveys were conducted since 1978 taken at 5-6 year intervals; 2003 the latest, comprising the topics of food consumption, anthropometric measurements, clinical assessment and biochemical survey. The current surveys evolved from the experiences and refinements of regional food and nutrition surveys from 1956-1977. These also served as basis for the revision of the Recommended Dietary Allowance (RDA) in 1974. All these activities plus the nutrition survey of 1987 provided inputs for the later Philippine Plan of Action for Nutrition, PPAN (FNRI, 2004, http:www.fnri.dost.gove.ph/nns/overview.htm 15-02-2005).

In 1974, PD 491, also known as the Nutrition Act of the Philippines, created the National Nutrition Council (NNC) which became the policy making and coordinating body to formulate national nutrition plans. This integrated the different nutrition activities of the public and private sectors under one program known as the Philippine Nutrition Program (PNP).

The post-Marcos government in 1987 passed the Reorganization Act of NNC (EO 234, July 22, 1987), which reaffirmed the need for an inter-sectoral national policy making and coordinating body on nutrition. This also made the Department of Social Welfare and Development (DSWD) the mother agency of NNC, instead of the DA, recognizing nutrition as a welfare concern in a broader social sense, not only of agriculture, science and technology. But soon, with agriculture receiving increasing attention by the government's emphasis on self-sufficiency of food, Administrative Order (AO) 88 (August 26, 1988) provided that the NNC be attached to the DA, which then assumed chairmanship of the council until now. The NNC formulated the food and nutrition policies and strategies, coordinated budget preparation and release as well as the implementation of the Philippine Food and Nutrition Program (PFNP) with various agencies (NNC, 1995; FNRI, 2004).

The nutrition program has as its goal the improvement of the nutritional status of the Filipino people with nutrition stressed as a basic human need, basic for survival, and for individuals to become economically productive and

socially active members of society. The PFNP is family-focused and also a broad multi-level program concerned with food supply and demand, health and sanitation, and improvement of quality of life via employment and reduced poverty. Its strategies include nutrition intervention, communications, policy development, surveillance, and support services (FNRI, 2004).

3.3.2 Food and nutrition situation

Understanding the food and nutrition conditions of the population can be gleaned from two sets of information: food supply and consumption patterns, and the nutrient intake of individuals. The former is estimated from the food balance sheets which are regularly taken by the Economic and Social Statistics Office (ESSO) of the National Statistics Coordination Board. They provide indicators of food availability relative to the nutritional requirements of the population. The latter reveal the actual intake of specific nutrients of individuals, and is estimated from the FNRI nutrition surveys.

Food supply and consumption patterns

Food security at the household level would determine how well Filipinos are eating. The 1993 food consumption data based on the National Nutrition Survey conducted by the FNRI showed that the food basket of an average Filipino household still consists mainly of rice, fish and vegetables. Rice as the main staple of the Filipino diet makes up 35.1 percent of the total per capita food intake and about 56.4 percent of the energy intake. Overall, a decrease in the per capita daily food consumption in 1993 for rice, roots and tubers, vegetables and fruits was found, while the intake of other food groups was relatively steady.

The declining trend in the consumption of various foods is indicative of decreased intakes of energy and micro-nutrients, which were already inadequate to start with in the first 1978 nutrition survey. Increases in protein and retinol were not statistically significant (Tables 3.1 and 3.2).

The FNRI analysis of food consumption pattern showed that the vulnerable groups, such as pre-schoolers (3-59 months), pregnant and lactating women had barely met their energy requirements; on the average less than 70%. Mean iron and calcium intakes at 45.1 percent and 42.6 percent, respectively, were found to be grossly inadequate for the three groups, especially for lactating women. Pregnant women had relatively high vitamin A intakes (125.7%) partly because of the supplementation pregnant women usually have either from the village health centers or in homes. Between urban and rural consumers, the former tended to consume about twice as much as their rural counterparts. Rural consumers usually have more of the cheaper quality foods, more of the starchy roots and tubers and all types of vegetables (FNRI, 2002).

Table 3.1 Comparison of mean one-day per capita food consumption by food groups (in gram), 1978, 1982, 1987, 1993 and 1998

Food groups (in grams)	1978	1982	1987	1993
Cereals and cereal products	367	356	345	340
	308	*304*	*303*	*282*
Rice and rice products	*38*	*34*	*24*	*32*
Corn and corn products	*21*	*18*	*18*	*22*
Bread and other cereals				
Starchy roots and tubers	37	42	22	17
Sugars and syrups	19	22	24	19
Fats and oils	13	14	14	12
Fish, meat and poultry products	133	154	157	147
Eggs	8	9	10	12
Milk and milk products	42	44	43	44
Dried beans, nuts and seeds	8	10	10	10
Vegetable	145	130	111	106
Fruits	104	102	107	77
Miscellaneous	21	32	26	19
TOTAL	897	915	869	803

Source: National Statistical Coordinating Board, NSCB, Philippines

The Department of Health commissioned the National Demographic and Health Survey (NDHS) in 1998. Findings showed that at three months, almost half (47%) of the infants were exclusively breastfed and a small proportion of them (4.0%) already started weaning. Most infants (99.5%) stopped breastfeeding before one year. Bottle feeding was practiced about three times more in the urban (27.3%) than in the rural areas (9.9%). This is most probably due to the fact that more mothers in the urban areas work outside the home to help contribute to the family income.

In 2000, the country's Food Balance Sheets (FBS) figured a per capita energy supply more than the consumption level based on the 1993 FNRI nutrition survey (i.e. 2445 kcal in energy supply vs. 1684 kcal energy consumed), 45 percent more than actual consumption. Per capita food supply per day of 1127 g. was greater by 9 percent than the food requirement of 1031 g. (FNRI 2001; Florencio, 2003). Food supply has consistently been in excess of requirement from 1970s-1980s: from 103 to 125 percent for food energy, and 107-136 percent for protein. While on the average, calorie adequacy was

95-99 percent in 1970-1979, and improved to 100-102 percent in 1980-1982. Protein adequacy was 91 to 96 percent for the same period (Quisumbing, 1987). This excess supply implies that other factors count in the final adequacy of individual nutrient status than availability or supply of food. How food is eventually consumed by individual household members and how efficient the food taken is available to the body are related to quite a number of factors (Osmani, 1992; Svedberg, 2000). About 30 percent of Filipinos are unable to buy enough food to meet basic nutritional needs. Neither do they live in healthy environments, nor drink clean water. While mortality rates of mothers and infants decreased, and life expectancy improved, the rising incidence of infectious diseases (e.g. diarrhea, respiratory diseases) contributed to poor nutritional status. The inability to deal with malnutrition has been complicated by an expanding population, inadequate food production, and inequities in incomes. The lack of nutrition education and the rise of infectious diseases add to the severity of the problem especially in the hinterlands (NEDA, 1982: Lachica, 2000).

The nutrition condition

The malnutrition problem has persisted over the years. Given the condition of excess food supply relative to requirement, the nutrition problem can be viewed as basically a confluence of several factors. One is the lack of effective demand by the poorer income groups due to lack of access to resources such as land and capital. Second, inequities in intra-household food distribution due to socio-cultural and perception-knowledge factors, which may be effectively revealed in age or sex, infleunce individual nutrient intakes. Third, the effect of environmental factors (e.g. water, sanitation and hygiene) on the availability and bodily utilization of food consumed.

In the latest available National Nutrition Survey data (FNRI 1998), vitamin A deficiency (VAD), iodine deficiency disorders (IDD) and iron deficiency anemia (IDA) continue to be major micronutrient deficiencies among all age groups of children, pregnant and lactating women, and older persons. The prevalence of VAD among 6 months to 5 years old children was 8.2 percent, 7.1 percent among pregnant women (3.0% cut-off), and 3.9 percent among lactating women (i.e. decline from 5.2% in 1993), were significant enough to constitute a public health problems. VAD among 6 months to 5 years old children was highest in Western Mindanao; and highest in Central Visayas for pregnant and lactating women.

Iron adequacy has been declining in all survey years (Table 3.3) and iron deficiency anemia (IDA) is most alarming as it affects more age groups: 56.6 percent of infants, 50.7 percent of pregnant women, 45.7 lactating women, and 49.1 percent older persons 60 years and above. While these reflect some decreased prevalence from 1993 data, they still are much in excess of the WHO 5 percent cut-off.

Iodine deficiency (IDD) prevalence was mild (71mg/L). But, 35.8 percent of children 6-12 years old still suffer from moderate and severe IDD. Protein-energy malnutrition (PEM) also continues to be a major concern. The

1998 survey noted an increase in the prevalence of underweight, wasting and stunting among Filipino children. About 31.8 percent of the pre-school children are underweight; 19.8 percent and 13.2 percent of all adults are underweight and chronically energy deficient, respectively.

The 2001 FNRI update on the nutritional status of children showed that pre-schoolers in Bicol (37.8%), Western (35.2%) and Eastern Visayas (32%), Northern (34.1%) and Southern Mindanao (32.3%) and CARAGA (33.5%) regions have higher than the average prevalence of underweight; and there is an increase in the number of regions with more at risk pre-schoolers compared to the previous survey. The highest prevalence of under height is the Autonomous Region in Muslim Mindanao (42%), followed by Bicol (39.3%), Western Visayas (38.5%), and Northern Mindanao (36.9%) (FNRI, 2002).

Table 3.2 Mean one-day per capita energy and nutrient intake and percent adequacy (%), 1978, 1982, 1987 and 1993

Energy & nutrient (intake measure)	Mean RDA/ nutrient	1978		1982		1987		1993	
		intake	Adeq.	intake	adeq.	intake	adeq.	intake	adeq.
Energy (kcal)	1919	1804	94.0	1808	94.2	1753	91.3	1684	87.8
Protein (g)	50.8	48.0	92.3	50.6	97.3	49.7	95.6	49.9	95.7
Iron (mg)	15	10.6	70.7	10.8	72.0	10.7	71.3	10.1	64.7
Calcium (g)	0.58	0.44	75.9	0.45	77.6	0.42	72.4	0.39	67.2
Vitamin A (mcg RE)	445	n.a.		n.a.		389.7	87.6	391.9	88.1
Thiamin (mg)	1.03	0.73	74.5	0.74	75.5	0.68	69.4	0.67	68.4
Riboflavin (mg)	1.03	0.73	74.5	0.58	59.2	0.56	57.1	0.56	57.1
Niacin (mg)	18	15.3	85.0	16.4	91.1	16.3	90.6	16.1	88.0
Ascorbic acid (mg)	64	66.8	104.4	61.6	96.2	53.6	83.8	46.7	73.2

Source: FNRI. Philippine Nutrition. Facts and Figures. 2001; 1982 Nationwide Nutrition Survey

From 1989-90 to 2001, the prevalence of underweight and underheight showed a slightly declining trend, yet the overall malnutrition situation has not improved over the five nutrition surveys (Figure 3.1). The mean one-day per capita food energy intake was 1684 kcal which met only 87.8 percent of the 1919 kcal recommended amount. Energy intake in the regions ranged from an 83.4 percent adequate in Western Visayas to 94 percent adequate in the Cordillera Autonomous Region. Half of the regions fall below the mean energy intake. The prevalence of underweight among pregnant women is 26.6 percent; for lactating mothers, 11.7 percent. About 24 percent of adults are overweight; 12.3 percent are chronically energy deficient (FNRI, 2001).

Malnutrition contributes to child mortality and morbidity and reduced mental capacity, thereby causing losses in potential productivity. Using early figures, the World Bank estimated that reducing underweight prevalence of Filipino children by half by 2000 could result in 20 percent lesser infant deaths. The average intelligence of children was lower by 13 IQ points in iodine deficient areas (World Bank, 1995).

Table 3.3 Prevalence of underweight, underheight, thinness, and overweight among 0-5 and 6-10 year-old children, in percentages, 1989-90 to 2003

Age group (years) and nutritional status	1989-90	1992	1993	1996	1998	2001	2003
0-5 years old							
underweight	34.5	34.0	29.9	30.8	32.0	30.6	27.6
underheight	39.9	36.8	34.3	34.5	34.0	31.4	30.4
thin	5.0	6.6	6.7	5.2	6.0	6.3	5.5
overweight	0.6	0.7	0.4	0.5	0.4	1.0	1.4
6-10 years old							
underweight	34.2	32.5	30.5	28.3	30.2	32.9	26.7
underheight	44.8	42.8	42.2	39.1	40.8	41.1	36.5
overweight	0.1	0.2	0.6	0.4	n	0.8	1.3
11-19 years old							
underweight							15.5
overweight							3.5

Source: FNRI, 2001, 2004

3.3.3 Health and nutrition programs

The health and nutrition programs of the government have been charted in different plans and implemented by various agencies. The recent health services programs are embodied in the National Health Plan 1995-2000 along with other related initiatives such as the Magna Carta for public health workers, capability building of the decentralized local government health personnel, and the dissemination of the 1995 Field Health Information System. The "Special Law on Counterfeit Drugs" (Republic Act 8203, 1996) was passed in order to put in place a rationalized system of drug procurement, distribution and use (Lachica, 2000).

The country's compliance to the demands of the International Conference on Nutrition (ICN, 1992) in Rome, Italy, was the making and implementation of the Medium-Term Philippine Food and Nutrition Plan

(MTPFNP) 1993-1998, also known as the Philippine Plan of Action for Nutrition (PPAN), which actually is a part of the Medium Term Philippine Development Plan (MTPDP) under the agenda on human development, and spearheaded by the NNC.

PPAN's vision to improve the quality of life of the Filipino through improved nutrition goes through the interrelated two-fold strategy: the promotion of household food security, and the prevention, control, and elimination of micronutrient malnutrition. To achieve these, five main programs were implemented: increased own-food production through home and school gardens, including animal raising; micronutrient supplementation and food fortification (e.g. rice, margarine, flour, salt) with related tax incentives in manufacturing; credit assistance to livelihoods; nutrient education to influence nutrition-oriented food practices; and food assistance for the vulnerable groups or households. Recognizing that food security is beyond food supply, the PPAN program has integrated financial capital access to support the livelihoods particularly of the poor households, and improving nutrition knowledge through informal trainings and other communication media. At the local level, PPAN has been implemented through a mix of services within the five impact programs based on the local government's assessment of the local nutrition situation.

After four years of interagency work led by the NNC, FNRI launched in 2000 the National Guidelines of Food (NGF) for Filipinos. A popularized book aimed as a nutrition education tool, it offers a set of common recommendations of balanced diets and healthy living to enable people to make proper choices. As complementary activity, the Department of Health (DOH), in coordination with Helen Keller International, through its Child Growth Project established weighing posts in the village health centers, which also served nutrition counseling depending on observed change in the child's weight status and related nutritional problems. This has been integrated into the local health program (e.g. regular weighing, Vitamin A and iron supplementation, de-worming, salt-testing of households, pre-natal check-ups, nutrient education, and household health survey and monitoring) undertaken by the village health workers who are already getting regular incentives from the local government. To highlight the fight against micronutrient malnutrition, the National Micronutrient Day (i.e. launched in 1993 and held every October to coincide with World Food Day), and the Pre-schoolers Health Week (i.e. every April 19-23) are celebrated yearly. The former focuses on the targets of reducing malnutrition by 30 percent, IDA by 10 percent, and periodic supplementation of vitamin A and iron for women and children, including the promotion of local nutrient plants and seedlings through home gardens. The latter includes nation-wide activities for children to enrich activities (as above) which many villages are already doing.

The DOH also implemented the *Sustansiya Para sa Masa* (i.e. Nutrition for the People Program), which provides a program grant of about 1,000-2000 USD a year for a beneficiary community. This is implemented in collaboration with non-government organizations (NGOs) and other funding agencies on a

cost-sharing basis which includes goods in kind (e.g. food supplements, equipment), services and staff time, and other items specified in a memorandum of understanding. To sustain the program, the initiated activities are integrated into the local development plans (i.e. provincial, town, and village).

The DOH micronutrient supplementation programs have had varied success levels. Vitamin A supplementation program has reached a wider coverage, yet its deficiency together with iodine deficiency showed greater differences across regions. Iron supplementation also fell short of target, while the initiatives to fight protein-energy malnutrition (PEM) have been lesser than the micronutrients. Addressing the enormity of the malnutrition problem has been complicated by the number of agencies coordinating and implementing the interrelated problems of food, nutrition and health vis-à-vis a relatively small budget for these social concerns.

Early on in 1978, the state university of the University of the Philippines at Los Baños implemented an action research project, the Barangay Integrated Development Approach for Nutrition Improvement (BIDANI), which in 1984 became a community-based development program with six other state university pilots in the Visayas and Mindanao regions. Each of the pilot areas implements its four-fold goals of good governance, poverty alleviation, food security, and improved nutrition by mobilizing and capacitating individuals at the village levels in coordination with the local government units. As an integrated development approach, the strategies include components such as the village level information system, home nutrition improvement, income-generating livelihood projects, and a related microfinance support system. The network was strengthened with the support of the Dutch government starting in the 1990-1995 phase which expanded the coverage into 37 state colleges and universities (SUCs), 38 provinces, 109 towns, and 581 villages (Balatibat, 2004). In the early 2000s, the institutionalization of the program within the SUCs began. How effectively the SUCs implement the multi-faceted program depends in large measure on their ability to sustain the fiscal support, harness the capacities developed, and build up the strategies and action already on the way during the institutionalization process.

To improve the effectiveness of national nutrition and health strategies, there is need to review, clarify and reconsider the mandates, roles and responsibilities of the various agencies involved, as well as the different approaches and strategies tried. With the synergies between food, nutrition and health, the resources and capabilities existing at the local levels of implementation, the history of experience of food and nutrition programs, and the clarification of the interrelationships between food supply, access and adequacy can help in streamlining the public structure. The conventional standards of cost effectiveness and facility in the delivery of the services are indeed relevant and important considerations.

3.3.4 Agriculture and food security programs since the 1980s

The importance of the agricultural sector relative to the food security situation cannot be overemphasized. The various roles of agriculture in terms of food supply, employment, contribution to income, and industrial raw materials inputs point to its significance to rural development and the related efforts to address poverty and food security.

Lessons from the past

Although agriculture as a matter of course has been allocated a program budget annually, it was not until the second half of the 1970's that it became a cause for concern. This was after the Ranis-Fei Philippine mission report, in the early 1970s, which highlighted the seriously lagging agricultural growth due to the import-substituting industry bias during the post-war years. Industrial development was given priority and preferential treatment by the government through currency overvaluation and tariffs on manufactured goods. Overvaluation reduced the cost of imported capital machineries, and it effectively imposed export taxes on agricultural commodities. These primary exports (e.g. copra, sugar) as well as agricultural products in general were left to fend for themselves and were instead heavily taxed. Government investment on agriculture research and development was nil. These biases against agriculture resulted in the deterioration of the terms of trade. Nominal protection rates of the agriculture sector were decreasing through the 1960s and early 1980s, even negative for commodities like copra, sugar and cotton. The sector as a whole was comparatively disadvantaged with its infrastructure (e.g. irrigation) and support systems (e.g. credit, marketing assistance, technology) seriously inadequate (ILO, 1974; Quisumbing, 1987).

Agriculture policies in the past were not quite clear about food security goals, and had seemingly conflicting objectives of cheap food and raw material prices, and stable prices, at times through direct intervention in agricultural markets (Cabanilla and Paunlagui, 1999). In 1981 for example, the National Food Authority (NFA) was created to regulate the marketing of food, and was given the monopoly to import grains and feedstuff (e.g. soybeans). But NFA could not effectively stabilize prices of food within the established price band at farm or retail markets because it did not have sufficient funds to be able to influence the market. It worsened with strict purchase requirements and corrupt practices of government personnel. This role was then clipped in 1985 with the lifting of rice price ceilings. The interventionist policy only proved wasteful and counterproductive (World Bank, 1995; Lachica, 2000).

In addition, the budget commitment to agriculture was dismal and, historically, received the lowest share to total budget compared to other countries in the Southeast Asian region. This decreased from 10 to 12 percent in 1976-1983 to an average of 6 percent in 1992-1994. As share to value added, public spending for agriculture in the mid-1980s were only equal to the 1955 level. In addition, the pattern of spending emphasis within the sector moved away from research, irrigation and community development (including rural roads) to agrarian reform, environment and price supports. Priorities then

shifted away from the tried and tested basics of agriculture development to strategies yet to be proven effective. Public spending in rural infrastructure (e.g. irrigation, roads) had been particularly severe: with the 1991 expenditure level only 60 percent of the 1981 level. A poor research and development commitment could only be paired by severe limitations of the extension services: only about 12 percent of crop-growing poor households received information about improved seeds, their use, and crop management. Only about 20 percent share of poor households have access to irrigation, high yielding varieties, or practice intercropping. This resulted in unrealized technical opportunities to improve nutrient deficient crops (World Bank, 1995).

Agriculture policies have been the centerpiece to promote rural development and address the all-time challenges of poverty and food security. In 1983, amidst the worsening economic situation, the Marcos regime gave increased attention to agriculture and the rural sector in general, which was started in the 1970s via the land reform program, by promoting agribusiness development – the so-called "balanced agro-industrialization" program (Quisumbing, 1987).

However, cereals have always received greater attention with the government's drive to food self-sufficiency. Rice policy did effectively have an urban bias. The country benefited in terms of high productivity gains from the hybrids produced by IRRI which was established in 1965, which led to breakthroughs in rice yields ushering in the Green Revolution in Asia. The increased production lowered the farmgate price of paddy rice, favouring consumers but leading to lower farmer incomes. The country actually had launched the *Masagana* 99 program (i.e. Bountiful Harvest) in the early 1970s to encourage the adoption of the high-yielding rice varieties and provided for no-collateral, low-interest loans to small farmers through privately owned rural banks, with the government guaranteeing to pay the banks 85 percent of any losses. Though about half a million farmers participated in the *Masagana* 99 program, it ended due to high arrears (Dolan, 1991).

The new government installed in 1986 revived the *Masagana* program in the 1987-1992 Medium-Term Development Plan and continued the emphasis on agriculture. It started overhauling the sector and developed a crop diversification approach that relied more on market signals than interventionist scheme. The rice-price stabilization program remained in effect, however, due to the avowed self-sufficiency policy. A number of programs were implemented to increase small-farmer access to postharvest facilities (e.g. driers, warehouses), credit (i.e. non-collateral, low interest, supervised), improved rural infrastructure (e.g. feeder roads, farm-market, irrigation), and technology access (e.g. improved seeds, extension) (DA, 1999).

The Ramos administration (1992-1998) launched the Social Reform Agenda (SRA) in June 1995, to enable people to have access to opportunities for sustainable livelihoods by providing an integrated set of social reforms that enabled the people to access basic services and resources, and effective participation in democratic processes. SRA targeted specifically the

marginalized sectors of the poorest 20 provinces in the country, and localized implementation to specific poor towns and *barangays* identified. Emphasizing the achievement of equity and economic prosperity goals to fight poverty through good governance, SRA progressed to craft the framework of the Social Reform and Poverty Alleviation Act in 1998, and had very specific targets to reduce poverty to a 30 percent level in 1998. Initiatives during this period led to the passage of the Agriculture and Fisheries Modernization Act (AFMA, Republic Act 8435) in December, 1997.

To correct the past deficiencies in agriculture programs, the current AFMA provided for the rationalization of the agricultural research and extension system and increased the spending for agriculture to a start up of about 360 million USD in 1999. But due to the already strained fiscal conditions of the government, the budget and related activities could not be fully implemented. So far, the achievements are mainly the basics in restructuring the research and development network by commodities and areas, and the formulation of their respective plans (1998-2000), the establishment of the national information system (NIN), the implementation of the impact projects per commodity (2000-2004), and the continuing capacity development of scientists and researchers.

Similarly, agricultural extension has been rationalized even as the extension service rests on the local government units (LGUs). This clarified the roles and relationships between the national and regional research centers and the local extension function, in a scheme that builds up the LGUs capabilities. This involves some time lag for local capacities to become sufficient enough for effective delivery. From my experience at a national research and extension institute, the extension decentralization has led, initially, to poor local extension service because of budget constraints faced by many low income municipalities, and the lack of capacity of local extension personnel, many of whom were political hires. The capacity development process is still on-going; its success depends on how responsive local governments and research agencies are and will be to defined responsibilities.

Brief on agricultural development plans and programmes

The Department of Agriculture spearheaded the Philippine Agricultural Development Plan (PADP, 1992-1995), the Medium-Term Agricultural Development Plan (MTADP, 1993-1998), the *Gintong-Ani* (i.e. Golden Harvest) Program (1996-1998), and the Agriculture and Fisheries Modernization Act (AFMA, 1997) for a more comprehensive agricultural development framework. Together they define the strategies to address persistent constraints, and promote development in the agriculture and rural sectors. Embracing the principles of a more holistic and sustainable development, these consist of an integrated set of services and support systems, and stress the importance of empowering more those in the sector and the critical responsibility of the local government units in the pursuit of food security. Specifically, the MTADP adopted the key production area (KPA) approach and aimed to achieve a per capita GNP of 1,000 USD, an average annual

growth rate of 6 to 8 percent, and poverty incidence reduced to 30 percent. This approach stressed the principle of comparative advantage in pursuing agriculture development, matching the crop with land suitability, which of itself is already a departure from the simplistic food self-sufficiency orientation of the past. This was premised on the need to optimize use of limited resources (i.e. land, water) and to provide the food requirements of a growing population in a sustainable way. The Integrated Pest Management (IPM, introduced in 1993), soil conservation and management, and water resource management are among the strategic projects in the program. The KPA thinking later led the government to put serious commitment to high-value crops which are potentially domestic and/or export winners based on the agro-ecology suitability and market criteria (Aldaba, 1997; NEDA, 1998).

Both the PADP (1992-1995) and the MTADP (1993-1998) share a common vision of improving the quality of life of those engaged in agriculture. These are directed to the development of the agricultural sector through policy reforms which include the increased public spending on infrastructure and services in the rural areas, rationalize the tariff rates on inputs, rural finance, public information campaign especially farmers' understanding of agricultural programs, marketing assistance, and institutionalize small-farmer participation in agriculture planning and implementation.

The *Gintong Ani* (Golden Harvest) Program (1996-1998) was directed at food self-sufficiency, launching a program of increasing nationwide domestic food production - grains, livestock and fish. This was understood as a food security objective since unlike the previous orientation, the strategy was to direct scarce public resources to areas where the government has a comparative advantage, and encouraging the private sector to participate. In times of emergency, it provides for a mechanism of maintaining a buffer stock that can subsidize rice to the poorest through the Department of Social Welfare and Development (DSWD).

Subsequent expansion of the *Gintong Ani* Program included increased production of high-value commercial crops as objective. To help improve the viability of the high-value crops, subsidies on output and input prices, non-tariff barriers, tariffs and taxes on agricultural inputs were removed. Also, access to credit and support services (e.g. irrigation, farm-to-market roads, and postharvest facilities) for the small agriculture sector were improved. The participation and cooperation among the DA, LGUs, research institute, state universities and colleges (SUCs) and the private sector were strengthened.

AFMA is landmark legislation because it engineered a comprehensive restructuring of the agriculture research and development and extension system to address the vision of eradicating poverty and food security. Moreover, it explicitly defined the concepts, the approach and strategies to advance agricultural development. It recognizes the fact that modernizing agriculture is a multi-faceted path and, further, confirmed the principle of comparative advantage for the efficient use of resources. AFMA has been explicit in redefining the objective of food security as one of improving

availability, affordability and adequacy of food, and access to resources to improve productivity of agriculture. It made clear that food security is the target, not necessarily food self-sufficiency. However, increased production of the cereals staple remains basic with respect to achieving their potential. Given the available technologies (e.g. improved seed, fertilizer, crop management), the country has yet to reach the crops' genetic potential. Average rice yield is a little less than 3 tons per hectare compared to a potential of 5-7 tons.

With the formulation of AFMA's Implementing Rules and Regulations in 1998, the 10-Point Agenda for agriculture and fisheries were formulated by the DA. This includes the rationalization of productivity programs in production and postharvest; strengthening the research, development and extension functions among appropriate agencies; expanding the high-value crops programs to less-favoured areas; promoting value-adding enterprises; developing the LGUs as food security leaders; expand the *Gintong Ani* programs to rainfed and marginal areas; quick-response and intervention to calamity and disaster situations; irrigation; rural infrastructure; rural finance; food price stabilization; and reorganization of the DA bureaucracy (DA, 1998; Lachica, 2000).

AFMA stressed the need for greater people participation in governance to shape their future and help them have greater control of activities to improve quality of life. These are difficult goals that entail strong political will at various government levels and the ability of the people themselves to responsibly participate in the process. But like any legislation, the proof of the document pudding is in the icing of implementation. A number of those in government still have to grow out of patronage politics, incompetence, graft and corruption among others. Also, raising the research and development budget for agriculture to at least 1 percent of GNP consistently has been constrained by fiscal constraints the government is facing from relatively modest growth and the drain from huge external debt of USD 56 billion (Sept. 2004 est., http://geography.about.com/library/cia/blcphilippines.htm 28-09-2006). Further, seven years to its passage, policy execution still wavers between the thin line of food self-sufficiency and food security.

Issues and challenges of agriculture and food security

With the 65-70 percent of the poor living in rural areas and being mostly farmers, the interlocking concerns of food security, poverty and increasing agricultural productivity remain the top challenges for agriculture initiatives in the Philippines. They continue to surface in programs of all administrations but remain elusive in terms of respectable achievement of targets. With agricultural productivity growth of only a little more than one percent from the 1980s to early 2000s on the average, the country lagged behind its neighbours which grew at rates between 3.4 percent and 4.3 percent. While the yields of commercial crops like pineapple, coffee, and mango are highest, the yields for rice, corn, banana, and abaca are lowest; and one of the lowest for coconut and tobacco (Camacho, 2003; NSCB, 2004).

At this point, these challenges may be viewed as questions posed against the conventional roles of agriculture as food supplier, source of agro-industry raw materials, supplier of labour and market for goods and services. From these, the relationship between food security and productive livelihoods are at once evident. How productive and sustainable can farmers provide adequate food for themselves from their own production and from incomes they get from other livelihoods? Are there opportunities for producing for industry or for providing off-farm or non-farm labour to obtain sufficient purchasing power to buy other foods and other needs to live a healthy and decent life? The rural population can indeed be a significant market for industrial goods with the improvement of their socioeconomic condition. In the context of less favoured areas, constraints and opportunities need closer attention particularly in dealing with vulnerable, resource-poor groups and an already fragile physical environment.

As population increases, a growing pressure is set on the agriculture sector to meet domestic requirements. Food must not only be available but people should have access to the means to buy it and meet adequately their daily nutrient needs to sustain a healthy life. On the whole, the country still remains ambivalent as to its population management program which is a critical part of the growth-with-equity equation. The current population growth rate of 1.88 percent shows a slow but steady decrease from the 2.1 percent in 2002, and about 3.5 percent in 1965 (Dolan, 1991; NSCB, 2004). The population management program needs to be dealt with urgently, but consensus is difficult because of religious sensitivities and social constraints, such as gender inequity (Balatibat, 2004). This may call for a multi-stakeholder set of solutions, not necessarily consensual, but strategies clearly understood and implemented effectively by every stakeholder with one clear goal: reasonable management of population. It needs to be noted that population has various sides: a resource, a cost, and the dimension of change. These three need to be balanced in a respectable population management program. In the immediate through the long run, the public sector should be committed to effectively invest in education and skills training relative to projected relevant demand in the labour market both domestic and abroad. It still holds true that a country can benefit from trade if it invests in the resource that it has most of, and create or improve its comparative advantage. At this point in time, the country's most abundant resource is human resource. This then calls for harnessing it to its most efficient use.

The population of Leyte grows slower at 1.6 percent which could be an indication of out migration because of lesser opportunities in the rural areas, and presumably of the low productivity in the small-agriculture sector (NSCB, 2004). The population challenge here is not so much one of numbers, but the relationship between the skills and motivations of the people relative to opportunities, and therefore a question of how productive and remunerative rural or farm work is. Supply and demand of people relative to desired productivity in order to address poverty and food security do not quite match,

as may be evident in the later chapters. This could be the picture of many such areas of similar situation.

High population growth rates especially in the past and negative economic growth for two decades (1970-1980s) increased impoverishment of about 30 percent of the population. Though this already shows signs of improvement, poverty in the agricultural sector still is a major part of the food (in)security problem. If agriculture were to contribute to growth and address food security, the government needs to realize the goals as formulated in existing plans and programs, and put an end to rhetorics and politicking.

The government will have to implement the public spending as committed in AFMA with reference to the various thrusts and strategies defined. Back to the basics, investment in research and development and extension are priorities together with rural infrastructure (e.g. roads, irrigation, post-harvest facilities). These will help facilitate agri-based production, processing and marketing and a host of other livelihood activities that benefit farmers and the rural people as a whole.

Another critical issue very much linked to agricultural productivity, poverty and food security is the concentration of control of resources, particularly the unequal distribution of land (i.e. Gini index = 0.48). While the land reform program has had a long history, this is also a history of very limited success. With vast experiences in land reform in the sense of land re-distribution, the program needs to be critically re-evaluated for relevance and effectiveness, administrative and financial feasibility, and economic efficiency. In village settings, private ownership, per se, of too small farms by farmers with meager resources is practically irrelevant to the struggle for survival. In many cases, these so-called “own lands” had lain idle and wasted, and were eventually sold to big landowners.

In relation to land as a basic physical resource, there is also the critical issue of severe degradation of farmlands and depletion of natural resources in rural areas which have significantly limited opportunities in agriculture, forestry, and fisheries. The case of fragile lands is common especially among the uplands and lowlands which are unprotected from strong river flash floods. The continuing unsustainable (mis)use of these lands threatens the present and future generations. Such conditions aggravated the decline in the productivity of small-time farming, drove the younger generation away from the farms, and leave the village-based generation in poverty. Such a rural landscape of the poor and malnourished is not uncommon.

Chapter 4
Research problem, context, and conceptual framework

This chapter aims to specify the research problem, and clarify the concepts, context and conceptual framework that are used in addressing the problem.

4.1 The research problem

A 1999 conference on food and nutrition organised by the Consultative Group on International Agriculture Research (CGIAR) at the University of the Philippines, Los Baños, Philippines, posed questions about how the agriculture-nutrition links should be approached. The need for more open lines of communication between scientists and researchers in agriculture and human nutrition was emphasized, if the problem on food security were to be adequately addressed. Per Pinstrup-Andersen (2000:352) was emphatic then that quite obviously "agriculture is the primary source of nutrients that sustain human life".

Many of the less developed and developing countries are agriculture-based. And many of the malnourished are poverty-stricken farmers who till small plots in less favoured lands. The picture of poverty and malnutrition is easily sketched in the face of the rural household who live and farm in fragile lands. The need for a new paradigm that views the agriculture-nutrition links in a holistic manner cannot be overemphasized. One such view is for agriculture to find sustainable solutions via food-based system approaches that link agricultural production to livelihoods, health and well-being (Welch and Graham, 2000). Along this line of inquiry, many investigations have been directed toward upstream research on biotechnology and breeding for commodity nutrient enrichment (e.g. bio-fortification for vitamin A, iron), micro-nutrient food fortification, and improving micronutrient bio-availability (UNU, 2000). But there has been little attempt to analyse the links in the production-consumption chain at the level of households and individuals in the context of food security and livelihoods.

A number of scientific inquiries which focus on a specific sub-system at a macro, watershed, community, or micro level, were driven as policy impact evaluation, or in search of cause and effect relationships to estimate relevant parameters. Both qualitative and sophisticated quantitative analyses have been applied. The literature encompasses multi-disciplinary research in the areas of agriculture productivity and degradation, resources and livelihood systems, development pathways for rural development, household decision-making, poverty and food security, and health and nutrition. This rich body of literature has, in fact, influenced this study which takes on the idea of integration at the micro level.

4.1.1 Research questions

The main research question posed by this thesis is:
How do the livelihoods of farming households impact household food security in a context of ecologically fragile environments?
This main question is further specified:

- How does the situation in ecologically less favoured areas affect the livelihood portfolio and generation of livelihoods?
- What is the mix of livelihoods households in less favoured areas engage in, and why?
- What are the assets and resources available to these households? What are the conditioning and constraining factors to their use?
- How are the livelihoods, budget allocation and resource use differentiated according to age, gender, and the household life course?
- What are the conditioning and constraining factors which produce differential effects on household food security and intra-household distribution of food and nutrients?

These questions will be addressed on the basis of the conceptual framework elaborated in this chapter.

4.1.2 Scientific contribution and scope

Two representative types of fragile areas were considered in this research. One is the nature-vulnerable coastal-upland community with multiple land uses. Here, the food crops are cultivated with short or long fallow, on moderate to heavily-eroded sloping lands, and the relatively fertile highlands cultivated with commercial crops like abaca or tree crops. Additionally, there are some small industry/service labor market opportunities inside or outside the community. This village is a small watershed in itself: it has some degree of controlling its common property, public and private resources. The other village is located in a lowland flat plain, mostly rainfed crop systems growing annuals and perennials with some irrigated rice farms, prone to flooding. There are no small-industry labor market opportunities. This community is part of a wider watershed over which it has no control. The descriptive details of these two villages are elaborated in Chapter 6. Though care was taken in the choice of research sites for representativeness, the results are applicable only to similar situations as to the characteristics of households, farm systems, communities and their environments as defined and described in this study. Thus, the interpretation of the study findings should be taken in the context of these agro-ecologies.

The scientific contribution of this thesis rests on the proof of feasibility and usefulness of the livelihood framework in assessing the food security situation of households in fragile environments, through an integrative approach that explores the interrelationships along the production-consumption chain. In particular, the study hopes to contribute to a holistic

assessment of food security in its three dimensions: availability, access and adequacy. In addition, the results of such an approach are expected to contribute to a grounded understanding of the processes that lead to food (in)security, and thereby, hopes to enlighten policy making.

4.2 Concepts and context

4.2.1 Fragile areas and fragility

The physical context of the study is "fragile lands" because food security is a most critical concern in nonprime lands that are ecologically fragile, marginal or vulnerable. Large portions of intensified agricultural production in the Philippines involve the substantially fragile areas of uplands, sloping hills and mountain areas. Most of the poor households are living and farming in these lands. And the poor are the most vulnerable, the most food insecure. Therefore, there is an association of resource vulnerability, agriculture, poverty, and food insecurity in less favoured areas. Hence, social concerns about food security will need to be firmly grounded in the biophysical context; in this case, the fragile areas.

The terms fragile lands and marginal lands are often intermingled and used rather loosely. Marginal lands are those that respond less well to human inputs than do other lands, while fragile lands are those seen as easily degraded. The latter are commonly, but not always, marginal as well. This view of fragile lands connotes a biophysical trait, that is, the stress on "nature's endowment". But it has been increasingly and strongly argued that a purely biophysical notion is too limited because biophysical and socio-economic factors interact in ways that affect production. The argument followed in this study is one that is based on a nature-society relationship in a specific land use-management context: that the forces of nature and human actions interact impacting on both the human and environmental conditions. That part of "nature" which is given (e.g. physical traits of the soil) as well as the forces over which man has no or little control (e.g. typhoons), and "society" in terms of households, i.e. their socio-economic characteristics and socio-cultural processes, are dynamically interacting realities. (Turner and Benjamin, 1994; Bebbington, 1999; Wood *et al.,* 1999). Whichever among the various factors are more significant and important is an empirical matter.

The dictionary defines fragility as the quality of being "easily broken, shattered, damaged, or destroyed" (Encarta). Here, it implies a mismatch between human use and biophysical conditions. For example, inappropriate use of machines or tools on sloping farms or certain soil types can trigger rapid environmental deterioration, reflecting "fragility" in that use-environment relationship. The same land, however, with appropriate farm tools or practices and other inputs may sustain agricultural production. Fragility is an attribute of all land or ecosystems under use. "Fragile lands", however, refer to a condition, not an attribute. The latter are lands that are already "so sensitive to biophysical deterioration that common uses cannot be sustained and the land does not readily recover; or may lead to irreparable

damage…or areas with easily disrupted ecologies", implying that the disruption is human induced (Turner and Benjamin, 1994:111; Blaikie and Brookfield, 1987; FAO, 1981). Adopting the meaning of fragile lands, this thesis uses interchangeably the terms fragile areas and less-favoured areas (LFAs).

Some environments are more susceptible to human-induced deterioration than others, given the same use. And it is increasingly recognised that human use is instrumental in starting the degradation process. With soil erosion, for example, Brown and Wolf (1984) imply that fragility is not simply a function of soil depth, but also of the pressure to produce, the lack of awareness about erosion-related damages, or the lack of incentive to avert such. Recent literature suggests an increasing awareness of the importance of socio-economic and political processes in the creation of fragility, portraying fragile land as resulting from nature-society interaction (Turner and Benjamin, 1994).

Researches in rural areas in the humid tropics of Asia and in the Philippines show that the survival capabilities of the poor who live in fragile areas are directly threatened by environmental degradation. Farmers have observed declining quantity and quality of water over the years: the drying up of water courses, flooding with heavy rains, declining length of the rainy season. These are attributed to the destruction of the watersheds as a result of commercial logging. Others attribute resource degradation to the activities of poor farming households, who grow a range of subsistence crops in sloping and marginal uplands and resort to agricultural practices that lead to even more degradation. These practices further reduce sustainability of agriculture through siltation and damage of irrigation facilities (Garrity *et al.,* 1993; Lapar and Pandey, 1999; Wood *et al.,* 1999; Ellis, 2000).

Tropical and subtropical soils are generally more sensitive to degradation and subjected to more severe climatic conditions than the temperate regions. Large numbers of people in Asia live in areas with poor quality soils that need careful management just to maintain production. Of the world's soils free from significant constraints, only 15 percent are in the tropics. On a global scale, about 45 percent of agricultural lands are on slopes of 8 percent and over. In Asia, about 78 percent of farmed lands are on such slopes, hills and mountainous areas. High numbers of people in Asia live in areas with moderate to high vulnerability. The GLASOD (Global Assessment on Soil Degradation) survey found that in the hilly and mountainous areas like the Philippines and drylands (as in South Asia) the extent and severity of land degradation is much worse, and most serious in areas for annual croplands. Higher rates of productivity loss were documented for India, Pakistan, Thailand and Philippines. Nutrient depletion is associated with areas of intensive crop production with low input use (Scherr, 2003).

After World War II, increasing rates of rural population growth have increased agricultural activity both by expansion, and intensification. Intensified farming due to increased population has been associated with land degradation. This reasoning is drawn from the relationship between population

growth and the concept of carrying capacity of land. The latter refers to the maximum amount of stress that the environment is able to absorb. Stress in this sense could be brought about by the demands of an ever growing population. This is mainly due to the excessive use of the local environmental resource base. Soil erosion, for example, could result from intensification through population pressure. Thus, when soil is eroded, farmers must use fertilizers or other soil conservation measures in order to maintain agricultural output (Dasgupta *et al.,* 1994).

Specifically, the fragile areas in this study are defined on the basis of highly erodible topography, or flood-prone areas, with relatively poor soils. Soils are marginal because they require large labour and organic inputs to sustain intensive use as well as extensive fallow cultivation. They are fragile because of the erosion and nutrient loss that follow from intensive use without appropriate inputs and techniques. In addition, the mix of institutions (e.g. market, credit) and support system (e.g. technology, extension) that permit households to balance subsistence with other needs is often inadequate or none at all. These create pressures resulting in non-sustainable land-use.

In fragile areas, the farming systems are complex, highly heterogeneous, generally low in productivity, and dominated by small resource-poor farmers. Ultimately, fragile areas are a logical context of the environment-poverty-food security critical triangle of development (Chambers, 1989; Ellis, 2000; Lacy *et al.,* 2003).

4.2.2 Food security: concept and measurement

For at least three-quarters of a century, the struggle to address hunger in many of the developing and less developed countries is arguably the most studied, most funded and least achieved of scientific and development endeavors. And with unquestionable logic: because the right to food is a basic human right. The Universal Declaration of Human Rights of 1948 (Art. 25:1) and the International Covenant on Economic, Social and Cultural Rights of 1966 (Art. 11:1) were unequivocal in articulating the right to a standard of living adequate for the health and well-being of everyone and their family, including adequate food. The Rome Declaration on World Food Security of 1996 (reviewed in 2002) has been more explicit, and reaffirms "the right of everyone to have access to safe and nutritious food, consistent with the right to have adequate food and the fundamental right of everyone to be free from hunger".

The World Bank (1986) defines food security as "access by all people at all times to enough food for an active, healthy life" (Maxwell, 1990:3). FAO defines food security as a situation "when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (www.fao.org). More explicitly, Maxwell and Frankenberger define "enough food" in terms of calories and nutrient requirements for an active healthy life, and not just simple survival. In popular terms, it can be understood as the absence of hunger and malnutrition, and that in order to be food secure

households must have enough resources to earn a living to have access to adequate food. These definitions are explicit in suggesting the three basic elements of availability of food, the ability to acquire or be able to afford it (i.e. access or entitlement), and adequacy of food for a healthy life (Maxwell, 1988, 1989; Frankenberger, 1992). This implies that a country is food secure when its food system functions in such a way that people, even those who are vulnerable, will have secure access to enough food. Food security, as a target of policy, includes three specific aims: ensuring adequate production of food, stabilizing the distribution of supplies and securing access by those who need them, and ensuring an environment for households and individuals to adequately have them (Huddleston, 1990; Maxwell, 1990).

These definitions tread on common grounds. They focus beyond concerns of supply and variability of food production. They also focus on access which relates to the concept of entitlement. The latter refers to the command over food by households or individuals, and implies that people do not necessarily starve from an insufficient supply of food, but because they possess insufficient command over, or access to, food (Sen, 1980, 1981). This concept logically relates food security to the dimensions and causes of poverty, and with the effectiveness and efficiency of the supply chain and distribution systems. Necessarily, these recognize the wider range of processes involved from production to marketing and consumption issues, and various levels of analysis from the household, the community, to the food systems chain as a whole.

Measuring food security is not without its limits and difficulties because it covers a broad range of elements; each with its particular set of determinants and outcomes. Therefore, it entails a specification of which element is relevant and for what purpose. For example, an analysis of supply of cereals for a specific time and place, does not give a complete picture of food security as it relates only to the element of food availability. A country can be food secure as measured by its food balance sheets, but may have a significant portion of its population suffering from malnutrition at the same time. Aiming for a complete analysis is a gigantic task indeed. At best, a mix of indicators can be used.

The literature on food security shifted away from the pure macro- and market-orientation in the wake of the African and Asian food crises in the 1980s, as evidence showed that reported adequacy in a national or regional food supply was not translated into food security at the individual and household levels (Frankenberger, 2001). There was mounting evidence, in fact, that many of the rural poor produced their own food, or they were gathering wild foods, which were not sufficiently reflected in national statistics if ever they were. All these form substantial part of the poor's food provision (Ulluwishewa, 1995; Omosa, 1998; Resurreccion, 1999, 2001; Price, 2000). With these, the market income-centred explanation for food security is just a part of the food security equation, and has been in disrepute as the main consideration in informed food policy decisions.

In the 1980s, household food security was approached in terms of availability and access; food availability at the national and regional levels, and stable and sustainable access at the local and household level. Both were considered basic to household food security. Initial interest focused on production and food systems, and other factors that influence a food supply and household access to a food supply. It is not quite clear how nutritional outcomes came into the food security equation (Frankenberger, 2001). It probably came as a matter of course in eclecticism; and in attempts to get a comprehensive picture and adequate indicator of food security. In the 1980s through the 2000s, various CGIAR system-wide studies (e.g. IFPRI, IRRI) brought to light more sophisticated inquiry and in-depth understanding of the impact of household-individual-specific factors on intrahousehold nutrients distribution and their adequacy (e.g. women's education, time and income on household welfare). Over time, ideas on food and nutrition have evolved around the concepts of food availability and food entitlement.

In this study, household food security is considered as a major outcome of the generation of livelihood by farming households. This adopts the concept of food security understood in terms of the elements of availability, access, and adequacy. The concept is analyzed at the micro-level, the household, and where relevant, at the individual and community levels. This demands an insight into household activities from production to consumption and understanding of intra-household dynamics that affect obtaining and allocating food within the context of specific biophysical and socio-economic and socio-cultural environments (Frankenberger and McCaston, 2001).

Food availability at the household level refers to the ability of the household to have enough food, either from own-production, purchases, gathering wild foods or food donation, in order to meet adequate nutrient needs of individual members. Availability encompasses the view of food sufficiency in the sense that food production and supply could be depended on even in times of shortages due to natural causes such as climate. Embedded in this concept are issues of natural resource preservation and enhancement of the natural resource base, concerns that guarantee sustainable production in the long run. Availability indicators also include a mix of information that bear on a food supply such as meteorological data, agro-ecological data, agricultural production, pests and their management, markets and distribution system, institutional support structures, and food balance sheets (World Bank, 1986; Maxwell, 1990; Frankenberger, 1992).

Food access is understood in terms of Sen's (1981) concept of entitlement which had considerably changed the thinking on food security shifting away from the mere notion of famine. Sufficient national food supplies (as given in food balance sheets) do not guarantee all to have equal access to food. Famine seems to hit sub-populations. In this sense, food access is determined by the ways and means which enable households to get food as well as the social mechanisms that get households through in times of periodic shocks. The "ways" include whether food is own-produced, purchased, given or gathered from the wilds, or obtained through kin or community support.

The "means" are reflected in measures which include assets, resources and liabilities of households (e.g. land, work animals, labour, savings, common properties and facilities, social contracts in production, consumption, services), the mix of livelihoods, and strategies to improve access. Risk-minimising strategies (e.g. livelihood or enterprise diversification, cropping pattern adjustments, migration) that ensure some production and adjust resource use, improve access. Increased farming in forest or marginal areas (extensification) or overuse of particular plots (intensification) which can destroy the environment, qualify the nature of access (Sen, 1981; Maxwell, 1996; Frankenberger, 2001). Thus, a number of socio-economic variables influence a household's access to food. For poor people, however, markets cannot guarantee an effective way of distributing food. This is an argument for some kind of government intervention necessary to address the issue of access (Lacy *et al.,* 2003). In this thesis, the livelihood approach is the main vehicle by which the concept of access is operationalized.

Food adequacy in this study is understood in terms of nutritional adequacy at the household and individual levels, and is treated as part of the holistic concept of food security. Nutrient adequacy refers to the different nutritional needs of household members, and is measured by the nutrient intake (e.g. calorie, protein, other nutrients) of individuals in relation to a recommended daily allowance of the specific nutrient. Nutrient demand depends on a host of factors which are internal (e.g. age, sex, household size) and external (e.g. drinking water, sanitation) to households and individual members. Intra-household nutrient intake is measured to distinguish adequacy at the individual level because individuals such as children and women have specific requirements and nutritional needs. The concept of food adequacy also includes the health concerns of household members (Berman *et al.,* 1994; Bouis and Peña, 1999). Adequacy measures would include information on the household food expenditure and consumption patterns (i.e. purchased, own-production, gathered or given) and, importantly, the measurement of food intake and nutritional status (including anthropometry).

This study will use both process and outcome indicators of food security. The process indicators reflect the elements of food availability and access, while the outcome indicators reflect food adequacy.

4.2.3 Livelihood system perspective

The study places food security in a livelihood systems context, in which food security is seen as a major outcome of livelihood generation by households. Experts have argued that food security is but one element of livelihood security and that indicators of the former should not be interpreted independent of a good understanding of the latter (Maxwell, 1996; Chambers, 1989; Maxwell and Smith, 1992; Davies, 1993; Frankenberger and Coyle, 1993). A recent Philippine study revealed that people may be food secure with a secure livelihood but not necessarily nutrient secure (Balatibat, 2004). Whether outcome or element, it is asserted here that food security is

understood and assessed more meaningfully, and clearly, if seen from a livelihood systems' perspective. The word "outcome" stresses and presupposes the existence of processes critical to whether or not food security is achieved.

This thesis holds the livelihood systems approach as fundamental in order to understand the interrelations between the physical natural environments, the socio-economic environments, and the internal environment of the household. In this context, the livelihood systems perspective applied to the small farming household recognizes the multiplicity of activities (farm, off-farm, non-farm) that the household pursues to provide for income and food that will satisfy the other material needs, and conditions the satisfaction of non-material needs (Niehof, 2004). Indeed the movement away from the farm is evident in the rural communities and the conventionally called 'farming households' are actually decision units of multi-activities. The pathway to the betterment of these households can no longer be simply taken in terms of agriculture but in terms of a system of opportunities and choices including non-farm livelihoods. This approach moves away from the "agriculture first" strategy that was dominant before the 1980's where emphasis was on farming as the means towards rural development and poverty reduction (Mellor, 1991).

Livelihood: a definition

The dictionary defines livelihood as "work done to earn a living" (Encarta) and is, therefore, not merely reflective of the outcomes such as income or consumption of which it is aimed. Importantly, processes are embedded in the concept and these refer to the ways in which a living is obtained. Niehof and Price (2001) distinguish livelihood (i.e. the material means whereby one lives) from livelihood generation (i.e. the process where the mix of activities that people undertake provides for their needs). The concept of livelihood includes what people do with their assets and resources, how they allocate such resources, and what they achieve by doing it. They further stressed the importance of distinguishing between activities, resources and assets from processes and outcomes. The flows or stocks of income and food (i.e. outputs) result from the process of livelihood generation. Livelihood generation implies action being undertaken in a multifaceted and dynamic system.

Chambers (1989) specifies the adequacy of stocks and flows of food and cash to meet basic needs, and defines livelihood as comprising the "capabilities, assets (i.e. stores, resources, claims and access), and activities required for a means of living". Adopted by many researchers using a rural livelihoods approach, this features the links between assets and the alternative activities people can adopt to obtain the income needed for survival. As derived from Sen, the term "capabilities" refers to the ability of individuals to realize their potentials as human beings (Chambers and Conway, 1992; Sen, 1993, 1997; Scoones, 1998).

Ellis, however, argued that the use of "capabilities" is potentially confusing because of the overlap with assets and activities which tend to blur process and outcome. Capabilities both influence and are influenced by personal and household livelihood strategies as they evolve. Thus, Ellis

defines livelihood as comprising "the assets (e.g. natural, physical, human, financial and social), the activities and the access to these, which is mediated by institutions and social relations, that together determine the living gained by the individual or household" (Ellis, 2000:10). On the other hand, assets are not only means but also give meaning to individuals, and thus, build capabilities and capacities which of themselves help create assets further. Such a process of asset and resource accumulation of individuals and households can challenge existing structures and pave the way for change or improvement. These assets build-ups pave the way to improvements of access and could affect the decision-making on the mix of activities or livelihoods (Bebbington, 1999; Ellis, 2000). However articulated, the composite of assets and resources, activities to obtain the means for living, and the access to all these, are common threads in the understanding of livelihoods and their generation.

The desired output is livelihood security where the household provides for its members' needs in a sustainable manner. Livelihood failures make a household vulnerable to income and food insecurity. Although livelihood security is a precondition to food security, the former does not necessarily translate into nutrition security because of such factors as gender (i.e. women's control of income more likely to improve nutrition), sanitation, hygiene, potable water, care and morbidity (Chambers, 1989; Quisumbing, 2003: Balatibat, 2004). Wheatley (1998:4-5), citing WCED (World Commission on Environment and Development), defines sustainable livelihood as "adequate reserves and supplies of food and cash to meet basic needs". He says further explicitly that "sustainable livelihood can be assured through stable employment with adequate remuneration, engagement in productive activities which are ecologically sustainable and economically sound, ownership of or access to resources and their management, within their capacity to recover". He stressed the importance of value-adding farm-based enterprises within a sustainable agro-ecological system.

Chambers (1989) describes sustainability as the ability to maintain and improve livelihoods while maintaining or enhancing the assets and capabilities on which livelihoods depend. Vulnerability has to do with not having enough assets and the inability to create, maintain, or secure a livelihood (Swift, 1989). The livelihood then generated is not adequate and cannot be maintained in the long run. Sustainable livelihoods can withstand stresses and shocks and are able to bounce back when affected, while vulnerable livelihoods cannot cope with stress and shocks without being damaged. Vulnerable households have problems in providing for their members' basic needs, are unable to create a surplus, and often are chronically in debt (Niehof and Price, 2001).

Assets include a number of components, some of economic categories of different types of capital, and other non-economic types such as claims and access (Chambers and Conway, 1992). With this overarching definition, the question is which types of capital or stock can be legitimately included. Followers defined what to be included such as Scoones (1998) who included

five types of capital: natural, physical, human, financial and social capital. These same types are also adopted by Ellis (2000).

Access is defined by the rules and social norms that determine the differential ability of people to own, control, otherwise claim, or make use of resources such as land and common property. It is also defined by the impact of social relations (e.g. gender, class), and is also referred to as the ability to participate in and derive benefits from, social and public services such as education, health services, roads, water supply, technology, etc. Ellis (2000) modified Chambers and Conway (1992) by stressing the importance of the notion of access and the impact of social relations (i.e. gender, family, kin, class, caste, ethnicity, belief system) and institutions that affect an individual or family's capacity to achieve its income or consumption requirements. Social and kinship networks are essential for facilitating and sustaining diverse income portfolios (Berry, 1989; 1993; Hart, 1995; Bryceson, 1996). Also, social norms on permissible courses of action by women can spell a big difference to the livelihood options among women as compared to those of men (Dwyer and Bruce, 1988; Davies and Hossain, 1997; Niehof, 2004). Institutions are also critical to access since they are ingrained patterns of behavior which are structured by the rules of society, have widespread use, and thus help shape human interaction. They determine the way markets work (including the degree of trust), local rules of access to community resources (grazing and forest), land tenure and security to tenure (Carswell, 1997; Leach *et al.,* 1997; Ellis, 2000).

Livelihood portfolio and strategies

Alternative livelihood activities (i.e. farm, off-farm and non-farm) open to households are diverse to a limited or wider degree, depending on the assets, resources, and the environment of opportunities (i.e. access included). This resource-using mix of activities that households engage in in order to earn a living for various ends (e.g. adequate food, clothing, shelter; better education, save for enterprise) is called the "livelihood portfolio". (Ellis, 2000; Niehof and Price, 2001). In different situations and for various reasons, rural households have increasingly maintained a diverse set of livelihoods (i.e. some permanent, some transitory; all transitory or seasonal). Rural livelihood diversification has become a strategy of households in order to survive and improve their standard of living (Ellis, 2000; Reardon *et al.,* 2001; Niehof, 2004). It also has become a rural development strategy in the last two decades moving away from the purist view on agriculture as the main development vehicle. In this study, the concept of livelihood portfolio is the basis for the definition of "livelihood type" which is used to characterize households, and also as a variable used in various analyses.

The diversity of livelihoods carries with it different sets of relations in the social, economic and political arena. The related factors and pressures that go with the process cause households to adopt even more varying livelihood strategies. In many cases, a rural community with highly diversified livelihoods figures a decreasing proportion of income contributed by farming

and reflects the increasing importance of non-farm contribution (Pender, 1997; Reardon, 1997; Ellis, 2000).

The various ways or processes (i.e. using skills and capacities to use/manage assets/ resources in certain ways) to generate livelihood is referred to as "livelihood strategies" (Niehof and Price, 2001). This term can be used rather loosely. Its use here supposes at least some amount of awareness, among the income-asset contributors and decision-makers, of what action to take. There may be discussion between household members, who may or may not agree but are at least are dimly aware of what others wish to pursue. It is helpful to note that strategies (i.e. in the sense of logical choices) are not the only stimuli to action; people get by, or may act impulsively or irrationally (Anderson *et al.,* 1994; Pennartz and Niehof, 1999). Human beings can be rational or otherwise, and this also bears on the analysis and understanding of livelihood strategies.

Livelihood strategies may be adaptive or coping strategies. Adaptive strategies are long-term or permanent changes households or individuals make to acquire adequate food or income, while coping strategies are fall back mechanisms to deal with short-term inadequacy of food (Davies, 1993). Adaptive strategies could include out-migration to town or cities for some permanent non-farm work, cropping patterns fitted to season or land-suitability criteria, or education of children. Coping strategies are livelihood strategies which are aimed at dealing with recurrent, hence foreseeable, situations of stress. Coping strategy, as strategy, should be distinguished from coping per se. When people or households are just coping, they try to manage a stressful event or situation for which they could not prepare (Boss, 1988). In relation to food security, coping strategy refers to the short-term response to an immediate and uncommon decline in access to food (Davies, 1993). Thus, coping strategies may be either seasonal coping strategies (e.g. production, diet); cultivating social relationships (e.g. patron-client relationships, gift-giving for later food assistance); diversifying income and food sources (e.g. off-farm or non-farm work, family support, wild foods); drawing on stores or assets by selling or mortgaging (Longhurst, 1986, 1988).

Livelihood approach

Using the above definition of livelihood and the related concepts on livelihood portfolio and livelihood strategies, a livelihood approach is adopted in this study. This approach departs from the conventional mainstream economic approach to rural poverty reduction and food security concerns. The latter uses the growth linkage model as the way out of rural poverty and achieving food security by means of increasing agriculture productivity. In turn, this stimulates the growth of rural non-farm activities through the linkage effect of increasing farm outputs and incomes. The usual starting point of analysis is the farm or rural economy. Agriculture-led rural development approaches search for patterns of cause and effect with universal applicability in order to identify and prioritize policies and projects. In the livelihood approach, the focus of analysis is the household and with greater emphasis on process in

addition to a consideration of outcomes. Strategies are decided through a process that takes place within households, with decisions bearing on their circumstances which may be in conflict with agricultural productivity considerations. The livelihood approach does not necessarily seek nor require cause-effect patterns of wider applicability. Poverty reduction or food security initiatives need to fit or be adapted to support the households' own circumstances and livelihood strategies. Wider applicability is sought but not limited by such requirement (Mellor, 1991; Ellis, 2000).

In the livelihood approach, the focus of analysis is neither sector nor commodity-oriented but takes households or individuals with diverse livelihoods and incomes as key features. It is not premised on a single-chain causality linking farm productivity and rural development or poverty. At the start, it recognizes the complexity in dealing with livelihoods, and thus, the options and strategies particularly of the poor farming households need to be understood in totality of their circumstances (Ellis, 2000). This study views the livelihood approach as a useful framework since the challenges and opportunities among the rural populace in contemporary times are more than just agriculture, which many are wont to leave.

4.3 Resource environments

Assets and resources defined as the set of the biophysical, economic, and socio-cultural endowments are applied in the study. They are used by households in the process of making a living. Broadly, they are inputs to the livelihood system. Assets are stocks of tangible (i.e. physical and material) and intangible (e.g. skills, property access or use rights, kinship, and social networks) stores of value or claims to assistance. Assets can be converted to resources, understood as flows, when used as inputs to the production of goods or services, or in response to crisis. For example, livestock is an asset if kept for its value, but can be converted to cash (by selling) in response to a crisis. Livestock is a resource when used in farming (Niehof and Price, 2001).

Corollary to asset is the concept of liability, where the latter is viewed as the opposite. Good health, savings, and land are assets whereas bad health, credit and claims to land are liabilities, respectively. In rural communities and farming households, accounting for liabilities (at household or community levels) could give width and depth to the limits and constraints households face. Indeed, a negative balance may help explain a downward growth spiral, or cycle of poverty (Bebbington, 1999; Niehof, 2004).

The biophysical resources consist of the soil, water, terrain, and agro-biodiversity or vegetation which are the conditioning factors in farming. In fragile areas or less-favored environments, the physical resources are often limiting, and require appropriate interventions for their productive and sustained use. The economic resources consist of the incomes, physical and financial capital, and other inputs acquired or open to farmers. As stocks, they are the outputs generated from previous period activity; in the resource sense, they are determining factors. Income generation and savings-investment

decisions are critical in resource dynamics. The human resources include skills and knowledge, while the socio-politico-cultural resources include property rights, access rights, institutions, organizations and social capital. This mix of relations can be enhancing or constraining, and are liable to improvement by the community or governance.

Niehof and Price (2001) distinguish a matrix of material and non-material resources at personal, household and environmental levels which can be used in characterizing households and sites, or in analyzing for strengths, weaknesses, opportunities and threats to address interventions at these different levels. The material assets include: physical strength, health, talents (personal level); space, income, tools, buildings, livestock (household level); land, soil, water, biodiversity (natural environment); and infrastructure and biodiversity (man-made environment). Non-material assets include skills, education, gender, experience, capabilities (personal level); experience, knowledge, management, information (household level); kinship (natural environment); and market, social/political institutions, support networks (man-made environment). With these distinctions, the concept of entitlement concerns the linkage between the levels. Personal and household levels can determine access to and claims on environmental resources such as land. For example, males may have the sole right to claims on land in certain societies, while household incomes and connections may determine entitlements to public positions.

Livelihoods are adequate or sustainable depending on the ability of households to access resources and the way households combine and use them without depleting their resource base. Household members may also have differential access to and control of resources by gender (as prescribed by socio-cultural norms), age, or education (Ellis, 2000; Niehof and Price, 2001). The intra-household allocation and use of resources is one of the critical processes that will be treated in this research. Where relevant, inter-household processes will also be analyzed, particularly those involving networks of relationships, and institutional or organizational rights and arrangements as they impinge on the household's decision-making on livelihoods. The community level is more than inter-household interaction as it also includes ecological and socio-political constraints and opportunities. It constitutes a context wherein household livelihood systems operate.

4.4 Household concept

4.4.1 Household: the differing views

The household is a common ground which different theoretical lenses can be focused on. When taken narrowly, these lenses could be limiting our insights into social reality. The household has particular relevance to all the colours of social sciences since it represents the microcosm of all dimensions of societal behaviour.

Kabeer (1994) aptly described the differences among the social scientists' concept of household and its application for enlightened reasoning.

Economists tend to use a reductionist approach, with simplicity and elegance achieved through a process of theoretical and methodological reductionism. In order to obtain determinate outcomes, they transform the complex realities of life into an explicitly defined econometric model using tightly bound concepts which lend themselves to quantitative approximation (Kabeer, 1994). Economists tend to represent behavioural realities to their barest essentials. They are concerned with how the basic allocation activities are organized through the fabric of family, kinship and other relations (the traditional domain of anthropologists), using quantitative models in order derive "signals" to inform policy. Households are viewed as performing generic dual functions: that of production and consumption. As a producer it uses resources to produce with the profit maximizing objective. As a consumer, it maximizes utility or satisfaction. These basic assumptions have guided economists in their empirical investigations, and have informed and shaped a range of different policies. The economists' main explanation of household behaviour dealt with two major streams of theories (with various specifications in recent years): one which treats the household as a unit of altruistic decision making, and one which considers it a site of bargaining and conflict.

On the other hand, sociologists and anthropologists are dubbed as students of noise because of their tendency to give attention to exceptions, details and diversity, and a general aversion to certainties, generalizable patterns of behaviour and the larger picture; just "too much noise and not enough signals" (Kabeer, 1994:97). Anthropologists see households with the filter of cross-cultural diversity of household forms characterized as shifting flexible structures. Boundaries are difficult to draw because of the wide range of composition and social relations made possible through marriage, kinship, and other forms of inclusion. Thus, different conjugal and residential arrangements are possible across cultures (Evans, 1991). Some even question the validity of household as a concept (Roberts, 1991), and challenge having the notion of residence, the productive and reproductive functions fused into a single entity, resulting in a monolithic, bounded and unchanging domestic group (Kabeer, 1994).

The volumes of discourses on even just defining the household should be quite enlightening. First, because they further confirm the critical importance of the household as a unit of analysis. Secondly, for a researcher, these allow one to better screen off what is relevant for one's purpose, while being informed of the differing views.

4.4.2 Household: the point of analysis and definition

The definition of a household is not without difficulties. Each country uses its own definition for its own official statistical purposes. This is also the basis by which income and expenditure account, and food balance sheets are made and estimated, and poverty figures constructed. Comparability then becomes an issue when such country statistics are used to depict poverty and the food security situation. If in consideration of the researcher's purposes the official

definition does not correspond perfectly, care needs to be taken that the limitations are understood.

The household is the focal point of analysis since it is the basic social unit with social and economic interaction among its members who combine their capabilities, resources and skills to undertake activities related to production, reproduction and daily maintenance. Interests may be shared by members as their general well-being, but with room for familial and personal conflict and struggles. Analysis takes into account the individual and collective considerations and decisions. Distinct and separate choices of each member become part of the analyses, referred to as intra-household dynamics. Within the household, there is some kind of joint strategy or joint decision-making. Yet, individual members can follow their own decisions or strategies for their individual pursuits, not necessarily benefiting the whole household. There could be limits to these individual pursuits as being in a household entails preserving a minimum level of solidarity. Where relevant, inter-household linkages among different households within a cluster or community are considered particularly when they impact on decisions by household members (Jelin, 1991; Hardon-Baars, 1996; Pennartz and Niehof, 1999; Niehof, 2004). This implies that livelihood portfolio and livelihood strategies are analyzed at the household level as well as taking into account differences within households as brought about by gender, age and differences in assets and resources (Harris, 1981; Kabeer, 1985; Murray, 1987; Brydon, 1993).

Social scientists themselves lack unanimity both as to the concept of household and its application. Household is defined with reference to a physical place, a mode of social organization, or as a cluster of functions (Wilk and Netting, 1984). Ingrid Rudie's (1995:228) definition as that of "a co-residential unit, usually family-based, which takes care of resource management and primary needs of its members" combines all three criteria. The "common hearth and common pot" idea focuses at first glance on the eating arrangements, but also implies the inclusion of those involved in the processes of securing and preparing food irrespective of kinship ties or dwelling place. Using this broad sense, complex or extended families that live in separate residences within a compound, but who have common eating arrangements can comprise a household. Many cases in Africa and Asia render its applicability useful.

While inclusive of the "common hearth and common pot" idea, this study views the household as the smallest unit where "production, consumption and social reproduction are organized, and where dimensions of social order and economic obligations are made manifest in intra-household relations" (Berman *et al.,* 1994:207). This study sees the household as the main setting within which daily life takes place and the center of processes that determine the welfare of the individual member. Using "function" as the criterion, this enables the inclusion of members living outside the home but contributing significantly and regularly to the household functions. These could be children or spouse working in the town, city, or abroad who send remittances for the sustenance of parents/family or help in capital inputs to

farm and enterprise. That is, for as long as they play a significant role in decisions and actions relating to livelihood strategies and food security of the household. Otherwise, such members are considered mainly as support, not household members. An example would be a daughter married to a foreigner, who sends an allowance but only irregularly.

4.4.3 The farming household

Most of the households in the study are farming households where the reported major activity is agriculture but where the dimension of farm is integrated with the dimension of the household. In this way the farming system becomes an integral part of the household and livelihood systems. Empirical evidence shows that what may at first be called "farming households" may have a large component of their income coming from non-farm sources. This has important policy implications because such reality-distortion can give wrong signals even to the local policymakers.

A small farm household is a composite of the attributes of two basic micro-analytical entities: the "household" (as a consumption unit) and the "firm" (as a production unit). Traditional economic theory has dealt with each separately by simplifying the economic allocation problem in terms of a constrained utility maximization. This dichotomy is acceptable for economies where consumers derive most of their incomes from wages and do not produce for their own use, where producing units are distinct from consuming units. These distinctions are not quite useful in a "farm household economy" where the "household" depends on the "firm" to provide for its own requirement for food and other needs, and the "firm" depends upon the "household" to provide its major inputs into production (i.e. family labor mainly, and time). The household-firm is one and the same unit. Thus, its decision-making processes must simultaneously take into account the considerations applicable to each of these 'conventionally' discrete units. The small farm household chooses between work and leisure (i.e. non-work use of time), between present income (for consumption) and future income (saving to invest in the future), and between the amount of income converted to money income. These will affect their choices between different technologies, various livelihood options, production for own food or for cash, or between the use of own and indigenous and commercial inputs (Singh, 1988). The interdependence between the firm and household contexts of the household imply that their decisions cannot be treated singly or separately as in dealing with separate markets. The intra-household decision-making process cannot be viewed purely in economic terms.

Niehof (1998) views a farming household as one particular type where food production and consumption activities merge. The household has to be located within the food chain and its various interconnections. Thus, household food security, as a policy issue, research agenda and development goal needs to be viewed within the context of these inter-linkages. There is a need of an analytical model that highlights the linkages between the elements

in the production-consumption chain, the processes within the household, and the interaction of the linkages with the environment (Niehof, 1998).

Recent literature focused mainly on policy impacts on the welfare of farming households (i.e. using poverty indicators, health and nutrition indicators, etc.) as well as the resultant status of land (i.e. degraded or not) as explained through various survival or coping strategies in risk or stressed situation, or in situations of deficient natural resource endowments. Other studies traced the impact of women's allocation of time and income resources on household health and nutrition. However, there has been a heavy focus on outcomes or impacts, and a marked lack of attention to process. The latter could possibly explain why many of the findings (i.e. across and within countries) of the development pathways tradition are mixed as to the defined framework of relationships, and at times ambiguous with respect to gender roles. Others suggest that analysis should be grounded on the dynamics of the farming households, using the livelihood approach.

4.4.4 Gender-based intra-household analysis

Gender-based analysis of the household's various activities (i.e. productive, reproductive and maintenance), access and control of assets and resources, and decision-making is recognised as a useful perspective and tool in analysing how a household pursues its livelihood strategies, or in determining factors that affect household welfare. Various studies have confirmed that gender is a strong organising principle within the household and the role that each household member plays has important consequences for the household livelihood portfolio (Haddad, 1986, 1991; Quisumbing, 2000; Kabeer *et al.,* 1991; Niehof and Price, 2001). Whether and how gender matters is a subject of empirical investigation. Farming households may be jointly managed, mainly male or female managed, and exclusively male or female managed. The role of men and women in decision-making on livelihood and domestic issues may differ significantly according to the type of household and family or community subcultures. This is a complex issue and can only be clearly understood by empirical investigation. The household is the primary site for the structuring of gender relations and women's specific experience (Brydon, 1993; Chen, 1996).

Gender is critical in various aspects of the intra-household processes such as those that improve domestic chores and farm outputs, in the access and control of assets and resources, or in undertaking enterprises. Gender differentiation could exist in labour markets and cause different livelihood portfolio options for men and women, thus affecting household livelihood strategies. How assets and resources are accessed, used or controlled by men and women determine options and barriers to means of living. These also help explain income differences as well as the control and use over these incomes. Gender differentials can have impact on food security and household welfare (Ellis, 2000; Quisumbing, 2003).

Gender-based roles and responsibilities within the household are recognized as important for how a household pursues its livelihood strategies. However, these are coloured by culture and personal attributes, social norms, wealth and economic status, or technology use. In certain societies, women do not have the right to own property, neither do they have access to or control of household income, entitled only to the part they earn. Heavy farm work is usually relegated to men, household chores to women. More educated women who can earn better income, or are socially stable, are more engaged in household decision-making. With more opportunities in industry and cities, and pushed by declining farm productivity, men migrate to work in non-farm work outside, while women do the farm and household work assisted by the children. The control and allocation of resources within the household is a complex process which has to be seen in relation to a web of rights and obligations. The management of labor, income and resources is one which is crucially bound up with household organization and the sexual division of labor (Moore, 1988; Kabeer, 1994).

4.5 Conceptual framework

4.5.1 Defining the linkages

Separately, much has been done in-depth in analysing the dynamics in the degradation of agro-ecosystems in relation to socio-economic factors, land use and policy (Barbier, 1997, 2000 ; El-Swaify, 1997; Coxhead, 2000; Pender *et al.,* 2001 ; Scherr, 2003); the dynamics of household livelihoods and agriculture development pathways (Reardon *et al.,* 1998; Pender, 1999, 2001; Niehof and Price, 2000); commercialization of agriculture and food/nutrition security (Kennedy and Cogill, 1988; Longhurst, 1988; Katz, 2000); and factors affecting intra-household allocation of food/nutrients (Folbre, 1984; Rosenzweig 1985; Behrman, 1988; Senauer, 1988, 1990; Haddad, 1990; Pitt *et al.,* 1990; Bouis and Peña, 1999; Quisumbing, 2000). Each of these is a complex field of inquiry in itself.

Linking these spheres has become a serious scientific endeavour at least in the last three decades. Linkage assumes some relationship of variables in a chain of causation (e.g. population-environment relation, farm productivity, nutritional status). There are different research pathways possible, investigating linkage relationships in a holistic chain of events is one. A trend towards linking farm ecosystems, livelihoods and food security is gaining ground because of serious effort to treat, in holistic terms, the pervading question of poverty and food insecurity in the less developed world, especially in fragile lands which of themselves already make farm-based livelihoods vulnerable.

The environment-livelihoods-food security chain analysis at the household level still needs to be tapped. This is a formidable task because of the lack of sufficient data in the whole continuum from production to consumption. One way, as used in this study, is to define and establish the linkage via an assessment of biophysical and socio-economic endowments on

the livelihoods of households, and the consequent impact the resulting livelihood strategies have on household food security and individual nutritional status. The linked relationships along the chain from the biophysical and socio-economic resources to food security situation are then elaborated, starting with the effect of these resources on farm productivity. This is a critical initial point since households have to contend with the fragility of their biophysical environment. The linkage strategy involves identifying relevant variables found in the biophysical and socio-economic environments, and assesses their effect on farming productivity, and also on the households' livelihood choices and strategies. From these, the conditioning, enhancing or constraining factors are analysed as they affect the livelihood patterns that emerge and the resulting socio-economic status of farming households. Overall in the chain of relationships, the food security situation, at the individual and household levels, is analysed. Certain critical variables are then identified in the flow of causation. Thus, food security is directly or indirectly (i.e. depending on the variable under surveillance) influenced by the biophysical and socio-economic environments of the households via the effects on farm productivity, choice of livelihood portfolio, livelihood generation and strategies. Gender and age are cross-cutting variables in the analysis**.**

The conceptual framework in Figure 4.1 shows that the biophysical, economic and socio-cultural resources and assets are given or generated, used and managed by a household or its individual member(s) in order to strategize on the different livelihood options open to them (i.e. farm, off-farm and non-farm) and results in a mix of livelihood activities – the livelihood portfolio. Linking livelihoods and food security is premised upon the interplay of the biophysical and socio-economic realities faced by households. These resource environments, together with household (age, sex, dependency ratio) and health-related variables ((hygiene, morbidity) are factors in the chain of relationships that eventually impact on food (in)security. The household is at the centre as it is the focal point of analysis and where decision-making takes place. The livelihood system is the integrated whole of arrangements and activities carried out by households to achieve this aim. Households generate livelihoods where the ultimate aim is to achieve livelihood and food security. As food is the most important basic need for survival, an overlap between the concepts of livelihood security and food security is to be expected. Livelihood security, however, does not necessarily result to food security, as in the recent empirical evidence from research in coastal and upland households in the Philippines (Balatibat, 2004). Where households with secure or sustainable livelihoods are also food secure, the reverse is not necessarily always the case.

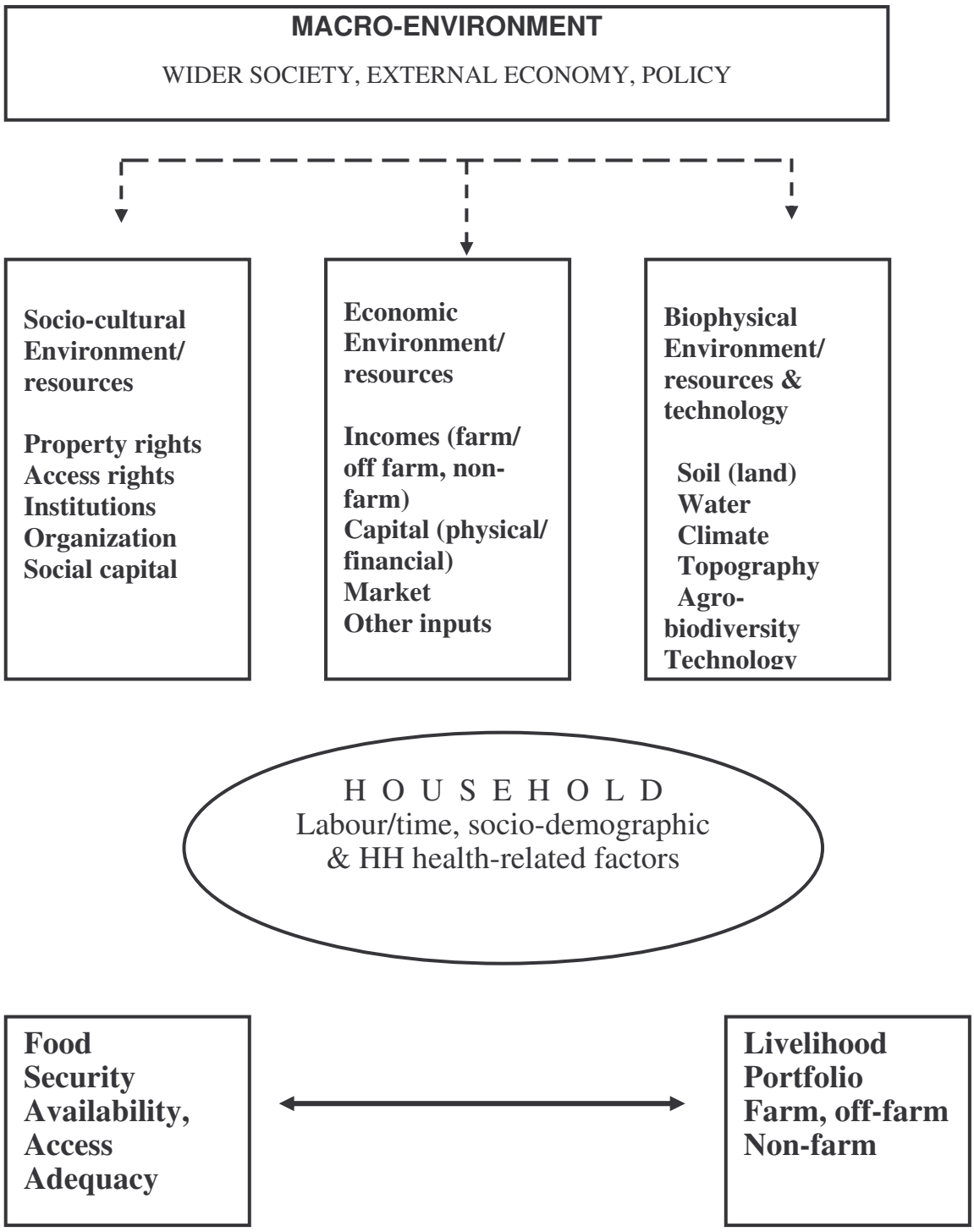

Figure 4.1. Conceptual framework in linking livelihood strategies and food security using the micro-perspective of intra-household dynamics of resource use and management

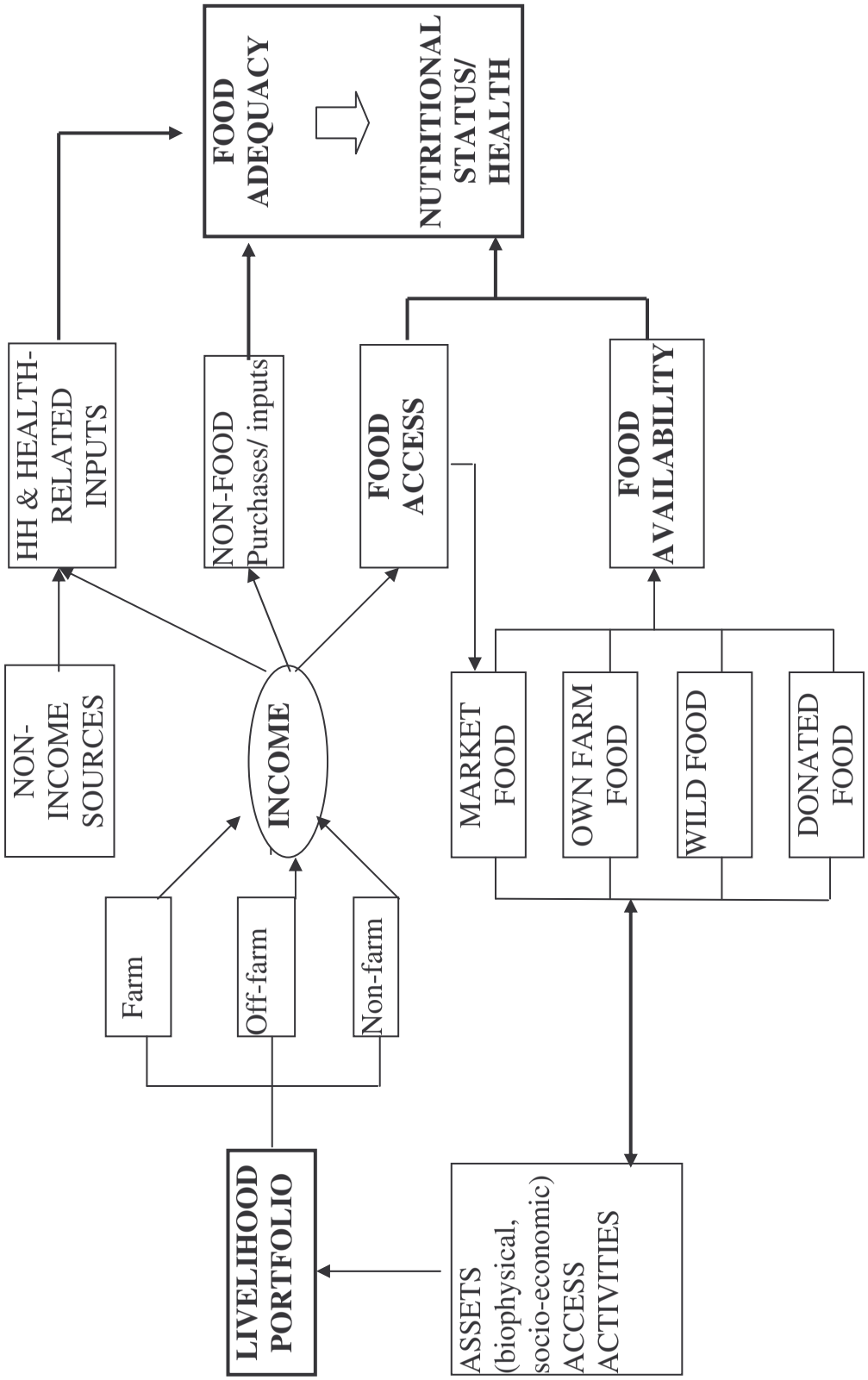

Figure 4.2. Schematic diagram of the relationships between livelihood strategies and food security

The relationship with the macro-environment is presented in dotted lines only because this is not the focus of this thesis. The study, however, recognizes the fact that the macro-environment (the external economy, policy) affects food security through the variables that they impact on and the inter-relationships of these affected variables at the meso/micro-levels. The usefulness of this study rests in part on the identification of the variables that informed policy can address at the micro- to the macro-levels in order to deal with food (in)security.

Figure 4.2 is a schematic summary of the inter-linked relationships from livelihood generation to food security. The research questions and hypotheses are represented in the chain of relationships as indicated in the middle-boxes. A theoretical framework that seeks to explain complex reality can be practically dealt with by decomposing the whole range of relationships into operational functional relations: productivity and incomes, livelihoods, and food-nutrient adequacy, which is indicated by nutritional status. This framework can be analyzed by using linked relationships defined in a series of interlinked hypotheses, which reflect the three-dimensions of food security: availability, access and adequacy. The nature of these linkages can be described both by quantitative analysis from formal surveys, and enriched by the intuitive logic and local perceptions based on qualitative evidence from cases, in-depth individual and group interviews, and local observations; in line with prevailing theories. Thus, the systematic links may be derived via a step-wise pattern of deduction. An ethno-history of agro-ecological and land use changes, and socio-economic and cultural environments of the research sites provide understanding of their current environmental conditions.

This study attempts to quantify the linkage relationships through the use of a selected and limited set of variables, if only to show the possibility of establishing such, through the use of pattern theory. In a pragmatic sense, this in effect is path analysis by empirical association. It is hoped that other researchers in this field will gain serious interest and test the livelihood framework and integrated approach to food security, and explore more relevant variables in other settings. Some policy implications are then drawn from the findings.

4.5.2 Hypothesis statements and pattern theory

The series of linked hypotheses articulated here follow the mode of pattern theory. The latter is a type of explanatory theory which is less of a chain of cause and effect, but more a web of interrelated concepts and assumptions that branches out to several directions from a core. These interrelated hypotheses present a system of ideas that informs, and the concepts and relations within them form a mutually reinforcing, closed system. The mode of pattern theory specifies a sequence of phases, or links parts to a whole (Neuman, 1991).

The hypotheses proposed here are systems of interconnected, related ideas which can be tested against empirical observations. They are attempts to explain and provide understanding of the linkages from a set of biophysical

and socio-economic endowments to food security. Thus, the main hypotheses are stated as multivariate relations which will then be inter-linked by theoretical association. The advantage with this mode of inquiry is that it allows for a simplified step-wise process of linking various parts of a complex system; a framework for subsets of analysis leading on to the next phase in the relational chain.

The point of departure taken here is that household food security can be meaningfully defined and assessed, and its inter-linkages established through a holistic view of its dynamics at the micro-level: the households and individuals in a relevant environmental context (i.e., fragile areas, biophysical and socio-economic environments), using the livelihoods framework.

4.5.3 The hypotheses

Household food security is assessed using three criteria: food availability (i.e. food purchased, own-produced, collected or exchanged, or payment in kind, distribution, supply); food access, determined via income and assets/resources generation, distribution, use and control; and food adequacy, determined via the intra-household food and nutrient intake, and health status of individuals and households.

The relationships between livelihood strategies and food security are complex and indirect. Thus, food security of households can be explained through a series of inter-linked relationships, expressed as subsets of relations linked to each other along the production-consumption chain. The three major hypotheses have corollaries which are related or qualifying statements.

Hypothesis 1: In less favored areas, farm productivity affects decisions of households to diversify their livelihood portfolio.
Corollary 1a: Farm productivity is dependent on land quality (i.e. soil-water characteristics), techniques used (i.e. variety, capital, fertilizer use/other practices, inputs), individual and household specific characteristics (i.e. education, years of farming experience, resource base), seasonality, labor (labor time of male and female workers), and land tenure.
Corollary 1b: Time allocation by adult males and females on the farm depends on the time spent by them in activities in other livelihood, and the domestic sphere (i.e. household chores, reproduction and social maintenance).

Declining farm productivity is a major defining factor that affects livelihood decisions and the livelihood strategies adapted by farming households. In turn, farm productivity results from the interface of the biophysical givens and socio-economic conditions households face (Ellis, 2000); and logically, as well as in this thesis, these resources constitute the starting points of analysis – an asset/resource-based starting point. A view that links vulnerability of specific land types to degradation under specific land use practices would be meaningful and preferable. Land quality, as a critical factor of production, becomes an integral part of the whole analysis of food security.

In addition, a full characterization of location factors (i.e. physical and

socioeconomic), and not just land quality per se, is relevant both from the scientific and development points of view (Wood *et al.,* 1999; Ellis, 2000; Pender *et al.,* 2001).

The nature of the biophysical resources affects the processes which induce changes in the farming environment and their relationship with the farming households' livelihoods. These biophysical factors define land quality, and include soil and water resources affecting crop patterns, cropping frequency, input use, risks of soil degradation; and topography affecting the distribution of production systems. It is important to note, however, that past human settlement and land use patterns also account for land quality differences and resource management. Land quality helps shape but, of itself, does not determine the sustainability of agricultural systems; technical and institutional interventions matter as well (Turner *et al.,* 1993).

The "land-man" or "nature-society" dynamics have had substantial scientific investigation over the past three decades woven with the interrelated concerns of poverty, poor agriculture performance and persistent food (in)security challenges in the less developed and developing world. The poor tend to be pushed into tilling the marginal lands for various reasons. Because they have very limited inputs, they rely mostly on intrinsic soil quality. The intensified land use by poor farming households in marginal lands has brought about, instead, a cumulative land degrading process, with serious consequences for their livelihood since they lack the access to assets to cushion the effects of declining consumption, health and food security (Scherr, 2000, 2003).

Other research also found that degradation resulted from natural forces rather than human mismanagement. Examples of which are found in the steep lands of tropical and sub-tropical Asia where farm lands exposed to the forces of wind and rain have caused gullying and mass-wasting, which are common forms of erosion in the highlands (El-Swaify, 1997). Elsewhere in the developing world, indigenous soil conservation technologies were developed; local communities implemented land use controls to stabilize vegetative cover; or farmers diversified activities to reduce degradation while maintaining incomes (Forsyth *et al.,* 1998; Cramb *et al.,* 2000). A review of over 70 empirical studies in poor hill and mountain regions concluded that the effects of population growth on land and forest quality were indeterminate. As land to labour cost increased, people changed their crop-livestock management through improvements that offset initial declines in productivity resulting from more intensive land use (Templeton and Scherr, 1999; Scherr, 2000). A review of 208 projects in Africa, Asia and Latin America observed some promising advances in sustainable agriculture, but not significant enough to be too optimistic about since sustained investments in social, institutional and human capital are critically required; and are inadequate in many cases (Pretty *et al.,* 2003).

The combination of human-induced and nature-forced land degradation is characteristic of the fragile areas under study. In this environment, rural livelihoods and adaptive strategies of the poor become a serious research

endeavor especially because of the variability of evidence in the poverty-environment interactions.

With small farm sizes and without access to credit, farmers will invest incrementally by using divisible technologies and multi-output systems that permit continuous financing, or by raising cash through off-farm employment. Collective action through local credit or exchange labor groups is promising. Agricultural input and output prices, taxes, wages and interest rates facing poor households may influence their income and investment strategies because the poor evaluate returns to sustainable land and water management relative to the returns they might anticipate from other livelihood options. Their strategies will also reflect the extent to which price and non-price incentives internalize the negative and positive externalities of natural resource management practices and outcomes (Anderson and Thampapillai, 1990). On the other hand, poor farming households' valuation for decision-making on farm outputs and livelihoods choice may be subjectively based on a balance between the added utility of farm or enterprise outputs with the added drudgery of additional unit of labour (Durrenberger, 1984). Public investments (physical and social infrastructure) also determine the comparative advantage of poor farmers in agricultural production and their access to social services (Scherr, 2000). Such are usually relatively low in less developed economies.

Hypothesis 2: Livelihood strategies are determined by farm productivity, market opportunities, and household specific factors (e.g. age, sex, education of household head and spouse, dependency ratio, inherited assets, labour availability).

Corollary 2a: Livelihoods are said to be secure when households have secure ownership or access to assets and resources needed for income-earning activities to sustain life, meet contingencies, manage risks or ease shocks without depleting the resource-base.

Corollary 2b: The generation, allocation and use of assets and resources are gender-specific.

Available supply of food to the household is dependent on the total food budget (i.e. including imputed values of non-market food such as own-produced, given or gathered). This then makes food supply to the household a function of access. The share of food expenditure related to total food budget or to total full income gives an idea of vulnerability based on instability of cash income, resources for food production and natural factors. Vulnerability of cash income depends on the levels of income, permanence or seasonality of income, and fluctuations in the price of food and basic goods, and so on, considering other relevant factors in the environment (Chen and Kates, 1994). This is the subject of a resource-based analysis of livelihood portfolio and strategies. Land and labour are the two most important resources open to the farmers. At a single point in time, the critical conditions of farms in fragile areas are givens in which a farmer or household may not have much to change in the immediate or short-run.

Reduced farm productivity because of poor land quality and other socio-economic factors serves as a trigger for households to seek other productive activities (either off-farm or non-farm) in order to survive. Other enhancing or constraining factors contribute to the shaping up of their livelihood portfolios; some or all maybe transitory in nature. These livelihoods in turn are dependent on market opportunities and wage rates, socio-demographic variables (e.g. age/life-cycle, education/capacities), and network of social relations.

Households maintain a diverse livelihood portfolio, whether permanent or not. This is aimed at achieving livelihood security in order to be secure in their food and other needs. Household livelihood security, defined as having adequate and sustainable access to income and resources to meet basic needs (i.e. food, potable water, health facilities, basic education, housing, and social integration), clearly addresses beyond the food basics (Maxwell and Frankenberger, 1992; Niehof, 2004). Livelihoods are secure when households have secure ownership of, or access to, resources and income earning activities, to cushion risks and contingencies. Failure to secure livelihoods, thus, determines the households' vulnerability to serious shortfalls in income and food resulting in health and nutritional inadequacy (Chambers, 1989; Ellis,:2000, 2001). In this sense, food security is a subset of livelihood security. Livelihoods are secure and sustainable to the degree that household members have access to or control of the needed assets and resources to earn the means for a healthy living.

Human labour, as the most important resource among poor households, differs from other factors of production because of gender, age and status. Gender makes men and women different in their interests, preferences, and obligations; so, in power, agency, and freedom of choice. Men and women may have specific assigned responsibilities for different household and livelihood activities with corresponding separate resources to undertake their responsibilities. It is observed that men and women tend to cooperate in the obligatory aspects of household subsistence, and to use their remaining time for own-account activities. Thus female and male activities vary based on the gender-specific assignment of resources and responsibilities. Gender roles and relations are underpinned by cultural values and social norms, and may constrain certain livelihood options (Boserup, 1970; Goody, 1976; Caldwell, 1982; Dyson and Moore, 1983; Kabeer, 1994; Ellis, 2000; Niehof and Price, 2001).

The unitary model of the Beckerian-tradition household economics is premised on free and flexible allocation of resources in response to economic incentives where household members act jointly or in cooperation to satisfy needs. Subsequent Nash-based bargaining models, however, have attempted to approximate the realities of varying and, at times, conflicting interests among members and result to bargaining terms. The various specifications of the bargaining models enabled to integrate gender dimensions in household processes, intra-household food distribution and welfare in particular. On the whole, social science approaches have evolved to a number of frameworks and tools in gender analysis designed for various uses (e.g. design of

intervention or study, planning, monitoring and evaluation); gender disaggregating data in formal surveys, in participatory and other informal methods of data collection and analysis, where relevant (Sen, 1990; Senauer, 1990; Haddad, 1991; Koopman, 1991; Kabeer, 1994; CIAT, 1997; Ellis, 2000; Quisumbing, 2003).

Hypothesis 3: Nutritional status is dependent on dietary intake, economic variables (e.g. income, the food budget), health-related variables (e.g. morbidity, care, sanitation, drinking water), household and individual specific characteristics (e.g. livelihood type, education of caregiver, level of nutrition knowledge of caregiver).

Corollary 3a: Individual nutrient intake is dependent on individual and household specific characteristics (age, sex, equivalent household size, dependency ratio), education of mother, nutrition knowledge of mother/caregiver, time allocation, total food budget, non-bought food, own-produced food, prices, and income.

The path from food to nutrient adequacy includes various health, environmental, cultural and behavioural factors that determine the nutritional benefits of the food consumed (IFAD, 1993; Frankenberger, 2001). Undernutrition (i.e. deficiency in required calories or energy requirements) and malnutrition (i.e. deficiency in protein, other essential nutrients) depend on a host of factors other than food, which includes maternal and child care, caring capacity, quality and composition of dietary intake, environmental sanitation and hygiene, health and disease (UNICEF, 1990; Payne, 1990; Svedberg, 2000). Thus, household food availability and access are necessary but not sufficient conditions of overall food security (i.e. inclusive of nutritional security), since food adequacy includes in addition the ability to translate the food obtained into satisfactory nutritional levels (World Bank, 1989).

Earlier studies on the income-nutrition effects dealt with impact on consumption and nutritional status (i.e. calorie intake) which yielded mixed results. With sugar farmers in South Nyanze, Kenya, and commercial production did not have negative effects on food consumption; that is, food available and calorie intake among different types of households. Nor was there any significant difference in energy intake across households of different farm sizes. Seasonality, education of household head (+) and income (+) were found to be significant variables, but not cash-crop production per se. Labour is a more significant constraint to production than land, which is the reason why less than 60 percent of land among non-sugar producers is cultivated (Kennedy, 1988).

There is enough evidence about the unequal distribution of household resources in general to suggest that the individual is a more appropriate building block than the household for food security analysis (Behrman, 1988; Senauer, 1988; Maxwell, 1990; Bouis and Peña, 1999; Haddad *et al.,* 2000). A country may reportedly have enough food supply on the aggregate with many households deficient for various reasons. Similarly, households may appear to

have enough food, yet some individuals within households may suffer from nutritional deficiencies. Various factors and processes affect the nutritional or health status of an individual other than food intake such as environmental (i.e. hygiene, sanitation, morbidity), bio-chemical processes (e.g. nutrient bio-availability), physical (i.e. activity levels) and socio-cultural (i.e. age, gender preferences/attitudes). Pregnant and lactating women and children have special nutritional needs. Inequities of food distribution within households remain empirical questions (Payne, 1990; Ellis, 1992; Svedberg, 2000).

That undernutrition is explained by poverty or failings in incomes and entitlements, has been the subject of volumes of empirical work, and so has the reverse causation (Behrman, 1988; Svedberg, 2000). The causal links that lead to nutrition-health status are complex and multi-directional, and estimations of relationships could be problematic due to simultaneity biases and multi-collinearity. For instance, most adverse outcomes or symptoms of undernutrition may very well have an effect on household income and internal distribution. Also, the possible reasons for undernutrition may not be independent, e.g. household income may affect intra-household distribution.

As in any science, the assessment of undernutrition and malnutrition has its share of debate over measurement and interpretation. Problems of measurement include the standard requirement by which actual intakes of people in fewer developing countries in practice have been compared to the standard of developed economies. The genetic issue is tricky as well (Payne, 1990; Svedberg, 2000). Ideas about requirements have changed since 1985 because of two different purposes (i.e. prescriptive or diagnostic) as recognized by the United Nations committee, requiring different sets of values. For prescriptive purposes, intakes are based on some upper threshold, based on intakes of population with adequate levels of incomes, social welfare and health provision. For diagnostic purposes, estimates are based on some lower threshold, below which individuals would surely experience some detrimental effects. For this, assessment is made on the basis of existing body size. But the basis from which the figures themselves are derived has also changed. Previous to 1985, these were based on the observed intakes of normal healthy populations. Recently, these are built up from "factorial components" based on physiological process, i.e. the energy costs of separate processes-maintenance, growth and physical activity (Payne, 1990). Estimates continue to be improved, such as adjustments for physical activity levels (PAL) of individuals that are based on occupation or on type of activity for developed and less developed economies (James and Schofield, 1990). The Philippines, for example, has developed its standards based on empirical evidence (i.e. since its first nationwide nutrition survey in 1974) set against international standards (FNRI, 2002).

Despite the difficulties in assessing dietary intakes, much can still be learned from questionnaire assessments of patterns of food use. More specifically, changes in food patterns over time result from income changes or means of livelihood. The way people use foods can give useful indications of

the strategies they adopt to cope with seasonal or occupational changes in food entitlement (Payne, 1990).

Nutrition security is a situation where an individual has secure access to a nutritionally adequate diet and the food consumed is biologically utilized such that adequate performance is maintained in growth, resisting or recovering from disease, pregnancy, lactations, and physical work (Frankenberger *et al.,* 1997). This study treats nutrition security as part, and ultimate test of food security. The former includes other determinants such as care or providing time to meet the physical, mental and social needs of members, state of health or the absence of nutrient-depleting circumstances which depresses appetite and inhibits nutrient absorption in the body, sanitation and hygiene, and physical activity levels (Smith, 2000). Ultimately, individual food security implies that food is consumed and nutrients absorbed by the body to sufficiently meet the individual's requirement for various nutrients needed for activity, growth and overall health. The level of need depends on the individual's age, sex, body size, health status, and level of physical activity. The individual's food intake is likely to depend on nutritional knowledge, occupation or lifestyle, and social, economic and cultural factors in and out of the household (Chen and Kates, 1994).

Nutrient adequacy, the final indicator of food security, is linked with hypotheses 1 and 2 through the relationships with endowments, individual and household characteristics. For example, nutrient inadequacy of a child could probably be explained by low nutrient knowledge of the caregiver, low income, high dependency ratio, and the last two variables linked to a livelihood type associated with low full incomes, all this related to low education and skills, low farm productivity resulting from poor land quality, etc. There are many explanatory pathways which could be traced through linkage relationships analysis, where the nature and strength of relationships between variables, at each or through the chain, can be estimated.

The challenge is how to operationalize nutrient adequacy. Within the social sciences, approaches range from the structured quantitative models of economics to the flexible grounded theory approaches of anthropologists, in dealing with the various socio-economic and cultural environments in developing countries. Findings from these varying approaches are needed and seen as complementary, contributing to a rich array of viewpoints to render reasoned and well-informed decisions. They bring about different aspects of the food security challenge. To benefit from this eclectic mode of thinking, this study adopts the concept of household production of health (HHPH) advanced by Berman as the framework for assessing nutrient adequacy. The HHPH conceptual framework is based on the dynamism of the household's behavioral process whereby households combine their knowledge (i.e. collective, individual), resources, and norms and patterns of behavior with available technologies, services, information and other external resources, in order to secure the health of members. As there are a variety of factors affecting health, there are also different ways to secure or maintain health. This approach encourages us to find a variety of approaches to health

improvement rather than rely on a single message, technology or service (Berman *et al.,* 1994).

From this framework, a two-stage model can be developed. For example, if the desired output is an individual's health, the first model consists of the demand for inputs (e.g. food or nutrient) that result in the individual's health. The second describes the technical relationship between those inputs and the health of the individual. This is simply the household production of health model. Households are assumed to make their decision on inputs as to their expectations about the health outcome. So, these two dimensions of choice occur simultaneously or are interdependent (Berman, 1994). In this study, the demand function corresponds to Corollary 3a, and the second, corresponds to the main hypothesis 3, with nutrient adequacy as the outcome. This can be assessed both at the individual and household levels.

4.5.4 Operationalization

The main and specific research questions were identified at the outset to serve as mental guides in establishing the links from the production part of the chain to the consumption part, with food security as the outcome. These enabled the formulation of the conceptual framework (see Figure 4.1) and the specification of the schematic linkage relationships (see Figure 4.2) looking at farm productivity and its impact on decisions on livelihoods at first. This then leads to the further specification and analysis of the intervening sub-relationships that help determine the different component indicators of food security: availability, access, and adequacy of food.

The conceptual framework and the corresponding linkage relationships in the production-consumption chain are operationalized by expressing these in a set of three main hypotheses statements. The latter are the instruments by which the linkages are specified in a manner that stepwise analysis can elicit. Answering the research questions then is embedded in the process of testing the hypotheses, and eventually be addressed specifically. The elaborated hypotheses in the previous sections of this chapter are summarized below (Tables 4.1a and 4.1b) with the variables specified for each set of relations. The tables show the groupings of independent variables into household and individual characteristics (i.e. socio-demographic data), farm and farming characteristics, economic and market.

Table 4.1a Summary of variables in Hypotheses 1 and 2

Variables	Hypothesis 1	Hypothesis 2
Y	Farm productivity of a crop	Livelihood type (proxy for livelihood strategy)
X	*Household and individual characteristics (socio-demographics):* Livelihood type Age of household head Age of spouse Sex of main farmer (work more hours in the farm/ year) Years of schooling of household head Years of schooling of spouse Total number of years farming Number of years farming the crop Dependency ratio Training related to farming Family or group network, relations	*Household and individual characteristics (socio-demographics):* Age of household head Age of spouse Sex of main farmer (more hours in the farm) Years of schooling of household head Years of schooling of spouse Dependency ratio Training related to farming. Equivalent household size Labour market for skills owned Number of working age children Number of adults who can work Total number of members who can work outside farm
	Biophysical and farming: Slope of farm, instead of Soil terrain or slope Soil texture next to Slope of farm Soil terrain or slope Irrigation water; rainfed or irrigated Variety of crop Fertilizer use Size of farm Land tenure arrangements Labour on crop for the season cost of production, not variable cost of production Use of animal-power Cropping intensity per year Growing season of crop	*Farm and farming:* Total size of cultivated farm Total number of years farming Number of years farming the crop Land tenure
	Economic and market: Price of staple crop Earnings from wage employment Earnings from non-farm Remittances Distance to nearest market Distance to road	*Economic:* Savings/dissaving Total farm full income Total farm cash income

Table 4.1b Summary of variables in Hypothesis 3

Variables	Hypothesis 3	
	Nutrient demand	Health production function
Y	Nutrient intake of individual (i.e. for 8 nutrients: calorie, protein, vitamin A, etc.)	Weight of individual (anthropometric measure used as proxy for health)
X	*Household and individual characteristics:* Age of individual Sex of individual Equivalent household size Dependency ratio Education of mother Nutrition knowledge of caregiver Physical activity level of individual	*Household/individual/economic characteristics:* Age of individual Sex of individual Equivalent household size Education of household head Education of mother/caregiver Nutrition knowledge of caregiver Full household income Livelihood type
	Food and economic: Total food budget Food purchased Non-bought food Own-produced food Full household income Price of staple food	*Health-related:* Drinking water Sanitation (waste disposal, Hygiene (cleaning , washing,) Health/nutrition services Morbidity: chronic Morbidity: non-chronic

Chapter 5
Methodology

5.1 Design considerations

The breadth and the seriousness of the research problem (i.e., environment-livelihood-food security relationships) in this study require not only scientific rigor, but also practicality and feasibility in its design because of developmental implications. At the outset, the development-orientation is basic because of the nature of the RESPONSE program. Thus, this study hopes to contribute towards developmental concerns in addition to the academic pursuit. This implies that the methodology conform to the test of scientific rigour while considering the practical concern for a wider applicability of the whole set of procedures. The applicability of replicating the procedure in developmental work is an important methodological consideration because estimating and understanding food security to enlighten policy and to help develop appropriate interventions should be manageable enough, so that this can be feasibly undertaken in a cost-effective manner especially in developing countries. Building on existing methods and tools used in the Philippine institutional setting was an important consideration in operationalizing the integrative approach as designed in this study.

5.1.1 Blending of methods and orientation

Qualitative and quantitative methods

The study used a blend of qualitative and quantitative methods in data collection and analysis for reasons strongly recognized by a growing number of scientists and researchers. This combination can work more effectively rather than using either singly. For example, using two or more of such methods as direct or participant observation, informal and key informant interviews, group discussion, or case study gives meaning and enhances the value of quantitative results based on the questionnaire-based formal surveys. Results from qualitative techniques tend to provide an understanding of the "cross-cultural meanings of concepts in a given cultural context" (Scrimshaw, 1990:91).

Achieving validity (i.e. "accurately measuring the concept") and reliability (comprising replicability and representativeness) are basic. Replicability is understood as the extent to which an observation can be repeated with obtaining same results. Measuring accurately behavior and motivation, and understanding their meanings all relate to validity (Niehof, 1999:17-18). Accurate measurement can be defined as "the degree to which scientific observations measure what they purport to measure" (Pelto and Pelto 1978:33). Achieving validity to a reasonable degree is a necessary condition that preceeds the concern of reliability.

Qualitative methods capture actual behavior and produce detailed information and insights, which can be used to develop testable hypotheses as well as interpret quantitative results. In fact, the methodological concepts of validity and reliability constitute the basis for combining quantitative and qualitative tools, and explain why such combinations are essential (Pelto and Pelto, 1978; Scrimshaw, 1990).

Interdisciplinary perspectives

The relatively wide range of interrelationships treated in this study demand drawing out concepts and tools from various disciplines: sociology, anthropology, economics, nutrition and health, and biophysical orientation. These contributed to the conceptualisation and the choice of approach to analyze food systems inter-linkages, with food security as the final outcome in the intra-household allocative processes.

From the anthropological tradition, the use of qualitative research techniques and a consideration of the "emic" view are crucial in learning the meanings of concepts. Initially referring to data collection methodologies (i.e. "etic" as observed behavior; "emic" as subjective statements about the meanings of culture by the informant), they later have been applied to the research orientation. An "etic" (outsider) interpretation of behavior or attitude is done without reference to the "emic" (insider) meaning of the observed phenomenon (Scrimshaw, 1990; Gittelsohn, 1992). In this study, the inter-phase of the global or scientist's "etic" view and the local people's "emic" view is considered crucial to confirm the findings needed to understand conditions or interrelationships, and to address opportunities or constraints with appropriate interventions or policies. Related to these concerns different tools were used for same questions (triangulation), and were continually refined throughout the research process (flexibility, iteration), and eventually, the livelihood-food security links were explored in a holistic manner (Pelto *et al.,* 1988; Gittelsohn, 1992).

The basic concepts and methods drawn from socio-anthropologists and economists on the study of livelihoods, households, gendered dynamics of intra-household resource allocation and food distribution, rural livelihood diversification, development pathways, and food security form the core of the conceptual framework used in the study (Anderson *et al.,* 1994; Reardon *et al.,* 1996, 1997; Pender, 1997; Bouis and Peña, 1999; Haddad *et al.,* 1999; Ellis, 2000; Niehof and Price, 2001; Rogers *et al.,* 2001; Rola *et al.,* 2002; Quisumbing, 2003). The concepts and methods used by public health practitioners, nutrition economists and nutritionists were also considered (Martorrel *et al.,* 1978; Gibson, 1990; James and Schofield, 1990; Osmani, 1992; Payne, 1992; Berman *et al.,* 1994; Collins *et al.,* 2000; FNRI, 2000; Svedberg, 2000; Inhofe, 2005). The orientation and concepts found in the work of production and environmental economists, agro-ecologists, and soil scientists (Scholz, 1986; Cramb *et al.,* El-Swaify, Turner and Benjamin, 1994; Scherr, 2000;

Barbier, 1997, 2000) clarified the contextual description of the bio-physical dimensions of the study.

Data were collected by organizing a core team of four research assistants trained in the technical (food and nutrition) and social sciences (agribusiness, agriculture economics) and two technical consultants in soil science and nutrition anthropology. In addition, two master students were involved in the research: one from Wageningen University (Netherlands), who worked on the soil and water management practices in the research sites; and the other from Leyte State University (Philippines) who worked on the technical efficiency of producing the two major crops (i.e. rice, coconut) in the research villages (St. Girons, 2003; Mazo, 2004). Their respective findings were used in the study.

5.2 Description of methods and tools

The boundaries between the qualitative and quantitative methods are nebulous. There are, for example, quantitative techniques used to analyze data gathered with "qualitative" tools. The quantitative analysis of formal surveys usually refers to some statistical analyses, and organizing and presenting qualitative data in figures. Some quantification does not by itself merit the name of quantitative analysis. Loosely or strictly, this creates confusion. So, instead of distinguishing between qualitative and quantitative methods, these are generally grouped here as non-formal survey and formal survey methods that use a structured questionnaire or an interview schedule, respectively, as the basis for classification. Below is a summarized schedule of methods applied with corresponding activities.

5.2.1 The preliminaries

The preliminary activities included the proposal preparation (September, 2001-January, 2002), the research site selection trip in 23 December, 2001- 24 January, 2002, and the first six weeks of the fieldwork proper (July-mid-August, 2002). The January trip to the Philippines finalized the selection of the two villages which are representative of fragile areas. This was needed to provide the physical and socioeconomic context needed to firm up the proposal, to get the go-signal of the respective local governments, as well as make the logistical arrangements in the villages. The PhD proposal was then finalized and presented in a seminar 28-29 January, 2002 held by the RESPONSE program for the purpose. The revised proposal was submitted to the Neys-van Hoogstraten Foundation for funding the fieldwork. With major modification of the second formal survey conducted in three rounds instead of a single round, additional activities (e.g. repeated soil sampling, enterprise survey and interviews, additional case households), the fieldwork was extended for another year.

Table 5.1 Summary schedule of methods and activities

Methods	Activities	Schedule
Preliminaries	Proposal preparation Site selection/local logistical arrangements Proposal presented and finalized Town and village protocols Recruitment of field assistants and enumerators	September-December, 2001 January, 2002 January-February, 2002 July, 2002
Review of literature and secondary data collection	Library and key research institutions data search Key scientists' consultation	July-December,2002/ continuous up to 2006
Non-formal surveys and interviews	Community survey Orientation and concept validation workshops Key informant/other informal interviews Transect walks Local enterprise/ associations interviews Focused group discussions (FGDs) Agro-ecology and land use changes Food security and livelihoods	August-November, 2002 September-October, 2002 September-December, 2002
Soil analyses	1st Soil sampling 1st Soil analyses (laboratory) 2nd Soil sampling and soil analysis	August-September, 2002 March, 2004
Formal survey 1	Pre-testing/ training of enumerators Finalization/production of questionnaires Conduct of production and socio-economic survey of households (220 x 1)	July, 2002 August, 2002 August-November, 2002
Formal survey 2	Pre-testing/ training of enumerators Finalization/production of questionnaires Conduct of food consumption and intake surveys including the 24-hour recall (3 rounds: 220 x 3)	October, 2002 November, 2002 February, 2003-April, 2004

Methods	Activities	Schedule
Anthropometry of household members	Measurements of weights and heights of individual members, 220 households	May-June, 2004
Focused micro-enterrise survey (*Romblon* crafts)	Informal survey of local *romblon* crafts and input producers	May-June, 2003
Romblon supply areas survey	Production survey in supply areas (Hiokilan and Apid islands)	June 2004
Case study	Case studies of 12 households	January, 2003-June, 2004
Data processing	Qualitative data Formal survey data	till December, 2003 January, 2003-August, 2005
Research integration	Writing-up and consultations	July, 2004-June, 2005 September-October 2006

All this already included the initial processing of qualitative and quantitative data, and start write-up of three chapters.

The fieldwork started in July, 2002. The first eight weeks were spent on the fieldwork protocols, selection and trainings of field assistants and enumerators, further secondary collection, and "housekeeping" in study sites. This also included the assistance and arrangements for the master's student from Wageningen in the visits to key research agencies such as the Bureau of Soil and Water Management (BSWM: Manila, Tacloban), University of the Philippines at Los Baños, SEARCA (Southeast Asian Regional Centre for Graduate Studies in Agriculture), and relevant research institutes at the Leyte State University (LSU).

Town and village protocols. This consisted of communication and preliminary informal meetings with the town mayor, the municipal agriculture officer and technicians, and formal meetings with the village officials (Baybay and Dulag) informing them of the implementation of the field study. It will be noted that preliminary notice was already given in January, 2002. Permission to consult with the relevant "*tanods*" (local assistants), village health workers and agriculture technicians was obtained. Notices were given late June/early July about the scheduling of the village orientation meetings and concept validation workshops, which were agreed to be held after the village elections in mid-July.

Recruitment and training of enumerators and field assistants.
The enumerators were recruited from a pool of research assistants at LSU who already had experience in the conduct of farm and food consumption surveys, after which they were trained for the specific purpose and details of the two surveys. The field assistants were chosen, based on their

knowledge and experience of the activity that was undertaken. For example, secretaries and health workers were quite helpful in the preparation of the sampling frames, and assisting in the anthropometric measurements. Other locals would assist in the location of farms and the delineation of *puroks* (village sub-section) and agro-ecologies.

5.2.2 Review of literature and consultation with key scientists/researchers

Three trips to Manila and Los Baños (July, August and December) were made to consult with experts and to review Philippine studies on food security, livelihood strategies, household livelihood systems, upland systems, soil and water research and development projects in such institutions as the School of Economics, University of the Philippines (Diliman), University of the Philippines Los Baños UPLB), Bureau of Soils and Water Management (BSWM), Food and Nutrition Research Institute (FNRI), and Southeast Asian Center for Graduate Studies in Agriculture (SEARCA). Also undertaken were the reviews of town and village profiles, maps, regional/national statistics on agriculture, socio-economics of upland systems, markets, Industries/enterprises, and the socio-demographics of research areas.

In particular, experts at the FNRI were consulted on the food consumption survey and nutrient standards for the country. Importantly, the revised standardized food item code was used in the food consumption and intake survey of households. Preliminary arrangements were made with the statistician of FNRI on food intake-nutrient conversion data processing.

5.2.3 Non-formal survey methods and tools

Informal surveys, key informant and group interviews, and workshops

Exploratory ethnographic work was conducted (16 weeks; August-November, 2002) to ensure realistic and accurate knowledge of the area and the people, capturing some time dimension such as seasonality. These included community surveys and direct observation (i.e. for physical environment assessment and community profiling), concept validation workshops, informal/key informant interviews, and transect walks to validate and refine the concepts of food security, livelihoods, poverty, and land quality and land management. This stage was inter-phased with the initial interviews and focused group discussions of the MSc student on soil and water management practices, which lasted till mid-October.

Orientation and concept validation workshop

Two sessions were conducted in each of the study village. The first one was a general orientation, and the second on concept validation. These sessions introduced the research project to the communities, its objectives

and the importance in using different methods, while requesting the participants representing the village sections to spread the word. Most case study respondents were present in these workshops. The participants were also consulted on the most convenient times and places to hold sessions.

In the main, these elicited local concepts such as household and family, and livelihoods and their components, which were basic to establishing a common language, and refine the concepts used. Each concept elicited local, cultural equivalents, which helped define the livelihood types used in the study, as well as the clear distinction between household and family. Concept pictorials (i.e. household and family), brainstorming and open discussions in sub-groups (livelihoods) were used with aids like manila paper, pens and group dynamics (e.g. games songs). A workshop guide was prepared (see Annex I).

Community surveys

This was basically a reconnaissance and direct observation of the local economy, social life and public services, local markets and distribution of goods, consumer and farm prices, social and political life and networks, influential groups, facilities, constraints and opportunities.

Transects

Done with key informants, these were walk-throughs in distinct agro-ecosystems in the villages noting the environment situation, soil and water resources, crop-farm systems, road network, and human settlements. These transects were helpful to prepare and triangulate for the FGD on agro-ecology, land use and management.

Key informant and informal interviews

These were combined with the community surveys, which were either individual, in pairs or small groups with local officials, knowledgeable and old farmers and village folks, health and nutrition workers, agriculture technicians, or ordinary folks on such information as the local social, political, and economic situation; farming and other livelihoods; village development initiatives; local projects and services; food security and nutrition situation, influential people in the social, political or business spheres.

Local enterprise and related production area surveys

The community survey and reconnaissance identified the importance of mat weaving and bag making from the indigenous *romblon* (*Pandanus odoratissimus)* plant among a substantial number of households in Plaridel, either as household-based enterprise, or as workers in a native craft factory for export. An informal survey and key informant interviews were conducted among 15 key *romblon* craft producers in Plaridel. This is an important livelihood among women in the community since the

mid-1990 and some men have taken a specific part in certain activities (i.e. bag handles and twines) during off-farm seasons. A supply-link survey of the dried *romblon* raw materials farms in nearby islands was also conducted in May-June, 2003. The objective was to describe and determine the role and importance of the *romblon* crafts work as non-farm contribution to the livelihood portfolio in the village.

Local associations survey
Various informal and formal groups, either as support or enterprise groups among the locals, farmers and women, were interviewed. These included the craft makers, farmer cooperative, credit peer groups (e.g. TSK, *"tulay sa kabuhayan*" or "bridge to livelihood"), and UPWARD (the *romblon* crafts association) in Plaridel; the women's group (nutrition and farming), and irrigation association in Dulag. Informal interviews of key people were taken for a better understanding of the nature, opportunities and constraints associated with these groups.

Semi-structured observations and discussions
These basically consisted of focused group discussions (FGD), which dealt with food security and agro-ecological changes in the villages. The FGDs also included relevant issues, variables and relationships observed during the reconnaissance and key informant interviews. FGD guides were developed based on observed behavior, local people's perspectives, and researcher's questions.

FGD's on food security and agro-ecology changes
Focused group discussions on food security . This consisted of five FGDs per village: three groups according to the life-cycle criterion based on wife's age (i.e. <35 years, 35-50 years, >50 years); two groups according to sex. These were whole-day exercises of 14-20 participants per session. In addition to informal discussions, each session included the application of various participatory tools (see Annex III):

- Food security concept validation – the local people's concept of who are food secure, insecure or marginally food secure as well as the reasons behind these situations.
- Agricultural calendars (seasons; own-produced food (lean and peak), labour availability for farm, off-farm and non-farm work, activity by gender); match rainfall pattern and dry seasons.
- Time lines (community/plot land use, seasonal food security time line to include flows such as harvests, cash, food and cash, expenses for home and farm, labour, other resources or inputs).
- Mapping (resources, plots, conceptual mapping of food sources and threats to food security including prioritization) livelihood sources/ strategies and threats to strategies, dealing with risks and food shortages. The groups also ranked the village sections, by *puroks,* as to their food security situation.

Focused group discussions on changes in agro-ecology and land-use. Three FGDs in Plaridel corresponding to its three geographic sections, and one FGD in Alegre were conducted (see Annex II) to include:

- Changes in soil fertility
- Changes in land use
- Land and water resources

The outputs of the focused group discussions on soil and water management and land use conducted by the MSc student, were used as inputs to this study.

5.2.4 Soil sampling and soil analysis

Soil sampling of 2-3 plots for each of the 12 case households (9 in Bgy. Plaridel; 3 in Bgy. Alegre) was to represent different crop mixes and farm terrains (see Table 5.2). Soil analysis was done at the Leyte State University central chemical laboratory. The results showed inconsistencies with some field samples (e.g. magnesium, calcium, soil texture) which were due to some field sampling error. A second round of soil sampling and analyses was undertaken in March, 2004, which included the sample farms of two additional case households.

5.2.5 The formal surveys

A two-stage sampling was used. With confidence level of 10 percent and a sample proportion of 20 percent for an unknown population (i.e. the total actual population of households in fragile areas), the sample size was set at a minimum of 100. The first stage was to purposively assign the sample size of n_1=120 for the bigger village, Plaridel; and n_2=100 for the smaller village, Alegre. The sampling frames for the two villages were prepared with the assistance of the village secretaries and the *barangay* health workers. Then, the sample size was proportionately assigned to the various village sub-sections or *puroks* according to the number of households per *purok*. The respondent households were then randomly selected from the sampling frame, which also served as basis for sample replacements.

The first formal survey dealt with the household socio-economic and production profile, while the second dealt with the food consumption and nutrition survey, administered to the same sets of respondent households. For both surveys, the prepared questionnaires were pre-tested with ten households each, then revised and reproduced.

The first survey was designed to have some quantified characterization of households as to their economic and socio-demographic profiles; farm, land uses and practices; patterns of livelihoods and resource use; farm and household budgets; engendered patterns of household, production and maintenance activities, and decision-making; and time allocation. It also provided the data for the

variables needed for the statistical analyses to test the first and second hypotheses. The interview schedule included the following:

- socio-demographic household characteristics;
- farm data (farm sizes and parcels, crop systems per parcel in calendar, outputs);
- terrain;
- soil-moisture conditions of farm parcels, distance from road);
- farming and fishing (operations by gender, planting dates, fishing/season per crop, land, labor and other resources use and management, varieties, expenditures);
- household and non-farm activities (time allocation by gender, age);
- uses and markets of products and by-products;
- incomes/sources by household member, as applicable;
- food and non-food expenditures;
- assets: type, ownership, mode of acquisition, estimated current value.

(See Annex V for the interview schedule):

Income sources were classified as farm, off-farm and non-farm. Farming was measured by the own-account growing of crops (i.e. perennials, annuals) and/or tending of livestock, whether for home or market use, whether land is owned or accessed through various arrangements (tenancy, family use rights, etc). Own-production is accounted for and valued because its absence would imply purchase. Farming includes both subsistence and market-oriented production. Off-farm activities refer mainly to farming in other than one's own farm for some wage, either in cash or in kind. These also include such activities as gathering of firewood, charcoal, house-building materials, and wild plants of which the value is estimated. While non-farm activities would include all other activities with or without remuneration not having to do with agriculture, or transfers from non-farm sources.

Since the study uses the livelihood approach, households were classified into livelihood types based on the greater than 50 percent income source. Livelihood type 1, for a more or less even contribution of farm, off-farm and non-farm incomes; livelihood type 2, if income from farm is greater than 50 percent; livelihood type 3, if income from off-farm is greater than 50 percent; and livelihood type 4, if income from non-farm is greater than 50 percent.

The second formal survey dealt with food consumption/intake and expenditure, and health-care-related data. Food intake was measured using the 24-hour recall for the household and members. This was done in three rounds spaced over a one-year period from February, 2003 to April, 2004. The interviews were scheduled according to normal, lean and above normal food months as reported during the exploratory surveys and workshops. The food consumption survey was modified from the original tool which consisted of a combined 24-hour recall for

the first round and complemented with a three-day self-record by the household respondent for all members. The latter was tried for ten households but did not yield valid results due to problems of illiteracy, unreliability and inertia. More importantly, the observed and reported cycles of greater and lesser food availability and access by the households (i.e. food seasonality) render the one-shot survey and self-record unreliable for the reference period. The second formal survey consisted of the variables needed to test hypothesis 3, and included the following:

- morbidity data (last month for short, last one year for chronic);
- care of child (less than 5 years);
- pre-school children feeding practices;
- housing, water and sanitation;
- nutritional knowledge of mother/ caregiver;
- 24-hour time allocation for working adults (3 rounds).

(See Annex VI for the interview schedule)

From the 24-hour recalls, the raw data of each of the food items consumed by each individual member of the household were converted into equivalent gram-weights of food based on the Philippine food composition table (FCT) published by the FNRI. The three rounds of data for each individual were averaged to capture the average intake for the year. Thus food intake reflects differences in food availability/access over the year. This is critical due to the seasonality reported and observed in the study areas.

The household/individual nutrient intake was analyzed using the household dietary evaluation system (HDES) package used by the FNRI for the official national nutrition surveys in the Philippines. This software contains the updated food composition table library, which is used to convert food items reportedly consumed in the survey to the equivalent nutrient values. The HDES program computes for the "as purchase" (AP), the "edible portion" (EP), the weights and nutrient contents of food consumed to produce three summary files: AP/EP intake, nutrient intake, and wastage. These three summary files were used as inputs to generate tables on food consumption survey findings using the Excel and SPSS programs.

5.2.6 Anthropometric measurements

After the third round of the second survey, the anthropometric measurements of household members were taken with the help of the *barangay* health workers. The weights (in kg) and heights (in m) of all members were taken.

Weight was measured using the standard weighing scale used in the village for the *Operation Timbang* for adults and children. The subject was barefooted wearing light clothing and made to stand on the

platform hands on the side. Weight was recorded up to the nearest 0.1 kilogram. Standing height was measured using standard height measurement attached to the wall. The subject was made to stand without shoes and back flat against the wall, standing erect as much as possible. The height was read with a ruler at right angle against the measurement on the wall, crushing the hair and having contact with the top of the head. Height was recorded to the nearest 0.1 centimeter.

These data are used as descriptive indicators of health in terms of weight-for-age, height-for-age, and weight-for-height of children. The children are grouped into less than 5 years and 5-12 years. The weight-for-age of children is used as the dependent variable in the health production function to test the proposed hypothesis 3 of this study.

5.2.7 Case studies

Considering the complexity of the research problem, the case study method was also used to investigate the relationships in the real-life context. The case study is not strictly bounded by the rigors of the formal survey, and the boundaries between the event-information and context are not distinctly shown. Context is critical in doing a case study (Yin, 1994).

Case studies of twelve households in the two research villages were undertaken to enrich the investigation on linkage relationships. These looked in-depth into the household development process in relation to changing socio-demographic characteristics of households and members, differing patterns of livelihoods, assets and resources over the life-course (see Annex IV). The number of cases per study village was purposively assigned in terms of the diversity of livelihoods, crop systems, agro-ecological conditions and age of the female spouse. Thus, Plaridel had nine case households with its more diversified livelihoods and crops systems in different terrains, Alegre, three cases. The life-cycle criterion (<30 yrs, 30-45, >45 mother's age to capture child-bearing and rearing) was expected to reflect household formation and to capture the differing opportunities and constraints to the female spouse, livelihoods and food security condition.

The case households were profiled and their food consumption and intake taken in the same manner as with the formal survey respondents. Soils of two farm plots of different crop systems and farm terrain for each household were sampled and analyzed at the Leyte State University soils laboratory (see Table 5.2).

Table 5.2 summarizes the case households (i.e. in fictitious names), where cases one to nine are those of *Barangay* Plaridel and cases ten to twelve from *Barangay* Alegre. The agro-ecological zones, which represent different bio-physical conditions in terms of soil quality and terrain, were matched with different representative crop systems.

Table5.2 Summary table of case households and crops in various agro-ecological zones in the two research villages

Case HH No./ Name	Agro-ecological zone			
	Coastal	Lowland/ Plain/ built-up	Sloping/ Hilly	Mountain
HH No. 1 Lolong-Lucia	x	X	*Bagakay:* corn, sweetpotato home use *Bagakay*, coconut *Casilion*, coconut	*Sub-onon*, abaca *Ka-igangan*, abaca *Ka-igangan*, coconut *Kaigangan*, abaca- *Bud Dako*, abaca with sweetpotato and *estaring;* abaca with 50 plants bananas- *Bud Dako*, coconut
HH No. 2 Dario-Isabel	x	X	*Tinago* (near house), corn, sweetpotato, vegetables (string-beans, squash, okra, *estaring,* egg-plant) Upper *Malbago,* coconut	abaca , forest
HH No. 3 Ramon-Lita	x	Lower *Malbago,* rice, coconut with cacao (300 trees, 9 yrs), pineapple, few rambutan, papaya, grapefruit, avocado, taro	*Pikas,* corn, bananas, sweetpotato, ginger, jackfruit trees, few hard-woods, fallow/pasture	x
HH No. 4 Mamer-Mercy	x	Lowland, near house, eggplant-corn-tomato- pepper depending on seeds and season; factory plot, corn	*Atol,* corn-sweetpotato; vegetables (stringbeans, upo, onion leaves)	*Tigbauan Dijot*, abaca, forest trees *Almacen*, abaca, (new 6 mos.), forest trees *Busay 1,* abaca (new, 6 mos.), forest trees *Busay 2,* abaca (new, 6 mos.), forest trees

HH No. 5 Roger-Goria	x	*Buhang,* rice field (idle) *Buhang*, coconut *Casilion* , rice field	*Mamono*, coconut	*Babag*, half abaca Guadalupe, abaca, not all planted
HH No. 6 Roberto-Gerlie	x		Sn. Vicente, corn, rootcrops middle Malbago, coconut with bananas, 20 plants Tigbauan dijot, 60 coconut trees	*Almacen,* abaca Bagakay, abaca (no work during fieldwork)
HH No. 7 Ricardo-Norming	x	*Nigad* (near house), paddy rice; Coconut	*Atol/Kanagahan*, coconut *Atol/* lower, coconut with bananas *Atol/* lower, coconut with bananas *Kanagahan/* lower, coconut with bananas *Hantag/* lower, abaca	*Hantag*/upper, abaca (last stripping was in 2002)
HH No. 8 Jose-Dinia	x	Lowland, factory plot, eggplant	*Malbago*, eggplant *Hantag,* eggplant Upper *Malbago*, coconut *Atol,* coconut *Hantag*, uncultivated	x
HH No.9 Victor-Teresing	coconut, few bananas	X	x	x
HH No. 10 Corazon	x	*Talisay*, rainfed rice, fallow Salu *Mombon*, taro and bananas, coconut Bgy. Bgy. proper farm, corn/ upland rice/ taro *Macarandang*, coconut	x	x

		Sungaran, coconut Bgy. proper, coconut		
HH No11 Ebyong-Merly	x	*Mombon,* coconut, sweetpotato, taro	x	x
HH No. 12 Ruel-Conching	x	*Barilajay,* corn, sweetpotato,, fallow *Salug (*riverside), coconut School garden, squash *Hindang* creek, rice	x	x

Note: *Italicized words are names of sitios as found in the village maps in Figures 6.2 (Bgy. Alegre) and 6.3 (Bgy. Plaridel). Case households 1 to 9 are from Plaridel and 10 to 12 are from Alegre*

5.3 Analytical methods

5.3.1 Qualitative analysis

Qualitative data and information were initially in field notes and on big work sheets (i.e. manila paper) of the participants made during the FGDs, group interviews or discussions (e.g. maps, time lines, matrices, pictorial diagrams). These were simply inputted in the computer using MS Word, in narrative files classified by topic (e.g. food security concept, livelihoods), or subject matter (e.g. food security by gender, age; land uses by *puroks or barangay*). The maps, which were drawn by the villagers, were transferred as computer files and combined with relevant contextual inputs from the field and manila paper notes.

This procedure was used for data from all workshops, focused group discussions, informal surveys and interviews, direct observation, and case studies. It should be noted that the various participatory tools such as calendars, matrices and diagrams were integrated in focused group discussions. The categorized information generated was then used as data and information sources for the topical or subject discussions in text. They were also used to qualify or enrich the discussions from the results of statistical analyses of the formal surveys. Often, the discussions combine the data and results of various methods (i.e. including secondary materials) as classified above.

5.3.2 Regression analysis

Multivariate analysis was done in logistic form for the respective functions corresponding to the three hypotheses. The variables per hypothesis are summarized in Tables 4.1a on page 96.

The first involved the farm productivity function where the crop yields of the common crops (e.g. rice, coconut, abaca, sweetpotato, taro) were regressed for livelihood type, socio-demographic variables, biophysical variables, economic and market variables.

Crop yield = F (livelihood type, bio-physical factors, socio-demographic factors, economic and market variables).

The factors determining crop productivity were analysed with relevance to qualitative information generated from the non-formal surveys, interviews, cases, and from secondary materials (i.e. production patterns over the years, local food balance sheets, markets and prices, job opportunities). The description of food sources (own, bought, gathered or donated) both from the FGDs and surveys complete the information on food availability. In addition to determining factors affecting crop performance, Hypothesis 1 also reflects the condition of food and cash availability to the households and the community.

Livelihood type is used as proxy for livelihood strategy and this was regressed on socio-demographic, economic factors, and farm/farming factors.

Livelihood type = F (socio-demographic factors, farm and farming factors, economic).

Livelihood type is used as a catch-all variable representing combinations of different livelihood strategies (i.e. development pathways). This typology was based on the percentage distribution of income sources as farm, off-farm and non-farm income sources. Agro-ecological conditions captured in the relationships found in hypothesis 1 reflect the bio-physical characteristics which affected farm productivity. These, together with some household and individual specific characteristics (e.g. age, sex, years of schooling, dependency ratio, equivalent household size, number of working age children) are the link factors with the first function. Non-farm wage is used as an indicator for labour market opportunity. Economic dependency ratio is the number of consumers over the number of income contributors or workers and reflects the driving force to earn and secure more food.

The regression results were combined with the descriptions of livelihoods, income and expenditure patterns, relevant social networks as well as opportunities and constraints present in the community and relevant influential labour and product markets. The cases representing different life course and livelihood patterns (i.e. with due reference to agro-ecological zone and land uses) enriched the analyses. The combined results of the analyses provide a clear picture of the condition on food access by households via livelihoods, incomes, resource and assets conditions, and socio-economic opportunities and constraints.

The third hypothesis was split into the analyses of nutrient demand and health production function where food security (i.e. using the adequacy criterion) is assessed. The variables are summarized in Table 4.1b. The resulting analyses provided indicators for food security via food or nutrient adequacy, as well as nutrient or food access by individuals in the household.

Nutrient demand (e.g. calories, protein, vitamin A, iron, iodine) of the individual household member was regressed on household and individual characteristics (age, sex, equivalent household size, dependency ratio, education of mother), physical activity level, food and economic variables. The food and economic factors included regressing with the total food budget (bought, own-produced, gathered or given) and its individual components, the full household income (cash, non-cash, own production), and the price of staple. The nutrient intake was based on food consumption converted into nutrient intake as calories, protein and micronutrients based on the FNRI revised food composition table. This used the FNRI health evaluation software.

Nutrient demand or intake = F (household and individual characteristics, nutrient knowledge of mother/caregiver, food and economic factors)

Intra-household nutrient distribution was also assessed adapting the formula of nutrient share-energy share ratio used by Bouis and Peña (1997):

$$R_i = \frac{X_i / \text{sum } X}{C_i / \text{sum } C}$$

where: X_i = consumption of the *i*th individual of nutrient X, where X is measured in grams;
C= calorie intake of individual i;
sum X = total household consumption of nutrient X;
sum C = total household consumption of calories;
R_i = is the nutrient share-energy share ratio of individual i.

This application is based on the idea that the intra-household distribution of a very basic nutrient, such as calories, is likely to be more equitable since households must see that the basic survival threshold is met by everybody. Thus, inequity in nutrient intake is more likely manifested in the consumption of micronutrients. The results shed light on the access aspect of food security at the level of individual members in the household. R_i is used as measure of (in)equity of intra-household nutrient distribution.

The health production function used the child health status (<5 years old) as the proxy for health, and the corresponding anthropometric measure, weight-for-age was used as indicator. This was regressed on household and individual characteristics (age, sex, education of household head and mother), full household income (cash, non-cash, own-production), livelihood type, and health-related variables such as morbidity (i.e. chronic, non-chronic), availability of safe drinking water, sanitation (waste disposal); hygiene (cleaning and washing), and nutrition knowledge of mother.

These three main hypotheses were run as separate multivariate regressions with their respective analyses contained within the theoretical and observed underpinnings for each. These functions were interlinked using theoretical association in the context of pattern theory. This practical theoretical association was used to explain the inter-linked relationships between livelihood strategies and food security given the bio-physical and socio-economic environments. It may be noted that this was done by decomposing the relationships through a set of equations (i.e. three main hypotheses) instead of a single multivariate regression, to determine the significant variables at each stage. The relational coefficients of the sets of equations (e.g. farm productivity, livelihood type, nutrient adequacy) were determined through an iterative process to estimate the coefficients.

The existing data sets generated by the family income and expenditure survey (FIES) and the national nutrition survey (NNS) contain the variables used in this study but without the household's location specification as to LFA or otherwise. These data sets cannot be used for a holistic analysis of food

security because of differences in the sampling design, reference periods, and conduct of surveys.

5.3.3 Analysis of anthropometric data

Analysis of anthropometric data consisted of comparing actual height and weight with FNRI standards using the weight-for-age, height-for-age and weight-for-height indices. The cut-off points for adults and children at less than minus 2 SD from the FNRI/WHO/NCHS reference medians were considered underweight and underheight, respectively. For weight-for-height, an additional classification, NEC (not elsewhere classified) was included for children whose heights were beyond the limits of the weight-for-height tables. To facilitate the assessment of nutritional status, ANTHRO software was used. The data generated by ANTHRO were then processed using SPSS to generate the required outputs. Below are the cut-off points:

Classification	*Cut-off points*
Weight-for-age	
Underweight	<-2SD
Normal	-2SD to +2SD
Overweight	>+2SD
Height-for-age	
Underheight	<-2SD
Normal	-2SD to +2SD
Above average/tall	>+2SD
Weight-for-height	
Thin	<-2SD
Normal	-2SD to +2SD
Overweight	>+2SD

5.3.4 Other descriptive analyses

Other types of descriptive analyses were done as they are relevant to the issues dealt with in the research questions. These included community and households profiling, agro-ecologies characterization, land use, socio-demographic profiles, income patterns, food consumption patterns, time and labour allocation patterns in household and farm activities, and the food security situation. Whenever relevant, gender and age disaggregated analyses were applied such as decision-making, time allocation and activity patterns, and resource use.

Chapter 6
Understanding the Research Area

6.1 The study area: location and general physical description

The village research sites are found in the two towns of Leyte, Eastern Visayas region (see Figure 6.1): *Barangay* Alegre is in the upper mid-eastern town of Dulag, and *Barangay* Plaridel in the mid-western town of Baybay. They represent two major types of fragile environments where the households and their farming systems are complex, diverse and risk-prone. Both portray different types of fragile landscapes. Alegre is a lowland plain prone to river flooding, waterlogging and river instability; while Plaridel is a coastal-upland area subjected to various types of erosion. Based on land use and number of households engaged in farming, they are officially classified as agricultural though farm incomes have dwindled over the past ten years or so.

Alegre

Alegre is an interior village about 5 kms southwest of Dulag centre, 5 kms west from the sea, and about 1.5 kms west of the provincial highway that runs from the north to the south seaboard and cuts to the west and south mountains of the island. With a total area of 272 hectares, 96 percent are farmlands, and the rest are built-up (7 ha.), swamps (2 ha.), and open grassland (10 ha.). Two river systems run through the village: the Daguitan River to the north and Talisay River to the south. The National Irrigation Authority irrigation system courses through the latter, covering about 17 percent (45 ha.) of the rice farms in the village (Fig. 6.2, Dulag, 1998).

Dulag is located just across the Pacific Ocean and is directly hit by typhoons. These typhoons or even simply strong winds can be damaging to agriculture, property and people. With 90 percent flat terrain (0-3%), an almost bi-modal climate, and alluvial fields in some parts of the village, agriculture could have been a good source of livelihood. However, the climate can be unreliable with river flooding during heavy northeast monsoon rains and strong winds (Dulag, 1998). The physical contour of the village is not really heartening as traces of flooding damage could be seen to mix with the next. Three floods occurred during the two-year fieldwork. The latest in 2004 was quite serious as it came with the freak typhoon that hit only Dulag.

The village is located on the periphery of the Daguitan watershed (i.e. a complex of 7 watersheds) to its west, bordering along the Daguitan River which is the biggest drainage that spans 103 km². Most of the watershed, but excluding Alegre, is covered by the Tongonan Geothermal reservation (107,625 ha.), which is the biggest source of geothermal energy in the country, servicing the region and other regions as well. The whole watershed covers an area of 31,665.34 ha. and spreads across a range of seven towns. Despite some

large forest cover in the northern range, it is reported to be eroded up to 79 percent with about 4.7 percent severe, and is manifested downstream in the village. The Daguitan water system is the source for drinking and other domestic uses, farm activities, and irrigation. But flooding through these waters have also caused the erosion of riverbanks (evidenced by river scouring) and farm lands, which is quite risky to Alegre. The watershed has been facing the problems of indiscriminate extraction of sand and gravel, riverbank erosion, illegal logging, and slash and burn farming system, which in turn created upstream erosion and loss of tampering capacity, and causing more floods (LCSD, 2000).

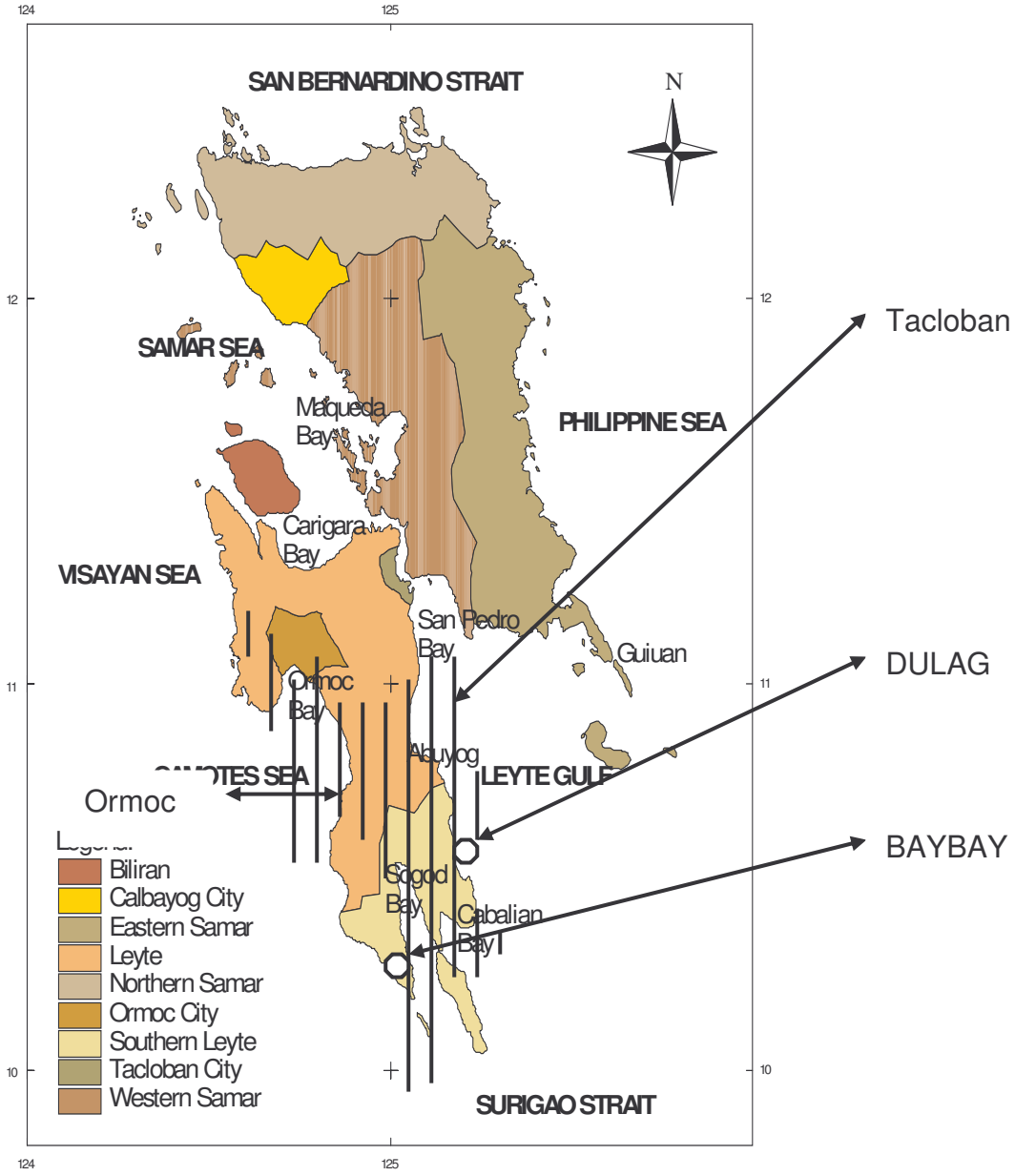

Figure 6.1 Map of Eastern Visayas or Region VIII, Leyte (line shade), the location of the study villages in the towns of Dulag and Baybay, and the cities of Tacloban (capital) and Ormoc

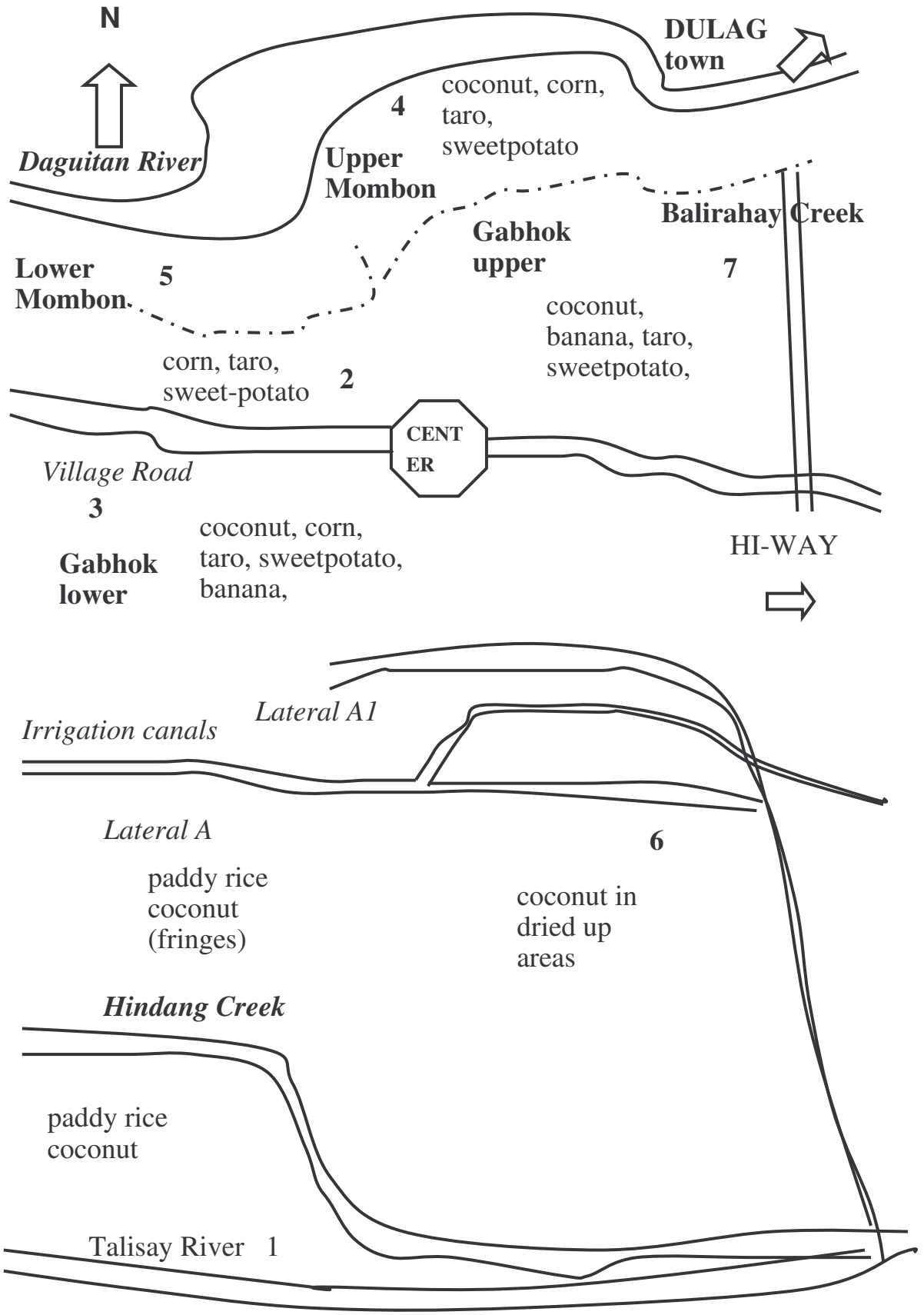

Figure 6.2 Agro-ecosystems and land-use in Alegre, 2002. Italics are names of sitios. Numbers refer to farm location indicated in Table 6.2. Sketch is not drawn to scale

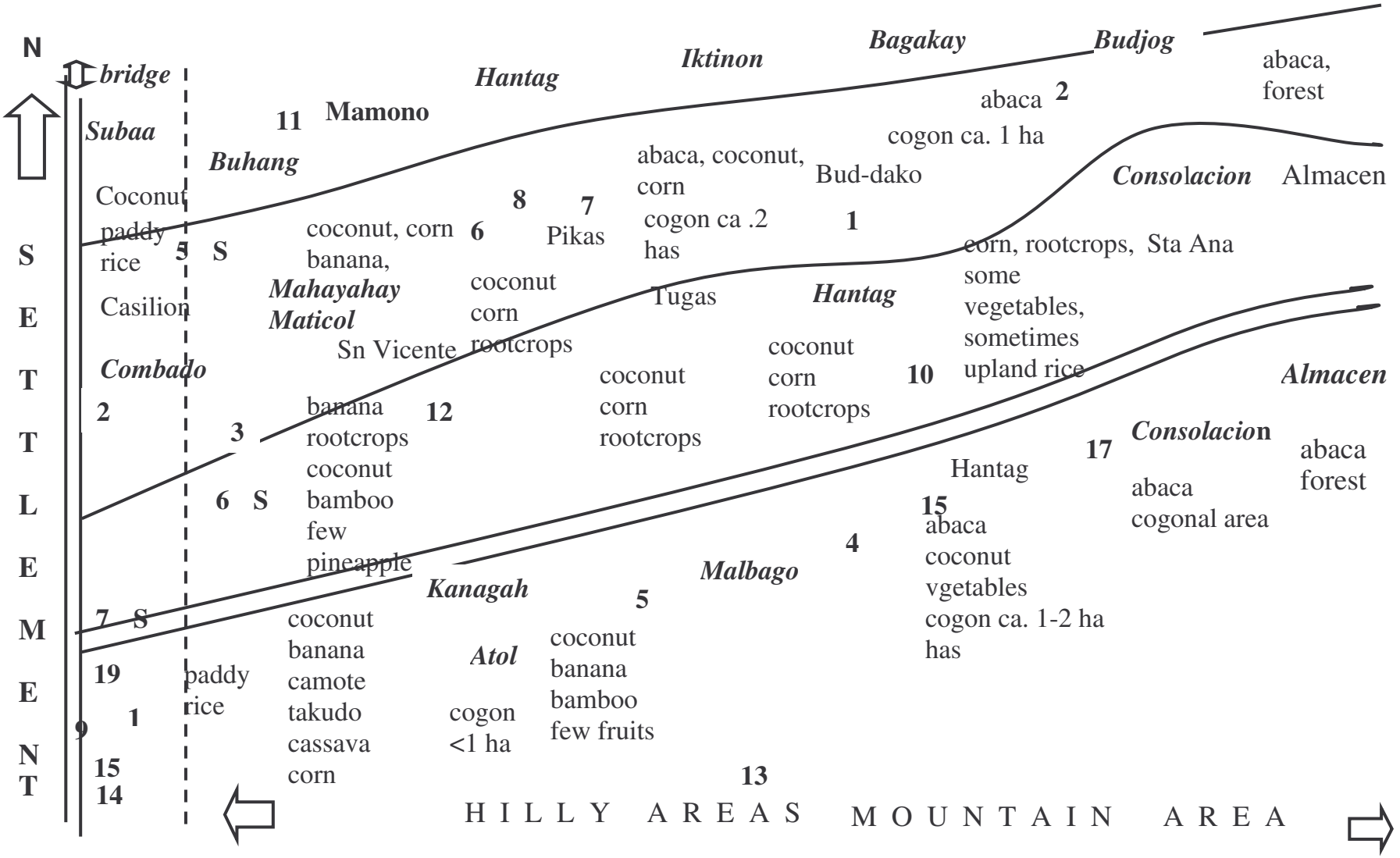

Figure 6.3 Agro-ecology and land use in Plaridel, 2002. Italics are local names of sitios the village. Numbers refer to farm location in Table 6.3. Sketch is not drawn to scale

Plaridel

Plaridel is the second biggest village of Baybay in area (943.67 ha.) with 44 percent of land used for agricultural purposes, about 52 percent secondary and primary forest, and the rest are built-up areas (Plaridel, 1998). It is the southernmost village of Baybay, about 16 kms. from the town centre, and is part of a good provincial perimeter road network that cuts through its western side north-south. From east to west, the village is largely mountainous (50%), gliding to the hills (35%), mini-plains (15%), and to the sea (see Fig. 6.3).

The village itself is a small watershed, with a river in its northern boundary serving as the biggest drainage, and other tributaries that run through the village streams empty to Camotes Sea. The municipality's SAFDZ (Strategic Agriculture and Fisheries Development Zone) mapping identified the village as largely under the forest watershed development zone and a relatively greater potential for non-food, high valued commercial development zone (i.e. trees, crafts). About 10 percent is slated for food crop development (Baybay, 2000). This local policy, which was based on the national development agriculture zoning guidelines, defines the development thrusts for the village till 2009.

Plaridel has 5-7 wet months and can be heavily battered by the southwest and the northeast monsoons, the latter usually associated with typhoons. Though a strong typhoon has not been felt for about ten years, the heavy monsoon rains had been damaging making agriculture a more precarious undertaking with heavy wind and water erosion in the exposed hilly-mountain areas. The climate is tropical mild, and without the wild weather the village could be calming to the locals or visitors with the benefits of quality mountain air and the soothing balm of a sea swim anytime of day.

6.2 An overview of the research communities

The villages are physically described in terms of the important dimensions that affect the potential for land production and, thus, the overall viability of farming operations. These include its location, climate, terrain or topography, soil and the related erosion status (see Table 6.1). Climate includes the rainfall and wind patterns, and temperature that largely affect the cropping mix and intensity, and related growing seasons. The topography or terrain refers to the slope which affects the feasibility of certain production techniques (e.g. manual, mechanized) as well as the related water infiltration and erodibility of the soil. Features such as mountains, hills, upland, plains and watershed description relate to this characteristic. Soil quality is an important determinant of land productivity and is characterized by parent material, physical, chemical and biological properties (Lal, 2003). The elaboration of these land-quality characteristics are intertwined in the discussion of land uses, and the general overview of community, livelihoods and food security condition of the research areas in this chapter.

Table 6.1 Physical description of the village research sites

Description category	Bgy. Alegre	Bgy. Plaridel
Location	Interior village ca. 5 kms. southwest of Dulag town proper; bounded by Daguitan River, north and Talisay river to the south.	ca. 16 kms south of Baybay town proper; bounded by Camotes Sea, west, Kaipangan mountain range, east; Inopacan town, south
Climate	Dry and wet seasons not distinct; lowest precipitation between March and May; highest in December. Summer rainfall is not uncommon. Northeast monsoon is November-February when heavy rains occur with probability of typhoons. Highest precipitation in December, 329.7 mm; lowest in May, 137.5 Temperature is high and even through the years between 22.6 (February) and 31.4 Celsius (May-June).	Rainy season, 9 months June-February with southwest monsoon from June to October when 50% of rain falls; northeast monsoon from November-December with high probability of typhoons bringing intense wind and water. highest in November, 355.2 mm, lowest in May, 79.4 mm; not so distinct dry season, March to May. Temperature is high and even through the year between 23.8 (February) and 31.2 Celsius (April-May)
Topography	5 km from the sea in broad alluvial plain (0-3%), width >500 m. and elevation <50 masl	Upland sloping to the mountains: 5% plain (0-3%); 15% valley; 15% hilly (3-18%); 65% mountainous (>18%).
Soils	Alluvial type formed by a series of erosion and sedimentation processes. Soil analysis of 3 case households farms show low Ca and Mg, 70% low N, 57% low OM and 30% low in P (2002). BSWM reports slow infiltration rate (0.1-0.7 cm/h), pH 5.1-6.9, low N, adequate in P and deficient in K (1990s).	Parent material of soil is andesitic of volcanic material from dormant volcano Mt. Sacripante, 6 km from the centre of Plaridel; still undergoing weathering. Hill soils mostly inceptisols, alfisols and ultisols (USA class), 1st two, still fertile, are earlier stages of transformation of the andesitic parent material; ultisols, a.k.a Guimbalaon clay, the later stage and infertile. Lowlands: soils are of alluvial origin a.k.a. Umingan clay loam. Mountains: close to volcano, andisols, black, deep soil with high nutrient content; soft, vulnerable to erosion; commonly soils are sandy, loamy, silty loam, stony and clay loam
Erosion status	Flood waters erosion in farms along river banks; town map records severe erosion especially in river banks	Between slight (sheet erosion and rills but <3 per meter) to severe (gullied land with exposed subsoil or rock) inland.

Sources: Bureau of Soil and Water Management, Region VIII and the National Irrigation Administration climatic data: 1961-1997 for rainfall, Tacloban; 1981-1990 for temperatures; Baybay, 2000; Dulag, 1998; Saint-Girons, 2003

Alegre

The first visit to the village dates back to 1996 in connection with a project that forged the links between sweetpotato growers and the South Korean-owned starch factory in the nearby town of Tanauan. The farmer cooperative in Alegre was one of a number of cooperatives identified as raw material suppliers where an integrated support system was designed for. The project hoped to improve the lot of poor farmers by expanding their rootcrop-based livelihoods and incomes. Faced with a number of constraints beyond its control, the project could not be sustained when the company folded up, destroying the hopes of the farmers. But the long dry spells in 1997-1998 (El Niño drought) derailed the farm technology pilot production, worsened by the waterlogging of many farms which followed (La Niña floods). These natural disasters robbed the small farmers from potentially rewarding opportunities. Therefore, it was not difficult to find a fragile area research site.

By public transport, the village can be reached only by a single-motorcycle which carries 4-5 people from the town centre and back. One can ride alone on a "*pakyaw*" basis, that is, pay the equivalent full load. The road is good except for about half a kilometer of unpaved portion before entering the village, and some interior village streets. The village is flat and traversing through unpaved streets has never been a problem to the locals. The village has electricity connections to homes but has long suffered from the absence of a source of potable drinking water. Well-off households have tried sourcing from underground water by electric pumps to no avail. Drinking water is sourced from another area, and fetching it is costly in time and effort. Water for domestic activities use comes from open wells scattered within the village. About 10 *sari-sari* (i.e. very small retail shops) stores sell not even the basics.

It is sort of a satellite village to nearby Cabacungan which is the health and nutrition services base. Alegre has a minimally-built weighing post for children, which is also the nutrition centre. Health is an important concern especially because of the resurgence of schisostomiasis in the river basin area which includes Dulag. During the fieldwork, adults and children received preventive doses of this waterborne disease, which is transmitted by wading through the wet fields such as rice. During the last months of fieldwork, the residents were scared because of two sudden deaths in a week's time within the village. As traditionally practiced in such emergency cases, a number of villagers had a procession of the patron saint around the village pleading for intercession to stop the spread of whatever caused the unexplained deaths.

The village hall welcomes one at the village entrance and a public elementary school beckons one at the centre. A Roman Catholic Church is just a few meters from the school. The houses are simply clustered around these main landmarks: a little over 180 households and a population of about 900. The village is divided into six sub-sections called *puroks* (2-3 blocks of residences with the nearby fields) each with an assigned local official and health worker for the implementation of projects and carry the people's voice to the local council. At least 81 percent of the people are engaged in farming as tenants or leaseholds or landless farm workers, and own-farm cultivators

(19%). The people speak a certain Waray-waray language version, and are generally shy but hospitable and helpful. Especially to visitors, the women, obligingly, simply love to cook their tasty native vegetable (e.g. taro petioles-leaves) or native chicken dish often cooked in coconut milk, which they know are quite different from the other Visayan dishes. Especially among the Waray-warays, both men and women drink the local coconut sap-toddy "*tuba*" after farm work, or local meetings. If one obliges warmly to an offer, they take it that one is 'with them', and this is a sure way to get immersed in the village.

Three households have members working abroad or married to foreigners. Their substantial support is visible from their houses, better clothing, and other siblings sent to study in higher education. The village folks expect their coming home and festivity-adding contributions to the fiesta. One case household's house was old and sagging in early 2002 during the first reconnaissance for area and case selection. The mid-fieldwork saw a relatively big house in its place. Certainly, this was so soon and so imposing by village standards, yet some young person's dream. While there are still a number of young farmers (ca. 25% versus 3.8% in Plaridel), many young people are looking forward to some non-farm work in the future after elementary or secondary school, or when an opportunity comes.

The village folks consider safe drinking water as the most important problem to households, together with a litany of economic and water-related constraints and threats to farming such as indiscriminate river quarrying, flooding, and organization-related irrigation problems.

Plaridel

Plaridel is a good twenty-minute drive by land transport from the town centre on a five-year old paved road. The drive goes through eight villages before reaching this last village of Baybay to the south. It has not been too long that the villagers have eked out of the misery of road potholes which became literally small pools especially in the long wet months from June to February. Now, the villagers are simply eased out of such disasters as mini-cabs called "multicabs" (a diminutive jeepney typical of the Philippines), now ply regularly every thirty minutes or so. With the old road, only the irregularly routed motorcab did some bouncy lengthy journey. But electricity has long been there, and the village has its own water system from three natural mountain springs that the village government had tapped for piped-in household water system. From the mountains, the pipes run through near the houses so those without connections can tap a nearby common outlet. By most standards, the village may be considered a relatively progressive one. It even considered itself for township in the past. But this was going too far. To a newcomer, a villager could boast of such a previous pursuit by local officials.

The provincial highway cuts north-south through the western coastal side of the village. A bridge over a dried-up river welcomes one to the village from the north. To the west is Camotes sea; and the east presents a landscape of sloping and hilly agricultural lands and forest. The blue seas and the greenery of plants can be refreshing and tend to hide the nooks and crannies of

local woes. But the people are friendly and hospitable and one easily feels at home. In a day's journey through its streets, one really can have the basics from the village stores for a short or long stay. A place to stay is not really difficult to get. A number of big residences have been built in the last three years by locals whose daughters married foreigners, or whose children or spouses worked abroad. To the locals, these are monuments of hope that someday one in the family will do similarly. My last visit was a few days before the fiesta (January, 2005), and the air was full of excitement of festive activities, as well as welcoming the always awaited "*balikbayans*" (i.e. returning foreign-based locals). Their coming home is usually to pay homage to the patron, the Holy Child, who is deeply believed to have provided them graces, blessings and luck. Returning to the home village is always a sentimental occasion for families, friends and associates. Most become benefactors to the Church, local projects, and the festivities. Village life revolves around the annual fiesta celebration, and other social events such as weddings, baptisms and deaths.

The locals, of course, know very well how to make life worth their work and are not content with occasional or annual celebrations. The regular Monday afternoon cockfights prep up the working week. While the men, and a few women, await their winning bet, the local *sabungan* (place for cockfights) yard abounds with local trade of native delicacies, culinary goods, soft and hard drinks. Winnings are at times shared with family and friends, and could paint the village red. For workshops, interviews or surveys with farmers, or whatever, the rule is "never on a Monday". If you have to make appointments with some farmers, this Monday event could be a help.

The village has 738 households (2003) and counts about 3700 people. The whole village is divided into seven *puroks* (i.e. settlement clusters within a geographic section as the village has low to high land forms), and similarly has a local official and health worker(s) assigned. Most of the houses, however, are concentrated around the main highway towards the coastal strip, and the rest sparsely distributed to the sloping *puroks*. To the locals, the village is already progressive insofar as it has a relatively bigger village centre and recreation complex (i.e. multi-purpose hall with basketball/volleyball court and stage), three water systems from natural mountain springs, a health centre, and especially, of itself is already a parish of the Roman Catholic Church (1 parish church, 4 chapels). It is also the education centre of neighbouring villages, with a national high school, and an elementary school. This school district (a geographic cluster of 10-15 villages for supervision and education development) covers about twelve villages of the southern part of the town. It does not have a public market but has about 40 small retail stores, a small hardware shop, and a mini-grocer with an eatery.

The village is home to the traditional mat-weaving craft and is a centre of bagmaking made from dried *romblon* (*Pandanus odoratissimus*) leaves. For the latter, an export factory of about 100 seasonal workers operated since 1998, and 15 other independent household-based micro-entrepreneurs, each supplied by 10-30 household-based bag/mat-makers. With about 95 percent

women workers and managers, this local industry constitutes an important income source for women, especially during the off-farm season, or the waiting time for harvest.

The village receives about 9,582 USD a year from the internal revenue allocation of the town which are used for administrative purposes and development projects based on the village development plan and investment program which the village officials prepare. It is also a pilot village of the BIDANI project implemented by the Leyte State University which is one of the seven pilot universities of the nationwide program. A relatively more progressive village, it has various organizations such as the farmers' cooperative, bag makers marketing group (UPWARD), three mutual help credit groups (i.e. TSK, Green Bank, BIDANI) with mostly women members, religious groups, and a health workers' group.

The village accounted as major problems malnourished children, insufficient food production, illegal small time logging, illegal gambling, stealing of farm products, and land disputes which are divisive even among relatives.

6.3 Ethno-history, agro-ecosystems and land use

Informal interviews, 4 focused group discussions (FGDs) of older farmers (65 or more years old, males/females) in different *purok* clusters, and 2 FGDs on land and water concepts/conditions (i.e. 35 or more years old, males/females; with MSc student) in the two villages accounted the details of the village ethno-history, the changes in agro-ecosystems and land-use, and the soil and water situation affecting agriculture.

Alegre

Early 1900s-mid 1940s. In the early 1900s, Alegre was only a sub-unit or *sitio* of the town of Dulag, and was a forested area. Though coconut (*Cocos nucifera L.*) was very sparsely grown then, oil was extracted and sold together with the surplus of other farm products. Thus, fittingly the village's old name, "*Lanajon*", meaning "having coconut oil". The *sitio* became a separate village in 1908, and the name changed to Alegre. Corn *(Zea mays L.*) and rootcrops such as sweetpotato (*Ipomoea batatas L.*), cassava (*Manihot esculenta Crantz*), and yam (*Colocosia xanthosoma L.*) were grown in patches together with rainfed rice (*Oryza sativa L.*), and sparsely with coconut and plantain (*Musa paradisiaca L.*). Corn mixed with rice was the staple food with other rootcrops or plantain as supplementary staples, depending on the season.

Locally processed fibre from abaca (*Musa textiles Née*) was then the main cash crop which enjoyed a stable price in the Manila market via the port of Tacloban. They were then grown on what today are almost all of the coconut and food crop lands. Local farm labour was not enough and had to be recruited from neighbouring towns, even the neighbouring province of Samar. The eastern opposite of Dulag is the southern part of Samar which already had active trade with the town, and could then be reached regularly by small *bancas*. In April 1930, a very strong typhoon, the oldest folks remember as

"Bob", literally wiped out all abaca farms and caused so much damage and frustration that many families migrated to other towns and Mindanao. Rehabilitation by less than a handful of households remaining took a long time, mostly of subsistent food crops, with almost no farm labour on hand. The Japanese occupation during the war, 1941-1945, further destroyed what little was rebuilt. Some food crops, especially sweetpotato, were used up during the occupation.

Postwar-1970s. After the war, abaca farms started to be re-planted by the handful remaining households and others who trickled back to normal life, but were largely wiped out again in December, 1951 by another very strong typhoon "Amy", and finally by "Asiang" in the early 1970s. Because Dulag is just across the gateway of typhoons from the Pacific Ocean, the blows were real hard on farmers. The hardy coconut was the natural choice to replace abaca which was also then started to be encouraged by the government. Plantations grew with the increasing number of copra buyers when coconut oil factories were established in Cebu. The industry boom after the war established oil mills in Central Visayas. Food crops such as corn and sweet-potato continued to be grown, others were replaced by taro or *gabi (Colocasia esculenta L.*), and grown increasingly for their commercial use. A few plantains and some vegetables continue to be grown in field patches, backyards or home gardens.

With a growing population, demand for taro increased, also because of its importance in the Waray-waray ethnic food culture. Petioles, leaves and rhizomes are all used in various native cooking. The better price gave incentive to farmers. Women were mostly in-charge of the crop because the harvesting of the petioles and leaves are too tedious for the men to care. They are harvested as soon as mature enough and timed for the weekly fair in town. Alegre soon became an important source of traded taro in the neighbouring towns and the capital city of Tacloban. Corn production, too, increased because of improved price and market, and the availability of seeds. Corn policy by the government, next to rice, was given a boost during this period.

The experience of migrating to Manila, other towns and Mindanao after the typhoons to seek for alternative income sources, was an eye opener for the young, many of whom took migration as a livelihood strategy to help support the low incomes at the home farms. Remittances started to be considered as supplemental income.

1980s. Rice production expanded with the irrigation project administered by the National Irrigation Authority (NIA). Reeds were slashed and burned for rice production and swamps drained for the irrigation system, and rice replacing corn as the staple. In the mid-1980s, coconut production was further given incentive through the government's cooperative-implemented fertilizer subsidy and provision of new varieties, in addition to better market prices when the Philippines became an important source of copra and coconut oil in the world market.

But coconut and irrigated rice farms were owned only by a few land-owning households. For most locals, life became more difficult in the farm as productivity fell prey to the vagaries of the weather and floods, and farm wage was very low. As economic depression took its toll, a number of the young, both men and women, continued to seek employment in Manila or elsewhere. Farming was done mostly by the middle-aged and older household members. Coconut farming also matched the needs of dwindling young farm labour with only seasonal labour requirements. But copra incomes also suffered from price fluctuations in the world market especially with the competition posed by the U.S. canola oil.

1990s-present. With close to 200 households, land use remains mainly coconut and irrigated rice, both as monoculture. Rainfed rice (i.e. in wet months) is usually rotated with corn, sweetpotato and taro (i.e. in dry months). Taro continued to be an important cash crop, of which women are in-charge of its production and sale. Backyard vegetables like stringbeans (*Phaseolus spp*.), bitter gourd (*Mimordica charantia L.*), eggplant (*Solanum melongena L.*), squash (*Cucurbita maxima*) and okra (*Abelmoschus esculentus*) have been grown by a few farmer-traders most of whom are women. The increased population density per area has not been matched by the productivity per area per crop and remained low till the present because even the coconut fertilizer subsidy program was not sustained. The cooperative member-farmer-adopters stopped using fertilizer because of resource constraints. The introduced varieties required intensive care and weeding, and wage capital was largely deficient. Food crops also continued to be grown using the less intensive traditional methods, both in terms of labour and fertilizer inputs. Only irrigated rice (ca. 20 ha. involving 10 farmers) was fertilized on a limited scale, again due to financial constraints. Alegre itself neither has economically rewarding nor promising non-farm alternatives. The young can only opt for low-paying off-farm and non-farm labour such as limited domestic help for women, local carpentry and construction, or driving for men.

The present agro-ecosystems of the village are of three main types:

- Farmlands in the northern riverbeds along the Daguitan river, locally known as "*mombon*" (meaning 'sandy') which are mainly grown with coconuts particularly in the upper section; some areas have mixes of corn, sweetpotato, taro, and some vegetables.
- Irrigated ricelands, ca. 20 ha., to the south between Talisay River and the lateral A of the National Irrigation Authority (NIA) irrigation system, and the land between lateral A and A1. Hindang creek crosses this formerly swampy area. With good irrigation, rice could be grown twice a year. But with irrigation problems, most farmers plant only once in December. The rest of the year, the area is either fallowed, or used for carabao pasture.

- Flat alluvial plains in the central part of the village, which include the settled area, are farmlands grown mostly with coconuts (i.e. in mono-culture, or with bananas and taro below). Other land use is the rainfed rice-corn-sweetpotato-taro mixed cropping, or rotation. Some fields are diverted to taro in recent years due to a good market. Backyard vegetable gardens such as eggplant, bitter gourd, and stringbeans have been tried, and grown when seeds are available. Some corn, rootcrops and rain fed rice are also grown on the dried up Balirahay creek since the flood in 1991 (see Fig 6.2).

Box 6.1 Can farming really make it?
Ruel knows his way with the irrigation complexities in Alegre. Growing rice as a cash crop on a 2-ha tenanted farm is the family's major activity. In his mid-fifties, Ruel seems a spent man and a bit cynical with government farmer support; a farmer leader who used to head the farmers' irrigation organization. Conching, his wife, is both full-time housewife and farmhand together with their two sons. With some basic education, these sons do not have further schooling interests, and are natural to farming. A daughter is studying criminology in the capital city, with high hopes for a better employment in the future. She could see that farm life has not been so rewarding despite the knowledge, connections, and industry of her parents. Better seasons have been countered by bad seasons with drought, typhoons and floods, and – currently – with rice pest.

Ruel knows farm technique, new varieties, and credit access. He has been a regular borrower in a rural bank to finance rice farming, understood the risks, and that part is covered by crop insurance. But in 2002-2003 as also with other times in the past, his 2-ha never paid back due to a mix of less fertilizer inputs and the black bug pest. With very limited capital and labour, he had given up the rainfed crops on the creek (corn, sweetpotato) and river (coconut) beds, and focused on rice in the past 2 years. In these rainfed areas, he said, the crops are mainly for subsistence and subject to the whims of the floods. He could only bank on the rice farms. But what used to be 70 to 80 50-kg bags per hectare of harvest was only 28 bags in all in the last season; neither were the previous much better. What about the next season? "I will still try it out with rice, the new variety. The choice is very limited. My wife will try again gardening with rootcrop. We need to get by." (*Case household 12*)

Plaridel

Early history. As one hails a mini-cab ride for Plaridel nowadays, dispatchers call for passengers with "*Tigbauan, Tigbauan!"* This was its old name, which is another term for "*bugang*" or wild cane (*Saccharum spontaneum*), a grass which was abundant in the area when the Spanish missionaries first came in early 17th century, and founded Plaridel in 1620. Bohol (another province to the southwest) settlers came in the 18th century and

largely influenced farming as they were known not only as good traders but also hardy farm workers. Clearing some parts of the forest in the mid-region and lower mountains, the Boholanos then practiced shifting cultivation of annuals in seasonal rotation. Upland rice or "*banika*" was grown during months of expected adequate moisture, corn during relatively drier months, while rootcrops such as cassava, sweetpotato, *pakudo* or *estaring* (*Xanthosoma sagittifolium L. Schott*) were grown throughout the year. After 5-20 years when the soil gets infertile, the land is left to fallow and turned into cogon (*Imperata cylindrica*) area. This cycle of slash and burn-cultivation of annuals-fallow continued for years, and the cycle pushed many areas to be grown with cogon in the early 20th century.

The coastal parts of the village were largely grown with *romblon,* which later in the early 20th century (the earliest the locals could account) was made into mats. This system could, in fact, be found also in the neighbouring 2-3 villages to its north and south. Both the plant and mat-weaving were probably introduced by Boholano farmers as similar systems could be found in many areas in Bohol.

Before the war, mid-1940s. In the early 20th century, a small cattle ranch of about 170 ha. covered what are currently the cogon areas in Hantag and Consolacion, starting to be in such condition in the 1930s. Some parts were also grown with upland rice, corn and rootcrops. Population was sparse and the upland rice-corn-rootcrop system continued mainly for subsistence or for barter. Barter exchange started with Bohol traders for dried or salted fish, or earthen jars. Paddy rice in the lower irrigated fields was grown mostly for sale. Coconut started to be grown in the 1930s in monoculture or mixed with abaca or *madre de cacao* (*Gliciricidia sepium*). On the lower and upper mountain clearings, abaca growing increased when an abaca fibre (known as Manila hemp) exporter in Cebu built a warehouse in Baybay and established a network of local traders. This trade encouraged the local people to convert some of the mountain public lands and forest areas into abaca plantations. The central to southern parts of the island has been the natural home of abaca which until today still grows the best cultivar in the country, "*laylay*". Further, with a growing population, trees started to be cut to build houses. A wave of forest encroachment then started.

Wild pig and deer hunting in the forests for food and barter was an activity for a few households who got the skills from their older generation. This gained commercial value in the 1960s because of good quality meat. Though diminishing in the 1970s, it is continued to the present, but only rarely, by one farmer who is considered by the villagers as the most industrious mountain farmer (see Box 6.3). Another reason is that the wild animal population has almost disappeared due to both the reduced forest and indiscriminate hunting for food by the communist insurgents who lived in the far mountains in the 1970s.

After the war-1960s. People who evacuated to the mountains during the Japanese occupation (1941-1945) came down to settle since about 50 percent of the farms were left out. Starting in the 1950s, coconut production expanded fast. This increased largely in the 1970s due to the government's promotion of the crop through fertilizer subsidies and new varieties, increasing markets mediated by more local traders, and better price. It replaced most lands planted previously with rice, corn and rootcrops. The reduced production of food crops, however, also increased their commercial value. In the 1960s, the subsistence crops sweetpotato and *estaring* started to command a price and sold, thus giving farmers the incentive not to abandon growing them even in minute scale. The farming of upland rice as a rotation crop, however, started to dwindle when the soil became infertile. Abaca production continued to increase with its growing importance and markets with such cultivars as *inosa, linawaan, libutanay and laylay.* The 1950-1960s was a period of cutting trees for commercial purposes. Small time illegal logging started.

Increased settlement in the coastal areas eroded the *romblon* plants and mat weavers had to source out from the neighbouring small islands of Himokilan and Apid which to this day still grow the plants and process them into dried strips called *lilas.* These are then ready to be dyed or stay natural for mat and bag weaving. Weavers also found that the cultivar grown in the islands produce stronger and better quality raw materials, especially the quality-demanding bags, than those grown in Plaridel.

1970s-1980s. Abaca and coconut which were locally processed into fibre and copra, respectively, became important cash crops for the small farmers. Farm labour for abaca and copra (i.e. harvesting, stripping, dehusking, drying) were preferred activities to generate off-farm cash incomes. This period saw the complete disappearance of upland rice due to serious reduction in soil fertility and the fields turned into cogon grasses. Farmers observed that even the sturdy rootcrops yielded less. With an increasing population and increased house building activity, carpentry also became an important non-farm activity to such-skilled farmers during off-season. Paddy rice continued to be grown with new varieties introduced, and fertilizers applied.

This decade of socio-political turmoil saw a heightened communist insurgency problem which spread throughout the eastern border of the country. The armed band of the communist rebels, the New People's Army (NPA), continued its spread through the forested areas in Leyte including Plaridel. More than 50 percent of agricultural activity in the mountains was abandoned affecting largely abaca and coconut, and the associated food crops in those areas which form important food sources to farming households.

1990s-present. Despite fluctuating prices, copra and abaca continue to be important cash crops, and labour hired for their production and post-production activities are still an important off-farm income source. Paddy rice is a crop of the relatively wealthy landowners, who are able to utilize local farm labour for cash or in-kind wage. A few farmers started to specialize in

vegetable production such as cabbage (*Brassica oleracea var. capitata L.*), tomato (*Lycopersicon esculentum L.*), eggplant, bell pepper (*Capsicum anuum*), stringbeans and bitter gourd, where most capital for seed and cultivation coming from remittances of children working in Manila or elsewhere.

Fishing was an important livelihood until recently and involves familial expertise handed down for generations. Starting in the mid-1990s, the fish population dwindled; increasingly serious in the late 1990s. Local folks attributed this to the *sensoro* (i.e. drift-net fishing) from other towns which engage in indiscriminate big-time fishing, the practice of blast-fishing by some fishermen as well as mountain-land degradation. As observed by the locals themselves, degradation-induced run-off caused water pollution via the sediment deposits which carried agricultural chemicals from the eroded fields, and in turn destroyed the fish habitat (http://www.nap.edu/napcgi/-skimit.cgi?isbn 8-3-2005; USDA, 2001; see Box 6.2). The decline of the fish population of the area displaced a number of fishermen, many of whom could not farm due to lack of skills or land. Today, those who were mainly fishermen have their spouses migrating to Manila and other cities to work as domestic helpers or factory workers. Only one commercial fisherman is left and his fishing ground is beyond the waters of Baybay going as far as the waters of Bohol (see Box 6.2).

Plaridel has currently four agro-ecosystems (see Figure 6.3):

- A narrow coastal strip about 150-200 m from the highway, running parallel from north to south, mainly residential with fields of coconut, patches of banana, *nipa* and "*romblon*". This local *romblon* is not the kind used for mats and bags, which is sourced out from the neighbouring islands.
- A narrow plain (0-3%) from the coastal strip to about 50 m unevenly east of the highway, mainly residential (i.e. marked S in Fig. 6.3), with pockets of irrigated rice, some in low terraces; and patches of home gardens such as eggplant, tomato, and ornamentals.
- The hilly area (18-35%) with an altitude of 200-500 masl, has small settlements in the *puroks*. The main crop grown is coconut, some areas mixed with trees (i.e. cacao, fruit trees), bananas, and patches of pineapple and taro. The second important crop mix is corn, sweetpotato, *estaring,* and cogon on some hilly slopes and top. Some plateaus, valleys, and hillsides are specialized, on a shifting basis, with micro-scale vegetable growing such as eggplant, tomatoes, bell pepper, and cabbage. These include Kanagahan, Atol, Malbago, San Vicente, Tugas, Buhang, Mamono, Mahayahay, Pikas.
- The mountain area (ca. 800-1000 masl) which is largely public land and forested (>2-7 kms from the highway). Other land uses are abaca, and in the lower range coconut usually mixed with banana or taro, and cogon. Most abaca farms have certificates of ownership, not a title, the document held by the user of a public land. User rights can be handed down over the generations; rights may be sold but not the land itself. These include the areas to the right up from Iktinon and Hantag.

Box 6.2 "Where have all the fishes gone? But I am lucky!"

With nine children, Victor and Teresing do not really live comfortably but they are hopeful, with some tinge of content after everything that they went through since their marriage in 1977. She weaves mats and bags to serve her *suki* supplier-trader, and he happily fishes in waters where most do not normally go. At the age of twelve, he started to assist his father fishing, but never thought he could make a living out of it as small fishermen could simply not make the very basic ends meet. The 70s were economically difficult years. After two years of marriage and a child, living with his parents as fish-farm hand, income was never enough. Manila was a dream; just a trip away, and off they went. He worked at a utensils factory, and later, as construction worker when the factory folded up. She was full-time housewife with five children in just eight years. The dream ended as harsh reality set in. Living was barely basic. The high cost of city life took its toll and the 6 years became unbearable. In this nightmare, the thought of village life became heaven, and back to the village they went.

Selling bread for a 13 percent sales commission for eight years, with his wife's mat-bag weaving and backyard pig-raising made ends meet, and the children were able to attend the local school. Some savings helped them build their current humble house by the sea on a plot of rented land. As soon as the four elder children finished secondary school, work for them became priority: to help the family or go their own way. When the bakery closed, Victor had to bank on fishing, using his father's small boat on a 3:1 sharing basis, and later, mortgaged a small pumpboat, combined with occasional subsistence farming and tuba-gathering. In 2001, a daughter was able to get a renewable two-year contract as domestic helper in Singapore. With the daughter's remittances, Victor bought his own motorized boat in mid-2002, and is now able to fish beyond Plaridel waters. This was important as the fish stock in the village had significantly diminished in recent years. With the combined sources of Teresing's mats and bags, his fishing and their daughter's remittances, make it possible for the four children to get better education. They hope these children could also some day find work abroad, or in other places. With confidence, Victor beams: "I am the only one now who could fish and sell because my motorized boat can bring me to far waters where fish still abounds. Here in Plaridel, the fish are gone. I pity the other fishermen who could not make it as I did. I am lucky with my daughter's help and the trade I learned from my father."(*Case household 9*)

In summary, the agro-ecology and land use of Plaridel have greatly changed over the last century. Significant changes could be discerned:

- Increasing agricultural land use of the mid-region forest as early as the 18th century has started a cycle of positive farm use intensification using shifting cultivation of food crops, but with longer fallow periods and the

land frontier was largely open. This is evidenced by the reported higher yields of upland rice and other food crops in that period.

- Intensification of land use by mixing food crops and cash crops (i.e. abaca and coconut) from early 20th century onwards, with some signs of degradation by the presence of cogon areas in some previously long used food crops areas and pastures.
- Increased soil erosion caused by water due to high rainfall in the mid-20th century to after the Second World War, coupled with intensified annuals cultivation and shorter fallows due to increasing population.
- Serious increase of cogon areas distinctly started in the 1960s in previous food-crop land and pastures especially in the slopes and hilly areas directly exposed to wind and rain. Farmers reported declines in productivity of food crops, and the eventual phase out of upland rice.
- Marked reduction of forest areas starting in the 1950s. Degradation at increasing rate through the 1960s due to the expansion of abaca farming, cutting of trees for building own houses, and commercial purposes.
- Marked decrease in fish stocks in the mid-1990s caused by indiscriminate big-time fishing by fishermen of neighbouring towns and degradation of fish habitat by sedimentation of eroded materials in upland areas.

6.4 The resource environments

Farming and livelihood decision-making of the households are affected by the resource environments: the physical (farm terrain, soil, water), economic (market, financial capital, prices), and socio-cultural (network of relationships, tradition, local practices) environments.

6.4.1 Biophysical resources

The biophysical resources include land and other natural resources (e.g. trees, water sources, biodiversity) in it. Land quality such as soil traits and terrain contribute to farm productivity, or explain its limitations. These traits reflect how fit the farm land is to function within its environment, support plant productivity and human health.

The quality of the soil can be enhanced or degraded by natural processes (e.g. erosion, weathering, decomposition) and human activities (e.g. cropping pattern, cultural management practices). The degradation of the soil could lead to both direct and indirect deterioration of surface and ground-water quality. The conservation of the natural vegetation and forest helps to balance the ecosystem, which is critical in maintaining the diversity of plant-animal population in the area, the productivity of farming, and fishing (http://www/gcrio.org/geo/quality.html 8-3-2005).

Soil samples of farms of the case households were selected to represent the different agro-ecologies and land use in the villages. Table 6.3 summarizes

the results of the soil analyses, which can be referred to the sketch maps of the villages (Figs. 6.1 and 6.2, this chapter) in order to locate the field of specific agro-ecology and land use. Selected soil quality characteristics tested include soil texture, water holding capacity, pH, organic carbon (C), total nitrogen (N), available phosphorus (P), exchangeable potassium (K), exchangeable sodium (Na), cation exchange capacity (CEC), exchangeable calcium (Ca) and magnesium (Mg). The threshold levels of these soil properties based on the Booker Tropical Soils Manual (Landon, 1991) are shown in Table 6.2.

Table 6.2 Threshold levels of selected soil properties

Soil characteristic	Very Low	Low	Medium	High	Very high
pH		<5.5	5.5-7.0	7.0-8.5	>8.5
Organic carbon, C (Walkley Black)	<2.0	2.0-4.0	4.-10	10-20	>20
Total Nitrogen, N (%)	<0.1	0.1-0.2	0.2-0.5	0.5-1.0	>1.0
Available Phosphorus, P (Bray 2, ppm)	<4	4-7	7-13	14-20	>20
Exchangeable potassium, K (m.e./100g of soil)		<0.2	0.2-0.4	0.4-0.8	>0.8
Exchangeable sodium, Na (m.e./100 g soil)				>1.0	
Cation exchange capacity, CEC (m.e./100 g of soil)	<5	5-15	15-25	25-40	>40
Exchangeable Calcium, Ca (m.e./100 g of soil)		<4	4-10	>10	
Exchangeable Magnesium. Mg (m.e./100 g of soil)		<0.5	0.5-4	>4	

Soil quality

The soils of Alegre are generally classified as *Umingan* clay, and Palo clay loam, and mostly come from alluvial material, which were formed from sediments previously deposited by running water. The soils in Plaridel are formed from andesitic parent material of volcanic origin that are still undergoing weathering, creating new soil and releasing nutrients. This parent material comes from Mt. Sacripante (1000 masl), a dormant volcano located 6 km from the center of the village. On the mountain close to the volcano, the soils are andisols (black, deep soft soils). Their softness makes them vulnerable to erosion. In the hills, soils are mostly inceptisols, alfisols and ultisols (USDA classification system). Inceptisols at the early stage and alfisols in the middle stage are still relatively fertile soils, and are in the earlier stages of the process of transformation from the andesitic parent material. The later stage is the creation of ultisols, of *Guimbalaon* clay (mostly red, sometimes black), which are infertile and characterized by an increase of clay

in the subsoil (thus, little infiltration), by a high acidity, a low base saturation by a deficiency in phosphorus. In the lowlands, soils come from an alluvial material called *Umingan* clay loam (Table 6.3) (Barrera *et al.,* 1954).

On average, crops grown in the area suffer from nutrient deficiency. About 60 percent of the sample farms have low (4%) to high (56%) pH. Most crops prefer medium or slightly acidic soil (5.6<pH>6.8) since lower or higher pH values can cause plant nutrient deficiencies or elemental toxicities that have adverse effects on crop yield (Evanylo and McGuinn, 2000). The farms with medium or suitable pH include the rice terrace, the hill slopes of Malbago and Pikas, most of the mountain areas in Plaridel; and the rice paddies near Hindang creek and the alluvial farms in the central part of Alegre.

But while the pH level may be suitable, most of these farms are deficient in the macro nutrients nitrogen and phosphorus. All farms have very low to low organic carbon. Only the rice fields near the Talisay creek in Alegre and about 50% of the farms in the upper hill (coconut, corn, rootcrop, vegetables) and mountain farms (abaca) in Plaridel have moderate amounts of nitrogen (N). Where available phosphorus is moderate to high in some rice paddies in Alegre and Plaridel and in the central rainfed farms (coconut, banana, rootcrops) in Alegre, it could not be effectively used by these crops because these areas have low pH and with mixed sandy soil, which has a low buffering capacity. Phosphorus needs low soil moisture, a high pH and clayey soil in order to be effectively used. Since rice and rootcrops require high phosphorus, such soil conditions limit the crops' growth (Dabin, 1980).

All irrigated rice paddies in Plaridel have low exchangeable potassium. While all farms in Alegre and all non-lowland farms in Plaridel have medium to very high exchangeable potassium. But most of these farms have high pH, which reduces the effective availability of potassium. The low K in Plaridel rice fields could be because of the relatively high rainfall in the area, which causes leaching of nutrients into lower layers and the cropping intensity of 3 times a year leading to this nutrient's loss. This low K content of rice paddies is similar to the findings in rice growing areas in Bangladesh, Cambodia, Sri Lanka and Thailand (Kemmler, 1980). For crops like rootcrops, vegetables, fruits and banana, K requirements are high.

Most farms, however, are less prone to the risk of the acidifying effects of nitrogen fertilizers (including organic N sources) because most soils have a relatively high base (e.g. Ca, Mg, K) status (Evanylo and McGuinn, 2000).

Except in the upper river bed farm in Alegre, the rest of the farms have medium to high cation exchange capacity.

From the community surveys and FGDs, the physical degradation of the soil mainly resulted from water erosion and land clearing since farmers do not use machineries. Chemical degradation mainly resulted from the depletion of soluble elements through rainwater leaching, and to a certain extent over cropping without the benefit of appropriate soil quality enhancement practices by farmers. In rice paddies, this could also arise from the accumulation of salts precipitated from irrigations schemes and other toxic contaminants. The intensive crop systems involving annuals lead almost inevitably to loss of soil fertility.

Table 6.3 Soil analysis results of the sample farms of case households by location and land use

Farm location* Land use		Texture	H_2O holding capacity, %	pH	Organic C	Total N	C/N ratio	Avail P ppm	Exch K cmol/kg soil	Exch Na cmol/ kg soil	CEC cmol/ kg soil	Exch Ca cmol/ kg soil	Exch cmol/ kg soil
Lowland: Irrigated rice													
Near Tali-say River[1A]	Irrigated rice	Silty clay loam	48.2	5.2 L	1.9 VL	0.21 M	8.9	8.6 M	0.2 M	**	33.5 H	12.4 H	21.03 H
Nr Hindang creek[6A]	Irrigated rice	Sandy silt	38.2	6.7 M	2.5 L	0.15 L	17.0	5.3 L	0.2 M	0.7 L	17.6 M	13.7 H	2.4 M
West, near highway[19P]	Irrigated rice	Sandy loam	33.2	7.7 H	2.6 L	0.17 L	14.8	1.4 VL	0.1* L	0.2* L	18.7 M	15.7 H	2.4 M
East, near highway[20P]	Irrigated rice	Sandy loam	27.4	7.2 H	2.2 L	0.12 L	15.7	12.8* M	0.1 L	0.3 L	18.0 M	14.9 H	2.1 M
Nigad, rice terrace[14P]	Irrigated rice	X	31.4	6.4 M	0.9 VL	0.17 L	5.1	24.0 H	0.1 L	**	36.1 H	23.8 H	2.8 M
Lowland: Coconut, mixed or rotation cropping													
Gabhok, upper center[2A]	Coconut, rainfed rice, corn, sweetpotato	Loamy sand	28.4	5.8 M	0.7 VL	0.08 VL	9.5	31.7 VH	1.0 VH	**	26.3 H	10.7 H	15.7 H
Gabhok, upper east, near Balirahay creek[7A]	Corn, rainfed rice	Sandy silt	38.2	7.5 H	2.8 L	0.19 L	14.8	2.1 VL	0.6 H	0.2 L	16.5 M	13.8 H	2.2 M

Gabhok, lower west[3A]	Coconut, banana, taro	Loam	46.8	5.3 L	0.6 VL	0.14 L	4.1	11.0 M	0.8 H	**	26.9 H	11.0 H	15.6 H
Mombon, upper[4A]	Coconut	Loamy sand	36.6	7.6 H	2.0 L	0.09 VL	21.9	2.1 VL	0.8 H	0.4 L	14.9 L	11.2 H	2.1 M
Lowland: Corn, vegetable, rootcrop													
Mombon lower[5A]	Corn, taro, sweetpotato	Loamy sand	33.3	7.1 H	2.2 L	0.12 L	18.5	2.5 VL	0.9 VH	0.2 L	15.8 M	12.2 H	2.0 M
Near highway[9P]	Corn, sweet potato	Sandy	27.8	7.5 H	2.0 L	0.16 L	13.6*	3.9* VL	0.2* ML	0.2* L	17.4 M	14.8 H	1.9 M
Near highway[16P]	Eggplant	Sandy loam	26.5	7.7 H	2.5 L	0.16 L	15.7	1.6 VL	0.4 M	0.2* L	17.4 M	14.6 H	1.8 M
Lowland, coastal/riverside: Coconut, banana/ rice													
Coastal area[18P]	Banana, coconut	Sand	31.3	7.5 H	8.8 M	0.57 H	15.5	3.5 VL	0.6 H	0.1* L	18.0 M	15.1 H	1.8 M
Buhang, near river[11P]	Rice, uncultivated 2 yrs.	Sandy loam	29.8	7.7 H	2.2 L	0.12 L	17.5*	6.5* L	0.2* ML	0.4* L	18.4 M	15.2 H	2.2 M
Hill slope (lower): Coconut, banana, rootcrop, corn, few fruit trees													
Malbago, lower[5P]	Coconut, banana, cacao	Loam	35.6	7.1 H	3.1 L	0.23 M	13.7	1.5* VL	0.3 M	0.3* L	13.8 L	10.6 H	2.1 M
Tinago slope[3P]	Corn, sweet-potato	Loam	30.9	7.5 H	1.4 VL	0.11 L	12.8	1.4 VL	0.2 ML	0.3 L	16.1 M	12.7 H	2.4 M
Pikas, foot slope[8P]	Corn, cassa-va, sweet-potato, few trees	Sandy loam	33.5	7.8 H	1.5 VL	0.11 L	14.7	2.6 VL	0.1* L	0.4* L	20.7 M	16.9 H	2.7 M

Pikas, hillside[6P]	Corn, sweetptato	Clay loam	34.8	5.9 M	2.2 L	0.21 M	10.8	2.4 VL	0.2* ML	0.2 L	18.4 M	13.7 H	2.3 M
Hill slope (upper): Coconut, banana, corm, sweetpotato, fruit trees													
Malbago, upper[4]	Coconut, banana, ipil[2]	Loam	33.1	6.8 M	1.9 VL	0.15 L	12.6	2.9 VL	0.3 M	0.2 L	13.0 L	10.0 M	2.1 M
Malbago, middle[13P]	Coconut, some fruit trees	Loam	36.8	6.8 M	3.1 L	0.20 M	15.4	3.3 VL	0.7* H	0.4 L	12.0 L	8.2 M	2.1 M
San Vicente[12P]	Corn, sweetpotato	Loam	39.2	7.4 H	2.2 L	0.13 L	16.8	1.7 VL	0.5 H	0.2 L	17.3 M	13.3 H	2.3 M
Pikas, upper slope[7P]	Pasture	Sandy loam	39.0	7.4 H	1.8 VL	0.10 L	17.7	5.3* L	0.3* M	0.4* L	20.3 M	16.5 H	2.6 M
Mountain/slope: Abaca, rootcrop, vegetable													
Bud dako, lower[1P]	Sweetpotato, estaring	Clay loam	33.4	5.5 M	2.0 L	0.12 L	15.3	4.5 L	0.2 ML	0.2 L	10.4* L	3.4 L	2.0 M
Hantag, upper slope[17P]	Eggplant/ other vege-tables	Loam	38.6	6.6 M	3.2 L	0.23 M	13.9	6.5 L	0.3 M	0.2 L	20.3* M	14.2 H	2.5 M
Hantag,[15P]	Abaca, coconut	Loam	35.5	7.2 H	3.4 L	0.27 M	15.6	1.5 VL	0.2 ML	0.2 L	18.6 M	15.3 H	2.2 M
Bud dako, upper[2P]	Abaca	Sandy loam	31.4	5.5 M	2.8 L	0.17 L	16.7	18.5 H	0.9 VH	0.3 L	19.6 M	15.5 H	2.4 M
Tigbauan, dijot[10P]	Abaca	Sandy loam	33.2	6.8 M	2.7 L	0.22 M	12.3*	52.3 H	0.9* VH	0.2* L	18.9 M	14.5 H	2.1 M

** The letter superscript refers to the village: A for Alegre, P for Plaridel. The number superscript refers to the farm location on the sketch maps of the villages found in Figures 6.1 (Alegre) and 6.2 (Plaridel). ** This means that the soil analysis for this samples was not repeated as the results were good, as this soil attribute was not taken in the .first laboratory analysis. VL=very low; L= low; ML=medium low; M = medium; H = high; VH=very high based on the soil attribute threshold level*

In the 1970s, the fertility of the soils, particularly in the hills and slopes and lowlands, began to decline. The abaca farms on the mountains, though, remain fertile until today.

Soil texture affects almost all other soil health indicators. It is changed by tillage and soil erosion. Soil-inverting tillage (mouldboard or disk ploughing) mixes subsoil with topsoil. This lead to an increase in clay content in the surface of soils that have a clayey subsoil. Soil erosion by water selectively removes fine sil-sized particles. Erosion by tillage moves topsoil downshope and is major reason for the formation of clay knobs.

Water-related concerns

Alegre

With 90 percent of the area being relatively flat (0-3%), Alegre is severely hazardous to flooding or *baha,* as with the other *barangays* along the three river tributaries which run across the town. It has been singled out as very severely eroded especially along the river (Dulag, 1998). With *baha,* the water level rises and overflows through the fields or the village itself causing sediment deposits, called *lahar*. This is a locally adapted term referring to the volcanic ash popularised since the 1991 eruption of Mt. Pinatubo. *Baha* and *lahar* are threats all year round except during the dry months (February-May). Floods occur several times a year especially in the lower Mombon area every time the water level rises caused by heavy rains or typhoons. The more serious floods with mudflows occur occasionally (1991 severe, 2001 less severe). This could flood the whole village a meter deep and leave muddy sediments. The 1991 flashflood, which was part of the tragic Ormoc flashflood[5], left the Barilahay creek dry until today. The floods follow a progression: first affecting the lower river plains, then the paddies near the creeks, the upper river plains, and in serious cases, through the village. The village folks believed that these are due to slash and burn practice or *kaingin*, causing deforestation in the mountains of Burauen, and to indiscriminate sand and gravel-quarrying in Daguitan river. Some farmers refer to *lahar* as eroded mountain soil which for many is just soil or fine sand. Flooding also occurred through the irrigation canals when large volumes of water rushed through the fields during unwanted times, due to the disorganised irrigation system (Saint-Girons, 2003).

The instability of the rivers exposed farming to greater risks. The local people observed the widening of the river and some keen farmers attributed this to water erosion which caused the river bed to change. Located in the periphery of a wider watershed, these were referred to as resulting from upstream developments such as deforestation in the mountains (from slash and burn farming, indiscriminate logging) and along riverbanks, and sand and gravel quarrying in various villages along the river. Upstream river

[5] The Ormoc flashflood in November 1991 caused a tragedy of about 8,000 lives. Ormoc is a city in the central western part of Leyte and is also a part of the Daguitan watershed.

degradation (e.g. bank erosion, river siltation) causes floods which in turn cause downstream river sedimentation and erosion of riverbank agricultural land. Soil quality decreases through the loss of topsoil during the floods but sometimes increases through deposition of fertile silt deposits or sediments. However, sediments have low organic matter content and lose some of the nutrients in the process. Additionally, sediment quality is bound to decrease slowly (Saint-Girons, 2003). These phenomena affected agriculture through decreased fertility and crop productivity, or decreased production by washing out of crops or covering them up, or simply through loss of land.

Rice growing has been beset with water-related problems: too much water at unwanted times, and not enough when needed. The rains in December fill the rice fields and make them ready for the cropping season. Water would be drained during and after transplanting. When in excess and not drained at proper times (especially with the La Niña phenomenon), waterlogging destroys the rice crop. Though the rains that drain to the paddies benefit rice growing, the snail pests that may be carried by water are threats to the crop. Also, the irrigation system set up by the National Irrigation Authority is another major constraint. Paddy rice growers could only grow the crop mostly once a year due to organization-management-related conflicts (Saint-Girons, 2003). Rainfed rice in the northern and central parts of the village were also exposed to the vagaries of the 8-10 year spells of serious drought (the El Niño phenomenon.

Plaridel

Soil erosion by water is evident in Plaridel as indicated by the following observations. BSWM reported that the erosion status is between slight erosion (sheet erosion and rills but less than 3 per meter) to severe erosion inland. The latter has been indicated by the presence of gullies and rills in many places, scores of areas with apparent rock or parent material from landslides, muddy river flows during rains, and huge run-offs after heavy rains and flooding flat areas. Water erosion causes the removal of the topsoil, reduces levels of soil organic matter (SOM), contributes to the breakdown of soil structure, and results to nutrient loss. This creates less favourable environment for plant growth. Deposits of eroded materials can obstruct roadways and fill drainage channels. Sediment can damage fish habitat and degrade water quality in streams, rivers, and lakes. The presence of small rills on the soil surface, soil deposits at the base of slopes, sediment in streams, lakes, and reservoirs, and pedestals of soil supporting pebbles and plant materials mark water erosion. Long-term soil erosion creates large gullies, exposure of lighter coloured subsoil at the surface, and poorer plant growth. Water erosion is most obvious on steep, convex landscape position, but not always readily visible on crop land because farming operations may cover up its signs. (USDA, 2001; Saint-Girons, 2003).

Villagers distinguish between two common phenomena *laka* and *banlas*. The former refers to a condition of exposed rock found in many areas on the hillsides or mountainsides which were exposed to strong winds and

flow of water. *Laka* started with the very strong typhoon, "Oracan", in 1929. Other strong typhoons contributed to the presence of a number of severely eroded areas to the point that local folks have resigned themselves to the forces of nature. Farming has become a matter of luck.

Thus, *laka* is basically water-caused removal of soil through rains or flooding. While farmers acknowledged both human and natural causes, they could recognise only clearly the latest and more severe stages of erosion in their farms. The least severe stage recognised is a soil with most of the topsoil gone with visible stones. The more severe stages are landslides where only the parent material is left. At the farm level, *banlas* means that the soil cannot be productively farmed anymore due to erosion where the topsoil is removed and stones appear. This condition could be less evident when farmers plant some trees on their farms, or their farms are far from the river and, thus, not affected by heavy water flows. Many times, erosion symptoms are taken seriously only when it is already too late for a change in soil condition, or land use (Saint-Girons, 2003).

Biodiversity losses

The indigenous cultivars of upland rice, sweetpotato and other native crops have disappeared as they could not even be grown now in cogon areas. The garden vegetables like *alugbati (Basilia rubra L.), malunggay (Moringa oleifera), kangkong (Ipomoea aquatica), pak*o (*Athyrium esculentum)* are less grown now than before, except for a few industrious gardeners. The bag and mat making among women tended to shift part of the labour needed in field gardening and other non-farm activities. Yams used to be grown but these also diminished as these also needed intensive work when staking and care in the early stage of growth. Farmers then have shifted their labour to working in or growing coconut and/or abaca when these crops began to have important commercial value. Even native fruit trees such as the star apple (*Chrysophyllum cainito*), *tisa* or egg fruit (*Poteria campechiana*), and jackfruit (*Artocarpus heterophyllus*) diminished as they were not replaced when destroyed by strong typhoons. The destruction of some areas in the forest by small time loggers as well as its intensified use by deep-mountain-dwelling insurgents contributed to the disappearance of wild pigs, deer and monkeys which were hunted for food. A combination of degradation-induced destruction of the fish habitat and indiscriminate big-time fishing contributed to the loss of fish population. In addition currently, abaca and banana are facing the threat of diseases: locally known as *alcojeres*[4] and "*bugtok*"[4], respectively.

[4] Both are types of the bunchy top disease (BTD) which is a serious viral disease infesting abaca and plantain. Infected plants have rosette appearance with narrow, upright and progressively shorter leaves, looking like a "bunchy top". The leaf edges roll upwards, a marginal yellowing, with short dark green spots. The disease can be controlled only by eradicating the diseased plants and using clean planting materials; measures which are difficult among farmers in the hinterlands (Thomas *et al.,* 1994)

6.4.2 Economic resources

Labour and capital. It is said that the most abundant resource poor farming households have is their own labour. Findings showed that family labour is the biggest input to the production of major crops such as abaca (Plaridel, 82.0%), sweetpotato (Plaridel, 83.3%; Alegre, 58.2%), taro (Alegre, 67.4%). Coconut uses about just as much family and hired labour because of the various post-harvest activities (collecting, de-husking, drying, sacking) before the dried meal, copra, is finally produced. The cultivation of rice also used a bit more of hired than family labour (Plaridel and Alegre, 38.9% vs.22.4%; 54.5% vs. 27.1%, respectively) because of the labour needs in both production and postproduction activities (Table 6.5). Thus, cash inputs are critical for rice and coconut to pay for wages and workers' food. When farmers run out of cash, they usually try to get advances from their *suki* trader. Also, for a very few specialised farmers, the growing of vegetables such as eggplant, cabbage, and pepper require some capital for seeds and fertilizer. Remittances from children working outside the village and other non-farm sources helped to significantly defray the costs.

The generally low inputs to production understandably produces low yields per hectare for most crops, except relatively for abaca (Plaridel, 974 kgs/ha) which is still grown in fertile soils, and rice (2.26-3.69 tons/ha) which is fertilized. Coconut yields ranged from 1.3 (Plaridel) to 3.6 (Alegre) tons/ha; sweetpotato at 1.9 (Plaridel) to 4.1 (Alegre) tons/ha; and taro at 4.5 (Alegre) tons/ha. On the average, coconut and sweetpotato which are grown mainly on slopes in Plaridel, and thus relatively less fertile soils, performed less well than those on the Alegre plains.

Table 6.4 Percentage distribution (%) of variable input costs of major crops per village

Cost of production	Alegre				Plaridel			
	Rice	Coco-nut	Sweet-potato	Taro	Rice	Coco-nut	Sweet-potato	Abaca
Family labour	27.4	53.3	58.2	67.4	22.4	48.6	83.3	82.0
Hired labour	54.4	45.4	26.2	10.8	38.9	49.8	13.0	17.5
Seed/planting materials	14.0	-	15.2	11.9	5.8	-	0.9	-
Fertilizer	2.4	-	-	-	17.4	-	-	-
Pesticide	0.6	-	-	-	6.0	-	-	-
Capital	1.2	1.3	0.4	10.0	9.5	1.6	2.8	0.5

Capital generation is very low, if at all. It is often dependent on remittances or occasional surplus after dividing the receipts between farm investment and immediate home consumption. Also, some investments are in the form of shifts of surplus income from backyard pig raising, local crafts, or selling of surplus farm produce. A number of households are indebted in several cycles.

Farm land. Most farmers do not own the land they till except the cash crops abaca and coconut in Plaridel where about 60 percent of the land is owner-cultivated (Table 6.6). The non-owners are either tenants, farm labourers, or have family use rights. The latter is the case of undivided family farms where a son or daughter is granted the right to farm certain portion(s) of the total family farm. This could either be longer term in the case of one or two children farming or on rotational basis in the case of more children interested in farming, per season or per year depending on what has been agreed. Households differ in the size and quality of the farm lands they cultivate. Most are working on 2-4 parcels of land but the average is less than 0.5 ha. The quality of the land is generally poor in terms of fertility, terrain, and exposure to uncertainties in weather, and consequently moisture inadequacy.

Table 6.5 Tenure status of farming per crop per village in percentage

Crops	Alegre		Plaridel	
	Non-owned	Owned	Non-owned	Owned
Abaca	n.a.	n.a.	41	59
Coconut	78	22	43	57
Rice	85	15	74	26
Sweetpotato	87	13	79	21
Taro	76	24	n.a.	n.a.

n.a. not applicable

In Alegre, most farmers are tenants, and to a lesser extent hold use rights on family farms. In both villages, tenants can double as exchange farm labourers in other farms or off-farm wage workers.

Market. Food crops are usually sold in towns during market days (Tuesdays and Saturdays for Baybay; Thursdays for Dulag) or in the village if produce is not much. Prices of food crops are dependent upon local supply and prevailing prices in the regional markets and to a certain extent on the cultivar. Aromatic, exotic and glutinous rice have higher prices than the normal hybrid or common cultivars. The same is true of preferred cultivars of sweet potato and taro. Taro from Alegre is supplied to neighbouring towns and the city of Tacloban. Usually, rice is milled in the village mills when for home use, and

brought to the town mills if sold. The cash crops abaca and copra are sold through an intermediary system of village assembler-traders, wholesale town buying stations, and city-based (Cebu city) oil millers or exporters. As in the case of any primary export commodity, abaca and copra producers are price-takers. The past two years were good years because of an improved foreign market for both abaca and copra. But they could also just have some bust as experienced in previous years. Fibre from abaca has bright prospects for Asia, U.S. and European markets. It is also used in local crafts which are exported to Manila or abroad. Research on abaca has been intensified in recent years in order to make full use of its comparative advantage as the country is a major centre of diversity for this crop, and is second only to Ecuador in world trade. But it is facing the threat of the disease called *alcojeres*, which is currently a focus in research and extension activities. Coconut-based oil faces competition in the world market with canola oil, but has sustained the market even then as domestic industrial demand has improved.

The non-farm labour market is quite limited in the villages, and Alegre is particularly highly constrained because of the smallness of both village and town. So, labour migration tends to be in longer cycles in the neighbouring provinces or cities. Plaridel is relatively better off in terms of market because of the relatively bigger size of both the village and town, which offered a bit more opportunities than Alegre. There are seasonal aspects to village off-farm and non-farm work because of the labour demand in abaca and coconut (35%), and that of bag and mat weaving for women (25%); construction and carpentry for men, private business, and domestic services (30%); and labour migration to Manila (10%). Although, workers are paid the prevailing local wage rates (2-3 USD per day), these still are lower than the legal minimum wage.

The suki system prevails in almost all types and levels of market transactions, both in the villages and towns. This is true for both product and labour markets (e.g. farm, bag factory). It is basically a case of interlocking market relations where the producer is assured of a buyer who is also a source of credit for home and farm uses. And, the trader/buyer is assured of a regular supply of products as well as client for other services (credit, goods). Such relations are usually initially built upon kin or social ties because trust is an important element of the suki system.

In Plaridel, market promotion and sales assistance of bags, mats and other crafts are provided mainly by the women's group, UPWARD (United Plaridel Women's Association for Rural Development). It channels orders to members, promotes the products in fairs and exhibits in the cities and towns, and facilitates trainings for members (e.g. design, new products).

Credit facilities. Villagers claimed that credit is the lifeblood of their lives, for some to the point of perpetual debt. Credit is obtained from formal and informal sources. Only Plaridel has more local formal credit sources. Alegre farmers have the rural bank in town but only very few irrigated rice farmers can access it. The farmers' cooperative no longer functions as a credit facility.

Formal credit in Plaridel is provided by the parish cooperative, farmers' cooperative, the BIDANI microfinance project, and the externally introduced self-help groups. Members of the parish cooperative could avail of credit which usually helped them in welfare type household expense such as education, sickness, or important trips. The farmers' cooperative likewise grants loans to members for farming purposes. Craft makers were also able to obtain loans from the BIDANI microfinance project which started in the late 1990s, but which has recently lost patronage due to some policy change, and competition from other credit services. Two self-help credit assistance initiatives (TSK, *tulay sa kaunlaran* or bridge for progress; Green Bank), with mostly women members, were established in the early 2000s to provide financial assistance for productive or entrepreneurial ventures. They operate on the principle of mutual help and social responsibility as failure of one member to pay penalizes everybody in the group. All these require membership and training before loan is availed, and thus cater only to a smaller number of villagers.

Informal credit is common in both villages, and accessed by villagers from local usurers, *suki* traders, and informal self-help groups. Interest rates are at least 10 percent per month, even with the *suki*. Credit, in fact, binds the *suki* relationship as the debtor is obligated to sell his produce to the trader-financier. Credit in kind (consumption goods) is also available from retail stores. At times, this becomes problematic to store owners. There are also various informal self-help financial assistance groups known locally as *bubo-ay*. This is like fund pooling of certain agreed amount at regular times (weekly, bi-weekly, monthly) with members drawing lot, or by mutual agreement, determine the schedule by which each could draw from the pool. Knowing their schedule, members can budget their contributions to the pool, and usually have an item in mind to buy when their time comes. This kind of adaptive strategy of mutual financial reliance formed voluntarily among members (i.e. 5-20 persons), who maybe neighbours, persons of the same trade, work (e.g. village health workers group) or similar interests. It has existed for years in the villages, even in towns. Members have always found this helpful, especially for relatively more expensive purchases. This practice of self-help credit facility is comparable to the *arisan* in Indonesia which has been well-documented and known as rotating savings-and-credit associations, abbreviated as ROSCA (Hospes, 1995).

6.4.3 Socio-cultural resources

Kinship-based social networks are still common in the village, both based on blood and affinal ties, and are considered important immaterial wealth. This is even stronger when reinforced by ritual kinship (e.g. godparents in baptism, marriage, confirmation) with those who have social or political influence (Nurge, 1965; Kikuchi, 1989). Such social networks help in accessing credit (mostly local informal credit), in employment, in business negotiations, and in winning local elections or political party patronage for higher level elections.

Influence peddling is common in the political arena. Experiences in the two villages proved that politically-motivated use of social networks could work either positively or negatively for the community despite the personal or family gains one may have. Some villagers involved in such type of socio-political connection reaped material benefits, many of which were passed on through generations. On the other hand, some lost their jobs or found difficulty having one because they wore a different political colour.

Family or extended kinship has been a source of food, personal credit, and other forms of assistance in times of need, and is always depended on for the care of children and the sick. The family support system could affect the perception of the value of resources and the situation regarding food availability, and even access. This also has some implications for the availability of women labour and the quality of child care when women must work due to financial pressures. Senior or respected family members are called upon to mediate in conflicts (e.g. inheritance, husband-wife relationship), which can break relationships and pave the way to household financial crises, which affect children, and so on. The fieldwork documented some cases of household break-ups leaving the small children in the care of parent(s) or other relatives. There is also some kind of communal spirit, meaning that a neighbour or friend lends a helping hand when necessary.

Kinship plays an important role in decisions where to go outside the village for employment as well as to pursue higher education of young locals with higher motivation or potential. Such decisions become stronger especially if there are relatives in the cities or towns where a villager can stay while looking for a job, and move out upon establishment. To a greater or lesser extent, this helps in reducing the costs of room and board for the job seeker or student, who usually helps with household work or the business of the relative. Richer relatives could help even more. Also, most migrant villagers in urban areas and abroad usually maintain their social contacts in their villages of origin, going home regularly or occasionally for the fiesta, Christmas, family reunions, or other social events. These back to the village trips or vacations usually create significant opportunities to the locals seeking for outside opportunities. Children who now have established families and work in the cities or abroad and also offer the older parents an opportunity for vacations and a taste of city life for a few months a year. Many parents who were farming all their lives welcome these opportunities but only for a short time. This is because the older generation perceive the village as the beautiful clean home they have always cherished, and farms must produce no matter how small (see Box 6.3). The strength of kinship-based social resource was found in varying degrees among households. What is ironic is that the higher the socio-economic status of the household the wider the social network becomes. The lower the status of the household, the more the social network tends to serve the very basic such as food, clothing, or providing domestic employment. This material support is borne out of a sense of obligation because of kinship value-based expectations.

Education and skills were also held important and are strong add-ons to kinship as resources. When combined with strong kinship ties of whatever nature, these could really bring about upward social mobility to families or individuals, even fortune or power to some. This is so with the rich and influential families in the villages, in addition to landholding. But landholding is also intertwined with family ties, since even the affinal and ritual kinship can also be based on social network. So, wealth by virtue of landholding could also be "wealth" based on fictive or ritual network of kin.

Affiliation to religious, self-help, social or trade-related groups is also become a resource, and determines the kind of services or economic opportunities (e.g. credit, marketing assistance) the household or individuals can access or have. The socio-cultural aspect of this grouping rests on the importance placed on conformity to the values held critical for the group to efficiently function. For example, one has to be a Roman Catholic and religious practitioner to become a member of the parish cooperative, which operates just like any credit cooperative in the country. Though not really explicitly stated in a by-law, members of religious organizations or active in Church activities had more information on the credit facility and could access it. The two self-help TSK credit groups are heavily founded on Christian biblical-based fellowship to instil among members the value of moral responsibility and accountability. Thus, debts must be paid not only for economic reasons but out of moral obligation, making the credit facility both an economic service and a way to deepen spirituality; thereby improving relationships. Meetings start with prayers, followed by bible-sharing before proceeding to the business at hand. This is expected to decrease the level of defaulting which is a problem in formal credit with small farmers. Though attaining some level of success in other villages and provinces, it was too early to say whether the two groups established in Plaridel will be successful, as they were newly established during the fieldwork period. But the members' reactions were generally positive. First, the interest is relatively low compared to prevailing usurious rates by private moneylenders in the village (2% per month versus at least 10-20%). Second, it offered the members (almost all women) the experience of fellowship which touched the personal core of their relationships with family, people and community. To start with, the members build their own meeting places: from the sourcing and cutting of bamboo poles to building the *nipa* hut of about 10 m^2, applying what is popularly called the Filipino *bayanihan* spirit (i.e. willingness to do voluntary community or group work).

The villagers value a service that is sensitive to their situation, which already is complex and difficult because incomes do not come regularly on a monthly basis. Income depends on the crop cycle, season-based cash collection from the bags or mats sold, plus other cash inflows, which are all interchangeable inputs to their various livelihoods.

Box 6.3 Children are blessings…… could be assets.
Themselves coming from large families, Lolong and Lucia, the 'ultimate' farming couple as the villagers would call them, are fully attuned to the spirits of farm and mountains for fifty years. Besides being full-pledged farmers, Lolong is the number one *mangangayam* (a spiritist wild animal hunter), a traditional healer, and producer of the best tasting *tuba* (local toddy from coconut sap). The toddy was their major source of income for about 30 years (1965-1995) and helped sustain their large household. My visits with them were always lively talks over glasses of *tuba*. Now in their early sixties, they still are pretty strong doing their regular mountain farming (abaca, coconut, rootcrops) of six farm plots, one to two hours walk from their homestead.

At the start, with no money to pay for a local midwife, sixteen-year old Lucia gave birth to their first child with only Lolong (then in early twenties) in attendance. And the couple having learned this skill, they did so for many more expectant mothers in the village. Their next fourteen children were also born self-help with only a sharpened *bagakay* (small bamboo knife) used to cut the umbilical cord. But this time, they have about 8 hectares to their name, in addition to the initial 0.5 ha inherited. Six children are now working in Manila, one in Cagayan de Oro, one is a scholar student protégé of some nuns in Cebu city, one working in Singapore, and the rest in Plaridel. Five children are still with them. Asked how they managed with purely diversified farm-based income (i.e. abaca, tuba, rootcrops, coconut) for years to live on, the couple would simply muse with an air of content and resignation to their faith. They may not be pious Christians, but they are firm believers in the Almighty. To them, children are blessings who have to be nurtured with the gifts of the earth. They believed that God blesses pure hard work if coupled with earnest prayers. Now, they said, children have become assets and opportunities allowing them to take a few months' taste of city life every year. As they go on with their respective lives, they helped in building their parental house, bought a videoke system and some basic household appliances to grace its simplicity. It was not difficult to see the light in the couple's faces as they recounted their life experiences *(Case household 1*).

So a cycle of full payback could last at least a year under normal circumstances. Typhoons or market decline could delay recovery. The manager of the *romblon* craft factory reported of a marked decrease in the export sales right after the September 11, 2001 attack on the World Trade Center in New York. The BIDANI microfinance project lost patronage among the mat weavers in Plaridel due to the change in payback period from one year to six months, without considering the income-cash flows of the households. It was a unilateral policy change about which clients were not consulted.

The *suki* system of patron-client relationship is as much a socio-cultural as it is an economic institution. This refers to the mix of values that form the basis for such often lasting trade relationship: kin relations, *utang na loob* or *hiya. Suki* could start through contacts through a relative or friend where such contact is already a *suki*, or has some trust-relations with the trader. Often, the trader is also a financier. A farmer may first have credit for farm household or farm use, and in exchange promises to sell his copra or abaca to the trader. That he is able to obtain credit could elicit some *utang na loob* or debt of gratitude especially if obtained without interest. *Utang na loob* is valued, and this then leads to a continuing cycle of mutually benefiting transactions. But even if there is another trader which competes for, say, some relatively better price, the farmer cannot just break the first established *suki* relation because of *hiya* or shame. This is a value which deters one to enter or break off relations merely for purely economic reasons (e.g. better prices). The same established *suki* system created confidence among the household-based bag and mat weavers. Most of them did not join the marketing assistance group, where the main supplier-traders are members, as they were sure to have the orders as well as access to new designs. Many of them shy away from meetings, time they could devote to other activities. Other types of trade-related informal relations exist between the export factory senior workers and household-based bag makers usually determined by both skills and good relations (family or friend). Skills are critical here because of the strict quality requirements of the factory.

That "health is wealth" is valued by the villagers, as pointed out in literature (Niehof and Price, 2000; Niehof, 2004). Health was ranked high in the survey as a form of immaterial wealth. They are especially conscious of this because of the physical demands of farm and non-farm work. But how this consciousness is translated to actual nutritional status is another matter. The findings related to nutritional status and health are discussed in Chapter 9.

6.5 Socio-demographic profile

6.5.1 Distribution of age, sex and education

In both villages, the population is more or less even in sex distribution, but reported household heads are mainly male: 89 to 96 percent. This still largely reflects the patriarchal orientation of society in family authority. Most household heads and their spouses have completed only the basic elementary education, followed by those who had gone to secondary and some tertiary levels, and the rest not having completed the primary grades (Table 6.7). With such educational background, most parents are mainly interested in their children finishing the elementary levels (in Alegre), or secondary education (in Plaridel), the highest school levels found in the villages. Right after this basic education, non-farm work outside the village, if possible in cities and bigger towns, is the single most common aspiration. One son or none at all may be left, leaving farming to the older generation. The average age of the household head is about 45 and a little over 50 years for Alegre and Plaridel,

respectively. While there are still younger farmers in Alegre, this does not imply that they will continue farming in the next years. All informal discussions indicated the desire to move out of farming as soon as opportunities are found.

The sample households in Alegre and Plaridel count 210 and 185 children, respectively, with about 53 percent males and 47 percent females in both. About 42 and 39 percent of the children in Alegre and Plaridel, respectively, are 5 years and under, and the rest are school-age children. These population figures and age distribution of children can be explained by the life course pattern of households in both villages. With the age of the female spouse as indicator of the households' life course, Alegre has relatively younger households compared to Plaridel (Table 6.7).

6.5.2 Household size, life course and dependency ratio

The average household size has decreased from 8-10 in the 1970's, and approximates that of the national average of 5. The household economic dependency ratio is 2.1, that is, each working member of the household supports the consumption of a little over two members. Averages, however, defy the miseries of a number of larger households consisting of about ten to twelve members who barely eke out their daily food. Or, those households with four to six small children left with single spouses or grandparent(s), the breadwinner being out in Manila or another area working to send home remittances that may not even be enough for the basics. Most young couples (<35 years), however, now plan for smaller families with about two to three children at most.

From the distribution of female spouses, Plaridel has about 60 percent of the spouses who are of the non-child bearing age while Alegre has about 64 percent of spouses who are of the child-bearing age. Thus, Alegre counts more children than Plaridel. This implies that mothers in Alegre more likely devote more home and child-care time than mothers in Plaridel. It will be noted that Alegre has more the farm and off-farm livelihood types of households where the husbands are engaged more in farming and off-farm activities and where mothers are obliged to be in the homes for the children (see Table 6.8). These life course patterns have implications on livelihoods and food security via the effects of resource use and allocation, and women's labour and time availability for work and home. This life course effect on livelihood is discussed in Chapter 8, while the related effects on food security are discussed in Chapter 9.

Table 6.6 Socio-demographic profile of households

Characteristic	Alegre		Plaridel	
No. of households	180 households		738 households	
Population	Ca 900		ca 3700	
Sample size: n=200	91		109	
Sex of household head: Male (%)	96		89	
Average household size	5		5	
Average education of HH head	48.7% completed elementary 30.8% some secondary 5.1% some tertiary		33.6% completed elementary 21.8% some secondary 0.9% some tertiary level	
Ave. age of HH head= 50.4 yrs	ca. 45		ca. >50	
Age distribution (%) of female spouse:				
<35 years	25.0		3.8	
35-49	39.2		35.7	
50 and above	35.8		60.5	
Age distribution of children (%)	Female	Male	Female	Male
Alegre: n = 210; Plaridel: n=185				
5 years and under	16.7	25.2	15.7	23.2
>5-12 years	30.0	28.1	31.4	29.7
Sub-total	46.7	53.3	47.1	52.9

6.6 Incomes and patterns of livelihoods

For any given year in at least the last two decades, farm incomes were generally low because of low productivity and decreased per capita farm size, unstable prices, capital-constraints and weather-related constraints decrease in production. Better incomes from the cash crops abaca and copra in the last two years were more than absorbed by the increase of consumer goods prices. In real terms, most farming households are worse off. So, the movement away from the farm and the search for other forms of income-generating employment are no surprises. In effect, current livelihoods are a mixture of various activities.

Based on the magnitude of income sources (farm, off-farm, non-farm), households were classified into four types: those with incomes from the three sources just about the same percentage distribution; farm incomes greater than 50 percent; off-farm incomes greater than 50 percent; and non-farm incomes greater than 50 percent. In Alegre, where outside the farm employment

opportunities are limited, more households are dependent on farm incomes but those with non-farm sources have increased through the years. The shift to non-farm income sources is already happening in Plaridel, with farm sources as next in importance. The presence of the bag and mat weaving enterprises with export markets, construction work, carpentry, trading/peddling, and domestic services opened up the non-farm labour market in Plaridel. In Alegre, these come mainly from domestic service, local carpentry, trading and driving. A relatively higher proportion of households in Alegre depend on incomes as farm workers than Plaridel (Table 6.8). Off-farm employment in both villages came mostly from coconut, rice farming, and tuba gathering; with abaca and tree cutting (*mangraha*) as additional farm work in Plaridel. The details of livelihood patterns and distribution of incomes are discussed in Chapter 8.

Table 6.7 Incomes and livelihood patterns by village; Alegre (n=91) and Plaridel (n=109)

Characteristic	Alegre	Plaridel
Average total HH income per year (USD)	1174.90	1638.73
Mean per capita income per day (USD)	0.64	0.90
Livelihood type: (%)		
About same distribution (LIVETYP1)	12.8	13.8
>50% farm income (LIVETYP2)	42.3	31.4
>50% off-farm income (LIVETYP3)	12.8	8.0
>50% non-farm income (LIVETYP4)	32.1	46.8

6.7 Food security issues in the research communities

6.7.1 Local perception of food security

A clear understanding of how local folks perceive their situation is necessary for clarity of targets and effectiveness of means to achieve such. The current Philippine agriculture development policy has been pushing for greater local empowerment and participation in the planning and implementation of programs. Then, it is even more imperative that policies and related strategies are ground-based. How locals perceive their situation could inform global science and policy.

What makes people food insecure? Further, do women and men, or different age groups explain food security differently? If they do, does it matter? Which factors or criteria? As discussed in Chapter 3, a number of Philippine studies have dealt with the gendered analysis of demographic factors, livelihoods, time allocation, and nutrient adequacy. Evidence of the likelihood of positive impact of mother's home and garden time, her education and income contribution to household nutrient adequacy particularly on children is common, but the evidence is mixed with other factors such as age,

education, nutrient knowledge, and income types, among others (Popkin, 1975; Quisumbing, 1987; Garcia, 1990; Balatibat, 2004). In this study, the villagers were reflective in accounting for economic, socio-demographic, socio-psychological and religious factors that affect household food security. This section summarizes the local perceptions, self-ratings and descriptions on food security and food consumption patterns that were generated through ten focused group discussions which were stratified by sex (4 FGDs) and age groupings (6 FGDs) (see FGD guide, Appendix 2).

Over-all, it was quite difficult to translate "food security" in local terms so that the villagers' perceptions could be elicited. Some brainstorming was necessary to get them to describe sets of situations rather than translate, and have them express themselves in their own terms. In the end, participants in both villages came up with describing the state of food security in three degrees translated here in italics first in Waray-waray, then in Cebuano. The "best" condition translated as food secure or "*permanente gikukuhaan; walay problema sa pagkaon"* literally means "always sure and no problem in accessing and having food". The lesser condition, food insufficient or "*may kakulangan ha/sa pagkaon"* (same phrase for both) means the "presence of inadequacies for various reasons". The worst condition, marginally food secure or "*duro hin lisud ang pagkaon; kapos, dako og kakulangan sa pagkaon"* literally means a "problematic food situation with serious inadequacies". Food security, as the villagers perceived it in these three levels, is summarized in Table 6.9. Their meanings were expressed in terms of indicators of wealth and assets, characteristic behaviour, attribute or attitude of people, or factors contributing to some food situation. They argued that no single factor or condition but a mixture of traits, factors and conditions lead to different levels of food (in)security. For example, a household may have a better income but if the budget is not managed well, or if at least one of the spouses is vicious, then the food security situation is at risk. On the whole, the most obvious measure of food security is associated with that of sufficiency or quantity/frequency of having food. The adequacy or quality side of food, though mentioned by some, was not quite obviously expressed. The phrase "*may kakulangan*" refers to both meanings of insufficiency and inadequacy. Some did have an inkling about quality of food as indicating adequacy with the expression "*dili himsog*", literally "not strong", which means less healthy, and more or less equivalent to indicating food inadequacy. But this was of less consensual clarity. The tables of perceptions are summarized as articulated from the FGDs. They represent the conditions and description of what is, or what causes, food (in)security), among households in the study villages.

In Alegre, more than in Plaridel, men are aware of such factors as land inheritance, old age pension for security, non-farm sources of income such as the spouse's wage employment, children's remittances and business to hedge against farm failures and for other non-food expenditures, the importance of managing well the resources, and small family size. Men and women all agree in the importance of sufficient regular incomes, sufficient assets such as

coconut and/or rice lands for food and cash, and such personal attributes as frugality, non-viciousness, high work motivation, and self-reliance.

The more mature villagers of both sexes (35-50 and >50 age groups) expressed the importance of cooperation among family members, good management, on-farm diversification such as backyard raising of livestock, work abroad or other places in the country, old age pension as contributory factors to a more sustainable food secure situation. The role of mixed and regular incomes and of remittances from abroad came in very strongly. Children who worked abroad or who got married to foreigners tended to generate more assets for the household. It is not surprising that villagers are quick to point to the big houses contributed by children and allowances as real indicators of wealth, and therefore, food security. Education of children at least to a level where they can be gainfully employed is also held as an important factor for economic mobility through non-farm work outside the village. The villagers consider farming as a means just to get by. Land needs to be cultivated as parents' legacy for food and some cash, but is not really for food security because of the precarious farming situation.

The main reasons that bring about food insecurity are similar across age groups and gender. Ranked by the villagers by order of significance, these included low and insufficient income from farming because of high inputs, low yields, low farm product prices, yet high cost of living; low income from the alternative wage work; natural calamities especially typhoons and floods; low level of education which means low skills and low paying jobs; and relatively bigger household size. It was quite observable in the discussions that while men and women felt relatively free to express themselves, the women tended to be more articulate and focused on the micro-related reasons, while the men were more concerned with macro-level issues like the state of the national economy and corruption as affecting the local economy, and thus, the livelihoods and incomes of people.

In Plaridel, men were also more cognizant of bigger land inheritance, remittances especially from abroad, family size, cooperation, work motivation, and frugality than in Alegre. They were also more sensitive to the fragility of farmland by location, due to their experiences of distinctly observed land degradation especially in the uplands. The younger villagers (<35 years) tended to assess what they start with. Those whose parents could provide capital or had established businesses that children can take part of, or children trained well in work and industry started off as relatively stable in their respective households. It is also interesting to note that they singled out as critical the maturity level at marriage. Home gardening was important to them especially when they have little to subsist on. Many young couples who got married at a very young age (<20 years old) have less skills and experience, and, thus, are less likely to get good work and be emotionally stable. Many have developed over-dependence on parents, are less stable in character and easily succumb to vices like gambling and drinking. This could become a pattern handed down to the children. A reason for this is probably that Plaridel has more gambling opportunities than Alegre with its own source of financing.

Table 6.8 Summary of factors perceived to be related to food security in Alegre and Plaridel, classified as common and village-specific perceptions

Food secure (*permanente gikukuhaan)*	Food insufficient/inadequate (*may kakulangan ha pagkaon*)	Marginally food secure (chronic) (*duro hin lisod ang pagkaon*)
Common Stable, sufficient, diverse income (esp. off-farm, non-farm) Remittances of children, especially from abroad Better harvest in rice farms Bigger cultivated farmlands (rice, coconut, abaca) Mostly businessmen Better home and budget management Nutritionally-balanced food Small family size	Household income just enough for the basics (food, clothing, basic education for children) Farm wage workers A bit more children Just enough good relationship between husband and wife Incomes may be better but vicious spouse (gambling, drinking)	Unstable, low income both spouses Large family, cannot send children to school Vicious (both, or especially husband) Less family cooperation, disharmony Less ambition, no determination Over-dependence on others for help Laziness, esp. the husband Household/resources mismanagement Usually large family size
Only Alegre Children with good education and work Bigger rice lands (food, cash) Usually have big inheritance For the old ones, have regular pension (security) No problem with housing No or less vice	Lesser farmland, either owner, leaseholder or tenant Maybe landless, but industrious Complete meals, but lacks nutrients Less than usual remittance from children Less in budget management and family planning Backyard animal raising for food/income	Less farm work, no work animal Once a day full meal Young children not schooling, already working Not good understanding of the situation
Only Plaridel Both spouses income-earning Wife factor: better home management Industry and ambition Family harmony, cooperation Cash farming (vegetable, livestock) Capital from parents for business God-fearing	Diverse yet unstable head of household income Less ambition and industry, laziness to some extent Smaller size of farm land Usually tenants or leaseholders	Non-prime farmland by location, exposed to wind and water damage More sickness cases, healthy problems interfering with work No land resources Lacking in the basics (food, clothing, shelter) Less or no education and skills Less trusting in God

Interestingly, it also became evident that young mothers had difficulty to learn skills or even attend "opportunity" meetings as they had to cope with the early demands of motherhood and other domestic chores. To attend the FGD sessions, they had to bring their young children with the field assistants to tend to them.

The more mature villagers tended to single out such factors as industry and ambition, multi-activity of households, double-income earning by both spouses either as permanent wage employment, or abroad. The elder ones (>50 years) pointed out that good education of children assured them of better work opportunities and income as professionals. A good character based on Christian values contributed to harmonious relationships within the family, cooperation, and non-viciousness. All these lead to better economic opportunities, better and assured incomes. On the whole, the major reason causing food insecurity is unstable and low income which, according to the middle-age and older villagers (35-50 and >50 years) is largely caused by natural calamities over the years, and the resulting low productivity of infertile farmlands.

Food (in)security in Plaridel was attributed to irregular and low incomes both from farming and local non-farming work, lack of resources and opportunities to improve farming and engage in other productive activities, vulnerability of many farmlands to wind and water damages, and big family size. Multiple sources of income and the contribution of remittances from children or spouse abroad, and a mix of personal attributes that contribute to harmony in the management of resources and relationships came strongly across age groups and gender.

In Alegre, the food security self-rating of own household and the village by both males and females tended to be that of the second level, that is, some food insufficiency/inadequacy. Twenty-five percent of the females said though that their households were marginally food secure (or chronically food insecure). In Plaridel, both males and females indicated that their households tended to be food secure, with some cases of food insecurity of the second and third degree. Instead of rating the village as a whole, they found it easier to rate by *purok* as Plaridel is a big village. The centrally located *purok* 3 was rated food secure. Here are the households with relatively stable income, more into business, and many household-based crafts makers. The other *puroks* are 50-50, while *Purok* 4 had more cases of food insecure households. *Purok* 6 was the worst with more food insecure and marginally food secure households because of gambling (i.e. including the women), and many households did not have stable sources of income. In both villages, there was no difference in self-ratings attributable to sex or gender. Caution needs to be taken especially with self-ratings of own households as those who voluntarily participated in the FGDs could be relatively better off households despite some cases of inadequacies. But village ratings could reflect some meaning and reality no matter how rough the distinctions may be, as the results of the formal survey would show.

The villagers also accounted for what they considered as threats to food security. In Alegre, these included low farm incomes, flooding, infertility of soil, inappropriate farm techniques, unstable market, fluctuating farm prices, lack of capital, limited off-farm and non-farm opportunities, low pay; bad debts in the case of small business, very limited market for food crops, and wasteful spending with remittances. Villagers from Plaridel included threats like low farm incomes, low off-farm wages, seasonal/irregular non-farm work, irregular buyers and orders of crafts, bad weather and infertile, eroded farm lands.

Food security is clearly perceived from the food access and availability angles, and less from the adequacy aspect. Access is mainly a function of the stability and amount of income which comes from various sources, from non-farm incomes of both or either spouse and remittances of children working or living abroad or other places contribute a great part. But stable and adequate incomes do not suffice. As the local folk said, food security is sustained because of the households' ability to manage their resources (i.e. land, labour, and finance) well, are well motivated, industrious and frugal, with members cooperating and harmoniously relating to each other. The gender dimension is clearly important in the recognition of the role of the wife and mother in home management and in harmonious relationship as contributing critically to food security. Children contribute to food security, especially by their remittances from work abroad or in urban areas. In fact, the farm labour contribution of children was not mentioned as contributing to food security but that they are educated to be able to work with good pay. Importantly, the local people have realized that not being able to manage family size can lead to difficulties in managing resources and inability to meet basic needs including the education of children. They said further that the kinship-based support system, if taken to excess, can make people over dependent, lazy and unmotivated to work, and thus can lead to unstable livelihoods, unproductive farms, disharmonious relationships, and eventually, food insecurity. Very strongly they said that vices such as gambling and drinking often make households unable to meet and sustain their food and nutrient needs even among households with relatively better incomes.

6.7.2 Patterns of food sources and consumption

On average, households spent 70-80 percent of their income on food. Many households do not have enough income to buy the basic food that provides adequate nutrients. Food is obtained from various income sources and from own production especially of the main (i.e. rice, corn) and supplementary (i.e. bananas, rootcrops) staples. Backyard and field gardens, which are often simply field patches or fringes, also produce vegetables and fruits (see Table 6.10). However, the diversity of individual household own-production is quite limited. Of the two villages, Alegre has relatively more households with food gardens while Plaridel has more of the ornamental gardens.

Table 6.9 Classification of sources for staple and non-staple food by village

Village	Own-produced foods		Bought foods	
	Staple	Non-staple	Staple	Non-staple
Alegre	rice, corn, taro, sweetpotato, cooking plantain	vegetables (taro leaves/ petioles, sweetpotato tips, eggplant, pechay, okra, opo, squash, patola, stringbeans), banana, fruits (avocado, guava), young coconut *tuba*	rice, corn, bread, rootcrops (sometimes)	fresh and dried fish , pork, chicken/carabao meat, other seafoods, egg,, cheap canned goods, other fruits (sometimes), bread, coffee, milk powder, sugar, salt, condiments, oil, spices, *tuba,* softdrinks/juice (sometimes)
Plaridel	corn, sweetpotato, rice, cassava, yautia, plantain, breadfruit	vegetables (*malunggay,* sweetpotato tips, bitter gourd, stringbeans, eggplant, , *saluyot*, *alugbati*, water hyacinth, pako, upo, kondol), native chicken (sometimes), fruits (papaya, guava, atis, avocado, star apple), young coconut, spices (onions leaves, lemon grass, pepper)	rice, corn, rootcrops, banana, bread	instant noodles, misua, miki, bread, ready-to-eat viand, pork/chicken meat, fruit (guayabano, avocado, pomelo, papaya) egg, vegetables (cabbage, carrots, pechay, chayote, cucumber, *alugbati,* squash), mungbean, other seafoods, powdered milk, softdrinks, chocolate drink powder, juice(sometimes), milk power, salted and dried fish, fish, shrimp paste, condiments, oil, coffee, salt, sugar, spices (onion, pepper), native delicacies, tuba, ice candy, candies, junk foods, *tuba*

Food donations and gathering from the neighbouring fields and mountain farms are not uncommon. Nutrition campaigns by health workers also have created some degree of nutrition awareness among mothers though these have not been systematically assessed. Mothers complained, however, that many children need be forced to eat vegetables. School children also tend to buy cheap junk foods which are readily available in village stores.

6.7.3 Farm systems and food security timeline

Land use choice varies among farming households as the opportunities, constraints, and specific situations they face differ. The reported bases for such decisions ranged from number, size, distance and characteristics (fertility, terrain) of farms; land tenure; capital particularly for seeds and labour hire, labour availability (especially with abaca stripping and copra processing), availability of planting materials, farming goals and behaviour.

The food security timelines (Bergeron, 1999), which are drawn from the ten FGDs, show relevant associations between cropping patterns and the incomes and food sources from them, and other income sources, in relation to food and cash status of households.

Alegre

The harvest months for both irrigated and rainfed rice are March-May and September-October with peak harvest in March-April. Some of the paddy and rainfed rice lands cannot have a second planting in July-August as a result of problems in irrigation water availability, and the lack of capital due to the expenses associated with the traditional fiesta celebration and start of the school year expenses in June. Rice seeding is usually in October and planting in December, when the rains also make possible planting in the rainfed areas. In fact, October and especially December are reportedly high farm expense months because of the cost-intensiveness of rice cultivation (labour and fertilizer requirements).

Corn and sweetpotato are dry season crops in rainfed areas and usually planted towards the end of the rainy months in January-February or May-July periods. With a more or less bimodal climate in Dulag, corn and sweetpotato can be grown in combination twice a year in the river banks (*mombon* areas) or in the interior rainfed areas (*gabhok).* Farmers stagger the schedule of planting and harvesting of corn and sweetpotato in April-June and September-October depending on the availability of planting materials and labour. Households allocate farm labour between the cultivation of various own crops such as corn, rootcrops, and wage labour in coconut and rice lands. The latter is mostly contributed by men, while the former is done both by men and women. Also, for the same months and depending on the kind of vegetable (e.g. squash, eggplant, stringbeans, bitter gourd), some farmers choose a suitable planting time. But vegetables are not grown by many but only as specialty crop for some farmers. Taro production has increased because of increased market and better price in recent years, with income providing part of farm capital. Though taro can be grown most times of the year, being not so

sensitive to moisture deficiency, farmers plant it at such a time that it can be harvested before the rice harvest, when cash is most needed in June and December. The petioles and leaves are harvested every week after three months of planting, and are important source of regular weekly income till fully harvested. Rootcrops and vegetables are especially women's crops. Their cultivation may be a combined activity by women and men depending on time availability, but harvesting and selling are mainly done by women. Sales of these crops are also within the control of women and used for domestic purposes such as food and other basic necessities.

Most households are tenants in coconut farms or work for wages during the main harvest-processing months in January, March-April, May-June, October, and December. It is at once noticeable that these peak months are timed for labour and cash needs. Work entails gathering of the nuts and processing them into copra. Income from this wage labour is in fact the main source of income. The production of food crops is mainly for food and the little sold surplus provides supplementary cash. In-kind income from labour in rice farms provides the staple.

The calendar below refers to farm income as a combination of own-produced crops and in-kind income. Wages income is mostly from coconut farms, others are non-farm income, excluding remittances. Farmers' rating suggested that farm incomes are relatively low in any given year because productivity is low or not assured, due to the weather and fluctuations in moisture, no fertilizer inputs except some in rice, and even labour is not of the required intensity in their own crops as they need to offer wage labour for the regular cash needs. Non-farm opportunities are quite limited in Alegre. Thus, the villagers expressed quite strongly that remittances from outside labour migration or external fund sources are really necessary for a decent life. They see that local households with such income source fare pretty well in terms of food and the other necessities of life.

Because only few households have regular remittances, the income of households are generally low as evidenced by experiences of hungry months (and also low cash months) in late January to February and to a lesser degree in July. These are just after the heavy expenditures (both farm and household expenses) in June and December, and the peak inflow of remittances in May-June and December. From Table 6.11, in months with relatively more aggregate income from various sources including remittances (dark-shaded), households could just meet the basics or even less since many households still had to pay off debts. In months with relatively less income, the household cash position can be negative because of the continuing farm and household expenses, and food insecurity exists. Many households are reportedly almost perpetually indebted to the local retailers and moneylenders. The latter charged interest to as high as 50 percent per week for capital borrowing (e.g. taro sellers), and 10-20 percent per week for consumables and wage fund (e.g. coconut farm labour).

Plaridel

For many farming households in Plaridel, the major cash crops are abaca and coconut, either as direct farm produce or farm wages.

Table 6.10 Seasonal calendar of crop harvests, incomes by sex, expenditures, food and cash in Alegre

ACTIVITY/Particulars	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Harvest of:												
rice												
corn												
taro												
sweetpotato												
coconut												
vegetables												
Income from:												
farm												
farm wage labour												
small enterprise												
remittances												
Women income from:												
farm												
wages												
other sources												
Men income from:												
farm												
other sources												
Farm expenses												
Domestic expenses												
Least food												
Least cash												

Legend The shades represent the rating of intensity of harvest, income, expense or food deprivation as rated by the FGD participants. These are ratings per crop or particular category, but not comparisons between crops or particulars

Shade	*= Rating*		*= 5*		*= 4*		*= 3*		*= 2*		*= 1*

Many farmers with family abaca lands also work as labourers in other coconut or abaca fields. Coconut is harvested and processed 3 to 4 times a year and time March, May-June and October for the school opening and just before the monsoon months, and December-January for the holiday and fiesta seasons. Abaca is harvested and processed into fiber 2 to 3 times a year depending on the distance of the farms. Distant farms could only be harvested once, and some were simply left and only harvested when possible. For both coconut and abaca, farmers maintain a *suki* buyer-trader usually from the village whom they could make cash advances to pay for farm labour and food, and pay out during the harvest season.

Paddy rice is grown only by a few farmers as owners or exercising use rights of undivided family land. It is grown twice a year with peak harvests in May-June and November-early January, just before the southwest and after the northeast monsoons, respectively. The first cropping is risky to drought, the second to typhoons. For the landed, these are appropriate harvests in time for the school opening in June and the fiesta celebration in the second week of January. Labourers in the rice fields can get their share of the staple as wages in-kind, while tenants get their share of the harvest.

Corn and rootcrops (e.g. sweetpotato, cassava, yautia) are cultivated in a mixed system or in rotation on the slopes, hillsides, or micro-plateaus in tenanted, owned lands or in lands with family use rights mainly for home use. The little surplus is sold to the market or local buyers or given to relatives and neighbours. Tolerant to less moisture, these food crops may be planted throughout the year after a day or two of rain. However, the growing seasons of various crops are distinct and these depend on the availability of labour, planting materials, the onset of some rain, or in preparation for some social event. So, for any given year harvest seasons are commonly in the months of January (fiesta), May-June, September, October, and December (holiday season). Corn seeds are set aside for the next planting; while planting materials for rootcrops are directly planted under shades in patches for propagation for the next growing season. Vegetables are grown in some home gardens or as specialty crops by at most three farmers. Eggplant, bell pepper and cabbage or *pechay* were grown for the market, and their continued cultivation depends on availability of capital for seed and fertilizer.

Incomes from mats and bags peak in April to May because of the holiday and social events-related orders, and the abundance of raw materials. The orders from a local export factory and a few local export suppliers come in September to December which make a number of women and some men quite busy. These incomes help households tide over non-busy months in the farm as men are engaged in coconut and abaca farms not on a daily basis.

With only a few engaged in rice production, most households buy their staple food rice. Lean income months would mean having corn, banana or rootcrops as staple whichever is available. The southwest monsoon months of July-August, when not much work is possible and there is very little harvest of rootcrops, are lean food months for many in the village. The same situation occurs after the fiesta in February when cash is lowest with no harvest nor remittance, nor income from mats and bags.

Table 6.11 Seasonal calendar of crop harvests, incomes by sex, expenditures, food and cash in Plaridel

ACTIVITY/Particulars	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Harvest of:												
rice												
coconut												
abaca												
corn												
rootcrops												
vegetables												
Income from:												
farm												
farm wage labour												
non-farm wage												
crafts enterprise												
remittances												
Women income from:												
farm												
others												
Men income from:												
farm												
others												
Farm expenses												
Domestic expenses												
Least food												
Least cash												

Legend: The shades represent the rating of intensity of harvest, income, expense, cash, and food deprivation as rated by the FGD participants.These are ratings per crop or particular category, but not comparisons between crops or particulars

Shade	*= Rating*		*= 5*		*= 4*		*= 3*		*= 2*		*= 1*

Chapter 7
Resource environments and farm productivity

7.1 Biophysical environment: the context

Farming households in fragile areas are the subject of this thesis. The biophysical environment therefore becomes the context and starting point of analysis since households base their decisions on livelihoods, partly yet importantly, via the effects on farm productivity. The biophysical environment has both biophysical (e.g. soil quality, terrain) and socio-economic (e.g. land tenure arrangements) characteristics which impact on farm productivity. But the existing biophysical conditions result from the interplay of dynamic forces of previous land use and management practices, and natural causes. This chapter explains the initial linkage relationships with farm productivity as the dependent variable, which was regressed on selected biophysical and socio-economic variables.

Of particular relevance is the need to view the biophysical environment both at the community or village level, i.e. as a small watershed in the case of Plaridel, or as part of a bigger watershed like Alegre, and at the individual farm level. Thus, the analysis combines information from the results of the statistical analysis, findings from the cases (e.g. soil analysis results, land use history), the student thesis, the focused group discussions and informal interviews and observations (e.g. agro-ecological changes). The results of the non-formal survey sources relevant to this chapter were mainly discussed in previous chapters and are used here when necessary.

Fragility and fragile lands in the research villages

Fragility has been defined as an attribute of land resulting from a mismatch between human use and biophysical conditions, causing a decline in those physical elements (e.g. soil quality) of the environment required for the land use in question. This mismatch could be within the boundaries of the specific area in question, as in a village where farmers' cropping practice caused denudation, or within a wider area but affecting the specific area in question, as in the case of the deforestation of a bigger watershed. The former applies to Plaridel, the latter to Alegre.

Since Alegre lies along the eastern periphery of the wider Daguitan watershed, the causes of environmental degradation are to a large extent external, and its manifestations are recognized but not quite understood by the people. They are aware of the risks of flooding or of water-logging depending on the location of their farms or proximity to the river (Saint-Girons, 2003), and some could only surmise what happened beyond the village. Farmers simply make do with whatever they can when floods occur. The villagers' historical account provided some intuitive knowledge of the process of land degradation of over more than fifty years. The present generation households

are 'historical takers' of lesser-quality lands, brought about by the cumulated processes of practices of the previous generation both within and outside the village, and those of nature.

Alegre has always been highly at risk to flooding as the floodwaters (from heavy rains or river overflow) could easily run through the plains. The floods, which grew in frequency in recent years, carry sediment deposits that damage the growing annuals. They can occur the whole year except from February to May, and can be at smaller (floods in river plains many times a year) or bigger (flashfloods during typhoons) scale. Floods also occur when huge volumes of water from the irrigation canals overflow to the farms because of irrigation-management-related problems. These floods caused the river to become unstable and bigger, causing erosion and river-bed change. Farms have been encroached upon and they were either positively (fertile deposits) or negatively (loss of topsoil) affected by river erosion, as all-time threats remain. But sediments have low organic matter content and lack nutrients. Soil quality depends on the resource base. When the topsoil is continuously eroded, the soil nutrient balance becomes negative and soil quality gradually decreases (Saint-Girons, 2003). The soil analysis results of sample farms of case households representing common land uses in different parts of Alegre showed this (Table 6.2, Fig 6.2). The processes cause reduced productivity due to loss in land quality and quantity. They also contribute to the decrease in total crop production as growing crops get washed away, or are covered; and the planting materials for the next season are also lost. For example, the market-preferred sweetpotato cultivar "Miracle", which was mainly grown in Dulag, was completely washed out during the 1990 flash flood.

In contrast, Plaridel is itself a small watershed where the causes of land fragility are within the boundaries of the village. With such a landscape, it has intrinsic physical constraints. Thus, a number of farming households face both physical (eroded, infertile farms) and socio-economic constraints (capital, labour) that push them into unsustainable land uses and management practices. These within-village processes of land degradation were understood by farmers and, in fact, they knew of measures to counteract those (Saint-Girons, 2003). In this small community watershed, all lands are considered fragile due to the environmental degradation induced by the actions of man and nature.

Farming in Plaridel has been done mainly on the sloping terrains, lowland mini-plains, mountains and mini-plateaus. As distinctly observed by the villagers at least in the mid-20th century, most of the lands particularly on the upper slopes and hills have been moderately to severely eroded. They are attributed as products of the vagaries of nature and land use malpractices over time. Strong gusty winds and heavy gushing waters brought about by typhoons took its toll particularly in high areas which used to be productive (e.g. *sitio* Consolacion), which then turned stony and barren. For example, the mid-elevation Consolacion area used to be a cattle ranch in the early 20th century, then intensively cultivated with annuals, and in the 1930s only cogon

grass abounds in the area. They comprise about 170 hectares and most of these are severely eroded.

Erosion in the village varies from none to severe according to erositivity (i.e. amount, frequency and duration of precipitation), erodibility (i.e. slope and position to waterways), vegetation and land management. As the village is within just a smaller geographical zone, erositivity tends to be uniform. But the erodibility of the farm plot varies considerably, as this depends on its location and natural endowment. For a certain land use (e.g. coconut, corn-rootcrop mix), land management practices of farmers were quite similar, using the same techniques and tools for same production or postproduction activity. The cultivation of annuals (e.g. upland rice, corn, sweetpotato) without conservation measures, since the early 20th century, contributed to the denudation of the sloping areas. Abaca farms on the mountains provide better land cover, and, thus, have low rates of erosion at the plot level. But they are vulnerable to the landslides which are caused by heavy run-offs, which are increasing in recent years because of deforestation. Slash and burn practices also contribute to degradation. These are practiced under the coconut trees as farmers believed these could improve yields. Grasslands were also burned to gain access to abaca farms. The severely eroded lands on the tops and sides of hills (e.g. Hantag, Consolacion), which were burnt continuously, will take decades to recover. Consequently, these eroded lands could not hold the rainwater flowing abundantly downstream especially during the monsoon months and typhoons, causing flooding and sedimentation in the lowlands (Saint-Girons, 2003). In addition, most farmers did not take measures to counter environmental degradation as they were more concerned with the immediate and short-run concerns of food sustenance and cash, and not the longer-term resource-intensive strategies for sustainability which require investment and foregoing some immediate returns. The short-sightedness of their planning horizon characterizes these poor, resource-constrained households. This finding, however, does not preclude unsustainable practices of the relatively rich farmers.

Further, the indiscriminate cutting of forest trees by five chainsaw operators in Plaridel contributed to the deforestation of its watershed. In addition, the extraction of sand and gravel to construct the highway in the late 1990s widened the northern river, and a few drainage siphons were constructed. These caused more intensive floods and the destruction of the nearby land and houses upstream.

Within the context of fragile areas, variability and uncertainty of the biophysical environment are the norm. Topography, soil quality, water availability, and the existence of micro-climates all contribute to the differences across fields. The villages and farms are exposed to the uncertainties and risks of rain and wind, to mild or severe drought, typhoons or floods, and pests. Thus, the farming households themselves could be described as heterogeneous in their farming circumstances. They live on less than a dollar a day, on average, and have meagre landholdings with very little or no capital. Outside own-farm opportunities for labour have been limited

because of a mixture of factors: the characteristic limitations posed by a small rural economy, shortfalls in governance and institutions, and the resultant lack of development of local potentials, e.g. craft-based agro-industry, productivity of export cash crops, to mention a few.

7.2 Hypothesis 1

The first hypothesis in this study posits the linkage relations between the biophysical and socio-economic environments of the households and their livelihood strategies by understanding the relations affecting farm productivity. In the process, effects on land use and livelihoods are explored by explaining the relevant explanatory variables, and by further elucidating from the case studies.

Hypothesis 1: In less favoured areas, farm productivity affects decisions of households to diversify their livelihood portfolio.
Corollary 1a: Farm productivity is dependent on land quality (i.e. soil, water characteristics), techniques used (i.e. variety, capital, fertilizer use/other practices, inputs), individual and household specific characteristics (i.e. education, years of farming experience), seasonality, prices, labour (family, hired labour).
Corollary 1b: Time allocation by male and female (whether adult or young), on the farm depends on the time spent by them in other livelihoods and the domestic sphere activities (i.e. household chores, reproduction and social maintenance).

7.2.1 Factors affecting farm productivity: discussion of findings

Using multivariate analysis, the yields of four common crops were regressed on a range of biophysical and socio-economic variables; a total of 27 variables (Table 4.1a Chapter 4). The model was a good fit for rice, moderately for abaca, and weak for coconut and sweetpotato. As indicated by the standardized β, the relative importance of the predictor variables could be identified and estimated.

Biophysical and technology factors
Land quality
Soil type and slope of the farm were the land quality variables found significant for coconut and sweetpotato. The regression used mainly the reported soil texture (e.g. sandy, loam) and slope of farm as proxy for land quality. Reported soil type was found significant only for rice. Growing rice in loamy soils (SOILTYP2) more likely produces better yield. In general, the non-significance for the other crops could mean that yield differences could not be distinctively explained by soil type because farmers' description and reporting for each of the crop did not vary. Results of the soil analysis of the farms of case households clearly showed that soil quality (e.g. pH, chemical

properties) varied across different areas in the villages associated with different land uses (Tables 6.2 and 6.3, Chapter 6).

Slope as a variable is very much related to soil quality because it affects erodibility of the soil as well as water holding capacity. Slope also indicates fertility as erosion carries topsoil and nutrients down to settle on the lower slopes. The main land uses on different slope locations are coconut, at times mixed with some trees, and sweetpotato-corn rotation or sequential cropping. Location of the coconut farm on the slope was a highly significant predictor. Those located on the lower slopes with relatively fertile soils and better water holding capacity tended to have better yields. For the same reason, slope was highly significantly related with sweetpotato.

Season

Cropping season was found a highly significant variable for irrigated rice because it is highly affected by the monsoon months. In Plaridel, the May-October growing season (SEASON2) caused the variability in yields as the southwest monsoon affects moisture availability and crop stand (effect of strong winds) of rice. In Alegre, this meant variability of rice yields due to inadequate moisture that limits plant growth. This results in low yields and lesser production for the year because many farmers would not grow rice during this season. They grow instead other food crops such as taro and sweetpotato, which are relatively tolerant to inadequate moisture and do not require much investment.

The reference period (i.e. June, 2001-May 2002) of the survey was a normal year for the cash crops, with no strong typhoons for the past eight years which are the main causes for yield declines. Thus, harvesting during the dry and wet seasons, usually two (i.e. abaca) to four (i.e. coconut) times over the year did not reflect yield variability.

Cropping pattern

This was highly significant and positively related with abaca productivity. It is highly likely that a farmer who has abaca as a monocrop would have better yield than when the area is mixed with other crops, due to the competition with soil nutrients. This was clearly evident in abaca because of the distinct diversity of crop systems in the abaca areas where farmers try to also grow food crops, such as rootcrops and banana. This is a system that farmers practice with one or more plots in order to optimize time and labour in the distant abaca farms. However, the yield differences are not as important to them as they are more concerned that they, too, can grow food crops for subsistence. The same phenomenon was found in coconut farms, but the evidence for the latter is not conclusive, most likely because of less and indistinct diversity in the latter.

Table 7.1 Summary of productivity regression analysis for cash crops

Variables	Abaca		Coconut		Rice		Sweetpotato	
R/ R^2 / Adjusted R^2	.667 / .445 / .284		.434 / .188 / .082		.859 / .737 / .665		.495 / .245 / .190	
df / F / Sig.	58 / 2.773 / .006		121 / 1.773 / .052		51 / 10.212 / .000		44 / 4.446 / .009	
	Standardized β	t (Sig.)	Standardized β	t (Sig.)	Standardized β	t (Sig.)	Standardized β	t (Sig.)
Constant (Unstandardized β)	(-2300.35)	-1.932 (.060)	(6009.274)	1.942 (.055)	(9913.099)	3.394 (.002)	(10862.666)	4.161 (.000)
Income from farm >50% (LIVETYP 2)	x[1]	X	-.196	-1.473 (.144)*	x	x	x	x
Income from off-farm >50% (LIVETYP 3)	-.256	-1.835 (.073)**	-.165	-1.528 (.130)*	x	x	x	x
Income from non-farm >50% (LIVETYP 4)	-.209	-1.595 (.118)*	-.323	-2.293 (.024)***	.191	1.758 (.086)**	x	x
Age of household head (AGEYRS)	x	X	x	X	x	x	-.319	-2.263 (.029)***
Education of household head (HHEDUC)	-.196	-1.517 (.136)*	x	X	x	x	x	x
Consumer-worker ratio (CWRATIO)	.225	1.722 (.092)**	-/073	-.667	x	x	x	x
Years in farming (NFYRS)	.158	1.241	.164	1.527 (.130)**	.344	3.509 (.001)***	x	x
Loam soil (SOILTYP2)	x	x	x	X	.161	1.771 (.084)**	x	x
Slope of field	.159	1.224	-.243	-2.194	x	x	-.331	-2.355

(SLOPE)				(.030)***				(.023)***
Irrigation (IRRIG)	x	x	-.092	-.898	.235	2.011 (.051)***	x	x
Variety of crop (VARIETY)	x	x	-.084	-.914	x	x	.240	1.698 (.097)**
Owner-cultivator (TENSTAT2)	.095	.752	-.133	-1.026	.255	2.171 (.036)***	x	x
Sharetenancy (TENSTAT9)	.315	2.591 (.013)***	-.152	-1.345 (.182)*	.202	1.762 (.086)**	x	x
Family labour value (PVALHL)	x	x	x	X	-1.279	-6.638 (.000)***	x	x
Production cost (PTCOST)	x	x	x	X	1.542	7.616 (000)***	x	x
Cropping pattern (CPPNG)	.565	3.673 (.001)***	.132	1.317 (.191)*			x	x
Selling price (SELPRICE)	-.183	-1.557 (.127)*			-.237	-2.546 (.015)***	x	x
Other farm income (OTFARMINC)	x	x	-.149	-1.593 (.114)**			x	x
Non-farm income (NFNETINC)	.418	2.729 (.009)***	x	X			x	x
Remittances (REMITTANCES)	-.315	-2.036 (.048)***	x	X			x	x
Wet season (SEASON2)	x	x	x	X	-.345	-3.741 (.001)***	x	x
Fertilizer use (FERTUSE)	x	x	x	X	-.295	-2.259 (.029)***	x	x

[1] Note: x = not significant

Variety
The non-significance of variety for most crops except sweetpotato reflects the fact that farmers were using one variety for coconut and a very limited selection for abaca and rice. Hence, no variability in yields, which could be attributed to variety differentials, was found. Coconut and abaca have already been long standing crops for at least ten years, and have not changed varieties since then. For sweetpotato, there were distinct differences in yields from cultivar selection. These were the locally selected best cultivar and other native or introduced cultivars. Farmers could easily exchange (or ask) planting materials, which has been the common mode of obtaining them.

Irrigation
As expected, irrigation has a highly significant positive relation with rice productivity. But it is interesting to note that irrigation is not the most important predictor for rice yield increases, accounting only for a seventh and a sixth standard deviation units compared with production cost and value of family labour. This can be indicative of the need to investigate the quality of irrigation water, especially with reference to the regression results on the fertilizer use variable, and the documented problems related to irrigation.

Fertilizer use
The result on fertilizer use in rice is highly significant, but of an unexpected nature where fertilizer uses can more likely decrease yield. This is revealing and could be alarming. A plausible explanation could be that farmers' fertilizer application is not appropriate. It is common knowledge that farmers do not really follow the recommended fertilizer use because of capital inadequacy. They usually mix urea and complete fertilizer (NPK, 14-14-14) in 30-70 percent of recommended amount. Besides, no soil analysis was done in both villages to serve as basis for fertilization. This finding on the inverse relationship of fertilizer use on rice yield has confirmed the experience of many Asian countries in the process of agricultural intensification associated with the Green Revolution. The inappropriate mixture of fertilizer could reverse the intended and expected increased yield, or that the inappropriate fertilizer mixes could result in water contamination, thus reducing the yield (Pinstrup-Andersen, 2003). This certainly has implications for extension activities on crop fertilization and the urgent need to convey to farmers and research-extension workers that the current practice could only be wasteful. This finding urges immediate investigation and action.

Household characteristics and socioeconomic factors
Age of farmer
Age of main farmer had a highly significant negative relation with sweetpotato yield. Sweetpotato is basically a home food crop, with only the surplus sold in Plaridel. But, it is a cash crop in Alegre. Such double function, the crop's tolerance to adverse climatic condition, the need to provide for a still developing household, and less demanding in terms of production inputs

attract the relatively younger households in growing the crop more intensively than their parents or older households. It is usually the practice of households, in the earlier and growing phases of the family development cycle to apportion one or more of their field plots to sweetpotato, which are commonly intensively farmed by the relatively younger female spouses. All these contribute to the more likely better productivity among younger than older farmers.

Education of household head
With abaca, education of household head was statistically significant but non-conclusive. The negative relationship could be explained via the effect on intensity of labour inputs devoted to abaca, from production to processing activities. The less educated farmers tended to have relatively intensive abaca farming by applying more labour inputs, compared to those who had higher education, and thus could shift labour away from the farm to other economic activities. Number of years in formal schooling (proxy for education) per se is not a relevant variable for productivity. Skills and farming experience would more likely be relevant, though selectively, as the evidence suggests.

Dependency ratio
Defined as the consumer-worker ratio (CWRATIO), the dependency ratio showed a significant and positive relationship with abaca yield. Among all the crops, abaca is the one which can assure farmers of a relatively more dependable cash income, usually in bulk. With more mouths to feed and maintain, farmers would have more motivation to rely on intensified abaca farming for cash income, which tends to improve productivity. As the ratio increases, the intensity of farming is likely to decrease because the distance of farm lands becomes a deterrent. Some households in fact left some farm lands unattended, or went there only once a year.

Years in farming
Number of years in farming was found to be highly significant and positively related with rice, less significant with coconut. Years in farming is a variable that embodies the skills from experience that affect farm management of the crops: more years of experience meaning better cultural management skills that improved yields. This is more critical with rice farming, most probably because of the sensitivity of the crop to timing and skills requirements of the different operations involved, i.e. transplanting, planting, weeding, fertilization, and the care that these should be followed because of the importance of the crop as staple food. These are skills-sensitive activities.

Land tenure
The productivity of abaca was found to be highly significant and positively related with land tenure arrangement, which is of share tenancy (TENSTAT9). About 41 percent of abaca farmers are tenants. These are usually long established tenancy arrangements built up by the older generation, handed

down to the younger and middle-aged farmers. Thus, the incentive to invest family labour to improve the productive capacity of the land is the same as that of own land with security of tenure.

A negative relationship was found with coconut, though not conclusive. In this case, the lesser intensity of labour use on coconut farms largely explain the lower coconut productivity because coconut farmers usually allocate their labour between own-farm work (in owned or tenanted farms) and off-farm work. In the focused group discussions and community survey it was found that coconut farmers usually have off-farm employment. To explain the difference in signs, it may be noted that sharing is better in abaca farms than coconut farms, on the average because of the distance of the former. Because of the distance of the abaca farms, it is not as easy as with coconut farms to shift labour to work on other farms. Abaca farmers go to the mountains for at least four days and usually in teams of at least three. In some bigger coconut farms, both land and capital are provided by the owner, and labour by the tenant. The greater gain usually goes to the landowner, which again would be a disincentive to the tenant to improve productivity.

The productivity in rice farms is highly significant and positively related to own-farming system (TENSTAT2), and of lesser significance but still positively related to share tenancy (TENSTAT9). This is distinctly unique with rice because it has a dual purpose for food and income for both owners and tenants. Owners will tend to invest more in production inputs to increase the yield. And because rice is the staple food where work provides cash and in-kind (i.e. kgs of rice) remuneration for tenants there is an incentive to improve output. Staple food sustenance is most important, and working hard for any one season is critical as the next season could be affected by a natural disaster (e.g. drought, flood, typhoon). It can be noted that on the average, 75 percent of rice farmers are sharecroppers. In addition, most tenant rice farmers have worked on farms for quite some time and developed an attachment to the land.

Family labour

A relatively higher value of family labour will have a greater likelihood of reducing rice yield. This means that improved wages of household labour in non-farm opportunities could more likely shift labour away from the rice farm and diminish labour intensity in various stages of crop growth, and thus reducing the yield. This was significant for rice, but not for the cash crops coconut and abaca. In rice farming, it would be relatively easy to hire alternate workers, but the skills or motivation may not be as well as those of the replaced family labour. The physically demanding work in coconut and abaca farms, plus their importance as cash crops which involve both production and postproduction activities, would more likely not shift family labour out of it despite a relatively higher value in non-farm wages. In the villages, the differential was not big enough anyway. So, family workers tend to give priority to farm their own cash crops, abaca and coconut, before working in off-farm and non-farm activities.

Costs of production
Rice yields were found to be very sensitive to cost differentials. Cost of production is highly significant and the most important predictor of its productivity. Of all the crops grown in the two villages, rice is the most cost intensive in the sense of cash outlays which include seed, fertilizer, pesticide, and hired labour. The other crops mainly use combinations of both family and hired labour, with minimal capital. The evidence showed statistically significant positive effect on rice yields with increased cost of production. This would refer to the combined positive impact of investments in better seed, pesticide, and adequate labour.

Non-farm income and remittances
The investment for the wages and food in abaca farming would become bigger, if farming were intensified by increasing the number of harvests, and the area per harvest, because of the distance, the number of workers in a group, and the length of stay in the mountain farms. The major source for such capital comes from non-farm sources. Thus, non-farm income was found to be a highly significant and very important predictor for productivity. Remittances, however, tended to have the opposite result in productivity. This more likely suggests remittances function as substitute income source for foregone earnings with less intensified farming, thus less productivity, in abaca. This seems reasonable since abaca farming is a more physically draining and time intensive kind of work. This also suggests that remittances are not used for farm investment but more likely for household consumables or durables. Farmers would more likely substitute labour for day's off-work, or even relaxation and rest with more remittance receipts. Remittances enable abaca farmers to have a more leisure. Remittance is a relatively important predictor for productivity.

Off-farm income
The harvesting and preparation of copra in the villages follow a distinct periodic pattern for the households involved. This makes working in other farms relatively easy as compared to abaca-farming, also because these farms are not so far away. Over time, a network of alternate off-farm workers simply grew out of the need for semi-skilled workers in certain stages of the production-postproduction activities (e.g. harvesting, collecting, de-husking, drying, sacking). The greater such labour demand, the more likely part of own-farm labour is shifted towards other farms for cash wages. This would more likely reduce own-coconut farm yields. The evidence, however, is not conclusive.

Livelihood type
It must be noted that the variable, livelihood type, refers to the typology of households based on the percentage of their income sources (i.e. farm, off-farm, non-farm), and not the type of income itself as predictor. The livelihood

type (LIVETYP) variable would be reflective of livelihood strategies, and socio-economic status of households.

Farming households relying more on non-income sources (LIVETYP4) for a living would most likely have coconut farms which are less productive. They are also most likely the farm owners (previously own-cultivated) who would now lease out or sharecrop their farms, and who would use less labour intensity and do less farm monitoring. A distinct pattern emerges: moving away from a greater reliance on farm incomes tends to dampen the productivity of own farms. As the most important predictor, greater opportunities and improved non-farm incomes among coconut farming households could be critical to the productivity of coconut farming in general.

The variable LIVETYP4 was significantly and positively related to rice yields. Non-farm incomes are definitely sources of capital for rice production which require intensive inputs such as seed, fertilizer, pesticide, and labour. This was a less important predictor than the costs of the inputs themselves. The variable, however, pointed to the likelihood of decreased productivity of abaca. The evidence though is not conclusive, which is probably be due to the capital-generating function of non-farm incomes that some abaca farmers use in intensifying productive activities. The evidence shows that non-farm income is, in fact, a highly significant and more important predictor for increased abaca productivity.

For households with greater reliance on off-farm incomes or farm wages (LIVETYP3), or starting to move away from farm income reliance (LIVETYP2), results showed some likelihood of decreased productivity of coconut farms. This could more likely be due to the lessened labour intensity on own coconut farms as labour time is diffused, and work apportioned to other farms. The evidence, however, is non-conclusive. For the same type of households, the results showed statistical significance of the greater likelihood of decreased productivity in abaca farms. Labour shifting away from the abaca farms is the most plausible explanation; especially since doing so would take out much from abaca time because of the distance of the farms and the inflexibility of labour time once engaged in those farms. The variable is a relatively important predictor.

Farmgate selling price

Price was found to be highly significant and negatively related with rice yield. This cannot be considered a price effect, and should be treated with caution because of the limited range of the survey reference period (June, 2001-May, 2002). Seasonal productivity differentials, due to differences in moisture and other climatic effects, will also need to be considered in production.

The relatively small decline in rice price was due to the relatively bigger harvest during the wet season, as was the case in other rice-producing areas in the region. These also produced relatively better than the dry season-yield because of favourable climatic conditions. This is reflected in the season variable, which is a relatively better predictor than selling price. Farmers usually intensify production during the wet season. The opposite is true of

price and productivity during the dry season, with expected lesser yield per area and the price relatively higher in less supply months.

For coconut, the results showed a negative relationship of copra price with production, though not conclusive. Copra price usually exhibited fluctuating prices over a year period. A reduction in copra price would more likely increase the production of copra to compensate for the decrease in price. It should be noted that the crop is an important source of income used for relatively bigger expenses of the household, such as education, fiesta and other social events, and as contingency fund.

It may be noted that small poor farmers are price-takers of cash crops of which production is basic for their subsistence. Land is a relatively fixed factor, and supply-response to price change is irrelevant. Whatever the price of the basic cash or food crop, they have to produce in order to eat and live.

7.2.2 Synthesis of patterns: factors affecting crop productivity

In Table 7.2, the summary of predictors for the different crops indicates some patterns of importance and significance. The next section continues with the distinction between the biophysical factors (e.g. slope, soil) together with technology (e.g. variety) and land use (e.g. cropping pattern), and those of socio-economic factors. It is quite clear that the productivity of different crops is sensitive to different factors both by the nature of impact and the degree of importance. It is therefore critical to understand the relevant factors: in the context of the physical environment where the crops are grown, their contribution to cash or food, and the resources (e.g. labour, capital) required to grow them.

Biophysical factors, technology and cropping pattern

For coconut and sweetpotato which are the main crops grown on the slopes, the biophysical factor slope is a highly significant and very important predictor of productivity. Slope is a catch-all variable in which soil (in)fertility, erosion status, and capacity to hold water are embedded. Soil sampling data and farmers' observations indicate the differences in land quality of the farms found on the slopes, and the biophysical environment degradation in many parts of the villages (see Chapter 6). This combined with the lack of appropriate technological measures (i.e. variety, soil conservation), contributed to the reported productivity decline, and, with relatively low farmgate prices, consequently bringing about low farm income. In the absence of an appropriate soil quality indicator (i.e. reported soil texture was used as proxy), it did not come out as a significant variable. Only the slope variable should have caught its significance as an "embedded attribute". As such, this highlights the significance and importance of the effect of soil quality on agricultural performance. Thus, diminishing soil quality due to erosion is illustrated by the lower yields of coconut, grown on the upper slopes than on the foot slopes.

Table 7.2 Relative importance of predictor on yields in decreasing order, and nature of relation by crop

Abaca	Coconut	Rice	Sweetpotato
(+) Cropping pattern***	(-)Livelihood type: non-farm income->50%***	(+) Production cost***	(-) Slope***
(+)Non-farm income***	(-) Slope***	(-) Value of household labor***	(-) Age of farmer***
(+) Share tenancy***	(+) Number of years farming**	(-) Wet season***	(+) Variety**
(-) Remittances***	(-) Off-farm income**	(+)Years in farming***	
(-) Livelihood type: Off-farm income->50% **	(-) Livelihood type: incomes same %***	(-) Fertilizer use***	
(+) Dependency ratio**	(-) Livelihood type: off-farm income>50%*	(+) Owner-cultivator***	
(-) Livelihood type: Non-farm income->50%*	(-) Livelihood type: farm-income>50%*	(-) Selling price***	
(-) Education of HHH*	(-) Share tenancy*	(+) Share tenancy**	
(-) Selling price*		(+) Irrigation***	
		(+) Livelihood type: non-farm income->50%**	
		(+) Loam soil **	

*p≤0.05 ***; 0.05≥p≤ 0.10 **; 0.10≥p≤0.20 **

Farmers work within the bounds set by such physical limits and resource constraints (land, labour, capital). Since at least 85 percent of the farmers are engaged in coconut farming (as sharecroppers, workers, or owner-cultivators), the declining coconut-farm productivity, relatively high wage costs (including food), and unstable copra prices over the last ten years (though relatively better the last three years) are problematic enough to drive farming households to seek for other income-earning activities.

While sweetpotato and other rootcrops are grown mainly for food sustenance, growing them on the slopes with observed productivity decline is the most important yield predictor. The reality though is that while being aware that certain varieties yield better, the choice is made not so much for better yielding varieties but for the better tasting low-yielding local cultivar (e.g. *Siete Flores* in Plaridel). Besides, farmers plant whatever planting material was available. In Alegre, where sweetpotato tends to have more cash

contribution to household income than in Plaridel, farmers tended to select a cultivar with both yield and market preference criteria.

Cropping pattern was found to be a significant and a most important predictor only with abaca because it is the only plantation-type crop that is grown in different crop systems: as monoculture, mixed with rootcrops or banana or both. This is important in the sense that abaca is a major contributor to household income as well as a system that permits substantial contribution to food crop production. The different cropping patterns arise from the different farmers' strategies in using labour and land to optimize production in distant abaca farms where they work for a straight week or two.

For rice production, while it is clear that irrigation contributes positively to yield, the negative contribution of fertilizer use is a slightly more important predictor. The latter results from a mix of inappropriate fertilizer use or irrigation water contamination or both. Both need further in-depth research to assess the real cause of the negative effect in order to properly address this urgent issue. The implication for appropriate technology interventions and using an appropriate extension system is highly critical. Institutional innovation to improved organization-management intervention of an irrigation system that extends beyond the community should be a high priority.

Rice is highly sensitive to season both through the effect on moisture adequacy and the timing of planting to avoid the damage from monsoon winds. Farmers, of course, understand this timing and moisture requirement, but still grow rice outside the favourable season because it is the basic staple and source of surplus for some.

Livelihood typology of households, remittances, and related incomes

For the cash crops, livelihood types of households are significant and important predictors, and generally have a negative effect on yield though differing in the nature of causality. Households which derive most of their incomes from non-farm sources (LIVETYP4), and thus devote more resources to non-farm activities, tended to have a negative effect on coconut productivity by shifting labour from their coconut farms to non-farm work. This was found to be a highly significant and most important predictor in coconut yield because coconut farming is male-gender-specific, and the needed labour-intensity is greater than other crops, i.e. labour for harvesting and postharvest activities which are periodic over the year. The same variable was not conclusive for abaca. Rather, abaca yield tends to be more sensitive, negatively, to off-farm income type households (LIVETYP3). This is because abaca farmers usually tend to diversify by working in other farms, and thus, the sensitivity is more of drawing labour resources for other farm activities. These patterns of other income complementation could be due to the distance and nature of farm work in both abaca (distant farms + long group engagement) and coconut (near farms + periodic engagement) farming. Coconut farmers can engage in non-farm activities relatively more easily than abaca farmers, although overlaps exist (i.e. farming both abaca and coconut), which are accounted for in the observed importance of both variables in both

cash crops. This relationship is not-conclusive for abaca. For similar reasons of competing resource allocation especially time and labour, households which are successful in engaging in all farm, off-farm and non-farm activities are more likely to have less productive coconut farms.

The opposite is true for rice. Households with incomes coming mostly from non-farm sources (LIVETYP4) tended to have higher rice yields because of the capital generated from and invested in rice production. It is, however, a less important predictor.

The related highly significant negative effect of remittances and off-farm income on abaca and coconut yields, respectively, is revealing. It provides yet another explanation of declining productivity with households' receipts from migrant labour, or when engaged in off-farm activities. Contributions from these sources suggest being lower-than-adequate for capital generation, and thus are more likely spent for household consumption purposes than being ploughed back as farm investment. Such high tendency reflects the generally low income levels of households which are mainly eking out a living, and, thus, their inability to accumulate capital for productive purposes. Though reflecting added utilization, the returns to off-farm labour are low and have failed to generate a surplus for capital. The labour-shift effect is enough to cause a negative impact on productivity. Non-farm contribution, however, showed the opposite highly significant positive effect on abaca. This suggests the critical contribution of non-farm income to the capital fund (i.e. wages and food) in intensifying abaca farming.

Land tenure arrangements

Land tenure is a system of rights and institutions where the rural people gain access to and govern the use of land and other resources. Its relationship to the question of food security has been explored via the impact property rights and responsibilities have on resource use and management, productivity, income, and consequently, household welfare (Tomich *et al.,* 1995; Meinzen-Dick *et al.,* 1997; Maxwell and Wiebe, 1999). As such, the subject has also long been on the policy agenda and landmark legislation for agriculture and rural development in the Philippines. The overarching direction has always been "land to the tiller" in accordance with the principle of freedom of choices and incentive from ownership, and on the argument that equity begets efficiency in small size farms, where with least-cost inputs, farmers optimize their labour. However, the impact of more than a quarter of century of land reform along these lines has, at best, been mixed and costly.

In the study sites, land access arrangements vary from the granting by parents to children use rights of family land, share tenancy, sub-tenancy to labour wage contracts. With four or more farm plots, households can farm on one or more family lands, be share tenants on another, and work for wages in one or more farms. These diverse co-existing options reflect a certain flexibility in access to land. On the whole, whatever the access arrangement, this is bound up with social relations that provide the basis for land-use arrangements and usually involves reciprocal obligations with respect to other

aspects of livelihoods (Ellis, 2000). Recent studies also show that livelihood strategies are associated with "more subtle tenure niches" that may vary and overlap by crop, resource, or season (Maxwell and Wiebe, 1999:827).

Only in rice farming is ownership of the land tilled highly significant and positively related to yield. With rice, which is source of both income and food, owners are more likely to invest in yield-improving inputs. But contrary to the incentive by ownership argument, the share tenancy variable was found to more likely have highly significant positive impact on abaca, and also, significantly positive on rice yields. It is a very important predictor, especially for abaca. Tenancy arrangements for the important cash and food crop usually are long-ingrained social kinship-based relations, carrying with them strong socio-economic responsibility (i.e. almost akin to owner responsibility) to be productive. Ownership of abaca and rice farms has been established some fifty or more years. It usually rests on the originally old families in the villages, so that later access can mostly be secured in terms of share tenancy. Many arrangements are handed-down or inherited within family share tenancies which effectively secure access and use of land. Incentive comes from security of use rights, not so much of ownership. Farmers further benefit from this arrangement by not being burdened with property tax, yet get secured income and food shares. Though not conclusive, share tenancy tended to negatively impact on coconut productivity because of labour shifts and more diffused labour allocations among coconut farmers who are engaged more in off-farm and non-farm activities.

Recent thinking on share tenancy no longer views it as one that is basically unjust and breeds inefficiency. The mutual interlocking benefits of landlord's land and tenant labour can be a resource combination that spawns incentive to productivity (Tomich *et al.,* 1995). As evidenced in the study villages, the long-established social relationships between landowners and tenants provided security of tenure. Especially in the cases of abaca and rice, which are the most important cash and food crop. The production of these crops needs a critical degree of security to be productive. Landowners and tenants are well aware of this, being the basis of an unwritten social agreement that is mutually benefiting. The tenants do not have to worry about taxation and get the extra benefit of access to informal credit or capital via the landowner.

Therefore, the core of the land-tenure issue is the question of security of tenure. Private ownership of small farm sizes (i.e. based on the efficiency argument on the inverse relationship on size and productivity), which was the objective of the land-distribution reform program, needs to be interpreted and understood with caution. Because when markets do not function well such that small farms do not have access to credit, extension services, technology, irrigation water, and output markets, the equity-efficiency argument for private ownership of redistributed land may not hold out in reality (Maxwell and Wiebe, 1999).

It is security of tenure, not necessarily ownership per se, that determines incentives in production. With well-defined and enforceable property rights,

farmers will be encouraged to intensify labour (their most important, mostly only resource) and other inputs to improve farm productivity and to conserve soil quality. Security of tenure tends to lengthen the planning horizon of farmers. Otherwise, farmers do cultivate by some kind of 'mining' strategy by rapidly exhausting soil fertility. In a study in the Philippine uplands, for example, farmers cultivated logged-over areas by growing food crops intensively for some years, abandoning the fields afterwards with no measure to conserve their productive capacity. Further, the study shows that in many communities, the local land-tenure system provides security of tenure (i.e. assign rights to own, use, transfer land), similarly as with a legal title but at a much lower cost. Lapar and Pandey (1999) found that attempts by governments to replace the local system with legal titles that are costly to enforce, have often increased insecurity.

Other socioeconomic factors

Rice is the most cost-intensive crop for any season. Findings show that its productivity is highly sensitive to over-all cost (e.g. hired labour, fertilizer, seed greater shares), which is the most important predictor. An increased wage in the non-rice sector more likely shift experience family labour away from the rice farm, and thus contribute to a decline in rice yield. More so since experience in rice farming is found to be a highly significant and important predictor. Farming experience is also significant and an important predictor for coconut. The negative price relationship in rice reflects more the season effect than a quantity-price response effect because of the very short reference period.

It is important to note that the variable dependency ratio was found to be significantly positively related only to abaca yield. This could reflect that the potential for intensification of farming productivity to cater to more dependents is offered substantially by this cash crop. Or, that it is likely that more dependents would drive farmers to improve abaca farming than they would do with other crops. This shows that abaca is an export cash crop with an expanding market and improving price. There still are frontier farm lands for abaca which have not been fully utilized because of their distance and primitive farm-market transport.

7.3 Environment degradation and land use

The physical environment in the research communities (as described in Chapter 6), the resulting low farm productivity and its contributory factors, and the nature of the small farming household provide understanding why farmers have engaged in a variety of land uses. On average, farmers diversify their on-farm activities in four to five farm plots, cultivated with a mix of food and cash crops (i.e. mixed, sequential, monoculture) under various tenure arrangements from the lowlands to the mid-elevation and mountain areas.

The fragile conditions of the physical environment in the two villages result from the interplay of natural and human causes over the years. This

means that the decisions and actions on the land by the current farmers have to reckon with their present socio-cultural and economic environments and the resultant bio-physical environment (beyond the control of the present generation). Thus, in terms of household strategizing, the fragile physical environment is a given, which the farming household must contend with. This type of environment, together with the absence or inadequacy of capital, low technical know-how, inadequate institutional support, in-adequacy of social services, absence or inadequate markets, limited opportunities, and usually bigger household size, are characteristics of less favoured areas.

A major difficulty of the given context of fragile areas is the absence of an objective benchmark with which to measure changes. The soil property characteristics (described in Chapter 6), and the reported productivity decline could only be substantiated with historical anecdotal accounts of changing land uses, in relation to observed environmental quality change. The difficulties of assessing environmental or land degradation, and the complexities of human interaction to it, are well known (Lindert, 2001). Nevertheless, the accounts and perceptions of the local people, indigenously expressed, are invaluable. One can, at best, make reasoned associations between the described physical environment degradation and those of changing land uses, and the resulting household livelihood strategies.

Alegre

The major change in land use occurred right after the war when the abaca lands were wiped out by typhoons and floods, and replaced mainly by large areas of coconut farms. Of the four rootcrops (i.e. sweetpotato, cassava, apali, yam), only sweetpotato continued to be grown. Taro, instead, gained commercial importance. Natural and economic factors combine for this changing land use. Floods should have stimulated farmers to grow the more sturdy coconut coupled with government programs, increased markets and price. Coconuts, sold either as whole nuts or copra, give a more reliable regular income source. It would seem that the currently grown crops are the more flood- and drought-tolerant ones. They can be easily re-grown after flooding. Even sweetpotato cultivars have changed over the years as major floods washed out entire fields. For example, the flood in 1991 wiped out the popular Miracle cultivar, which is now replaced with other cultivars as *Kasapad*. The new farm lands in the unstable river banks are grown with coconut, sweetpotato, corn or taro. The growth of the coconut industry has been providential since the coconut is a hardy crop and can be adapted to the difficulties of the environment, enabling farmers to engage in off- and non-farm activities.

The three case households in Table 7.3 exhibit the different land uses common in Alegre given the opportunities and constraints they face (Table 7.2). On the whole, the case households are resigned to the risks of flooding, waterlogging and drought Alegre is prone to. Their land uses are similar in specific agro-ecological locations of their crops. Lands can be left idle (Case household 11, a farmer leader) because of shortage of capital and labour. The

vulnerabilities of farming-based livelihoods differ depending on location and on the risk their land resource faces of natural calamities.

Table 7.3 Land uses of case households in village locations

Hh No.	Mombon (river bed)	Talisay-Hindang creek	Village proper (flat land)
10	Coconut with taro and bananas; 2.0 ha.; owned	Rainfed rice; 1.25 ha., owned Irrigated rice; Mayorga: >1.0 ha., tenanted to nephew	Rice-corn-taro, rotation, partial cultivation any one time; 2-3 ha. upland; owned Sweetpotato with 40 *calamansi* trees; 0.5 ha., owned Coconut; 0.5 ha. sitio Macarandang Coconut; 0.25 ha. sitio Sungaran Coconut; 0.25 ha.
11	Coconut with taro and bananas, reduced to <0.5 ha. due to July, 2003 flood; >1.0 ha., share-tenant,	Irrigated rice, 70% reduction past harvest due to black bugs; >2.0 ha., share tenant,	Corn-sweetpotato; idle for lack of manpower, seeds; >1.0 ha. Barilajay creek, share-tenant, Squash, sweetpotato; 0.25 ha. sharecropper, school garden,
12	Sweetpotato, taro, corn, coconut; 1.0 ha, tenant		Coconut; 0.5 ha., wife's family land,

They can only supplement their income with minimal off-farm livelihood activities since non-farm opportunities are absent. Only a few households have reported remittances of children substantial enough to invest in farm labour, fertilizer, seeds, purchase of durables, building houses, and pay for education. Evidence suggests that consumer durables and goods, housing and education are the major expenditures from remittances.

With all the vulnerabilities and limited opportunities farming households in Alegre face, their notion of improving wealth status is having non-farm options outside the village, especially remittances of children working in Manila, elsewhere or abroad. (see Box 7.1).

Plaridel

Farmers observed that soils in cultivated areas are no longer as fertile as they were before the 1970s, except for the abaca areas in the mountains. Abaca

continues to be a major cash earner to owner-cultivators, tenants, and farm workers. About 50 hectares, mostly undulating to sloping lands, which were permanently grown with annuals on a rotation or mixed system (e.g. upland rice, corn, sweetpotato, other rootcrops) during the end of the Spanish era, are now thickly grown with cogon, and will continue to be so for years because these are severely eroded. In the still cultivable but less fertile lands, especially in the lower hillsides, farmers continue to grow the same corn sweetpotato mix or rotation, sometimes dotted or fringed with plantains, cassava or *estaring* for their food needs. After the war, coconuts fields started to be grown and predominate in current land use, continuing to be a major source of cash income. Some farmers have intensified coconut areas by planting plantains or fruit trees underneath.

Box 7.1 Idle lands for trees!… anyone?

Ramon (55 years) formerly worked in an industrial plant in Manila for about 15 years, after 8 years of farming the family land in Plaridel (e.g. abaca, coconut, sweetpotato, corn). The plant closed down in 1994, and Ramon went back to take care of the 6-hectare family farm in Plaridel, as the only brother of two who decided to farm. He bought their current residence from his savings and started planning to invest in mixed tree plantation. But he first ran in the local government serving as village councilor or kagawad for three years. This enabled him to get training in agriculture and connections for fruit tree seeds (pineapple, jackfruit, rambutan, grapefruit, guyabano). He planted these in Malbago, a farm near their residence. He also registered the family land in the hilly Pikas as rain forestation area with the DENR and LSU through the GTZ project. These connections and benefits were not perceived well by many in the village. He lost his re-election bid. His wife, Lita, has always been a full-time home maker both in Manila and Plaridel, tending their nine children, and is more interested in ornamental plants.

Ramon has grown 300 cacao trees in 9 years, the harvest made into 'tablea' (i.e. small dried chocolate cakes used to make beverage) for sale. While continuing to grow jackfruit trees, Ramon's dream of a mixed tree plantation has still not materialised because of lack of capital. Just about a hectare of coconut farm, a small rice farm, a small time abaca bark trading plus fruit tree income sustain the household. Ramon is very well aware of the future of trees and the positive impact this will have on their hilly farms. But some parts on the hillsides are and will be grown with annuals (sweetpotato, corn) for home food, especially since they do not have the regular monthly paycheck anymore. Ramon is the only farmer in the village who deliberately planned and started to invest on trees. (Case household 3).

Rice fields near the river which were destroyed by sand and gravel quarrying have been left idle for 3 years. Only a small area of irrigated rice fields in the lowlands have remained, usually owned by the better-off farmers. Significant also is the non-cultivation of exotic upland rice (a preferred cultivar) that used to be part of the annuals mix up to the 1970s. With rice as the main staple, most people now buy rice and supplement with own-produced corn and rootcrops. In the middle to high hills, areas directly facing storm winds and passed by heavy rainwater have grown barren and denuded as the result of these severe forces of nature.

Box 7.2 Vanishing river and rice field = sari-sari store + piggery + agriculture trading

Only 48 years of age, Roger went out of farming after some 16 years of experience with coconut, abaca and rice in his parents' land which he later inherited. The rice field in Buhang (about 1.0 ha.), on the river bed, has been left idle for three years. Farmlands in this area were destroyed by river overflow from a typhoon that took away a lot of soil, and from the quarrying operations in the mid-1990s when the highway was built. The dried-up river no longer could irrigate it, and the soil became infertile. Their coconut and abaca farms are farmed by hired labour. The income from them is supplementary to their current main enterprises: a sari-sari or retail store, pig raising on rented land, and abaca and copra trading. In fact, when approached as a case household, he was apprehensive at first: "I am no longer a farmer, and I will never be one anymore. My rice field is gone, and I do not get much from the other fields".

To the couple, it is "thanks to the difficulties faced in farming", they had to look for other opportunities immediately after marriage in 1986, which was worsened by the depressed economic situation then. With minimal start-up capital, determination and luck, they became small-time entrepreneurs. The store was first capitalized from their wedding fund, and later, from some substantial gambling winnings. Goria (46 years), his wife, has a triple role as store manager, housewife and mother of three children. Store savings were used to start the piggery, abaca and copra trading, the latter being the more profitable venture.
(Case household 5).

The patterns of land use have changed only in magnitude. In the Philippines, where governments since the postwar era have been explicitly promoting self-sufficiency in staples, agriculture revolves mainly on rice and corn, which receive nominal protection rates of about 8 and 18 percent respectively. With low grain yields, increasing production was mostly realized by expansion towards the upland zone, where the short-duration corn-rootcrop intercrop or rotation system predominates. Continued cultivation with short or

no fallow has exposed the soil to the erosive effects of rain and wind. Such "land use has been associated with rapid increases in upland degradation and soil erosion" (Coxhead, 2000:112). The experience in the villages is similar where the cultivation of annuals continued for decades, but greatly decreased in the last quarter compared to the 1960's because of decreased productivity.

7.4 Farm productivity and livelihoods

It may be said that the relationship between agricultural performance and rural livelihoods is complex. It can be viewed in various ways: in terms of backward and forward linkages from agriculture, impacts on household labour allocation, and the role of livelihood diversification for income and resource/asset generation. The second and third points are more relevant to the research objective and the empirical evidence gathered from the study areas.

Because of the biophysical and socio-economic constraints affecting agriculture in the study villages, farming as the singular means of survival does not suffice. Low farm productivity, and thus low farm income, has driven farming households to diversify their livelihoods in order to survive. Households have engaged in a diversified livelihood portfolio to reduce risks (i.e. price fluctuations, seasonal, climatic reasons), and take advantage of opportunities (i.e. non-farm work, niche markets of ethnic food and crafts, specialized skills) in order to survive. This empirical evidence has affirmed other Asian studies (e.g. Taiwan, India) where non-farm livelihood diversification was more likely the result of stagnation in agriculture than growth. The so-called 'sponge effect' occurs where surplus labour due to lack of farm activity enables its use, if opportunities exist, in the non-farm sector, in or outside the village (Hart, 1994; Ellis, 2000).

Starting in the 1970s, labour migration (seasonal, temporary or permanent) has been a feature of household survival strategies. Even as farm lands could still be cultivated, the young migrated to Manila or other towns and cities to work in factories, construction, or in domestic services. Some started as young couples in Manila. When the children came and the benefits of city living were uncertain, they returned back to village farming (see Box 7.3). The low productivity from non-intensive farming in poor quality, fragmented farms, pushed them to find other sources of income, such as off-farm work (farm wage labour, tuba gathering, backyard pig raising) and non-farm activities (e.g. bag making, mat weaving, domestic service, fish vending, trading, carpentry, electrical/ radio repairs). Most are engaged in mixed farm, off-farm and non-farm livelihoods of different proportions. This characteristic diversified livelihood portfolio benefits from one or two children sending regular remittance to the village-based household, for capital goods (Case household 8 and 9), or invest in education or purchase of durables (Case households 1, 8, 10, 12). Some farmers (usually land-owners, users of family land rights) have reduced or shifted from farming food crops or annuals to tree growing, either under coconut (Case household no. 2, 4 and 7), or in the open

fields long left as grasslands (Case household 4). Livelihood diversification is discussed in detail in Chapter 8.

The study evidence suggests that diverse factors affect differently on the productivity of different crops. This is related to the differences in agro-ecologies (slope, soil, season) and farm land use (cropping pattern), the diversity of livelihood portfolio and its effect on labour availability and use, the contribution of non-farm livelihoods to household income (remittances, capital), land tenure, demographic factors (age of farmer, dependency ratio). Particularly for rice, the cost of production, wage rate, farming experience, and the role of technology and other inputs (fertilizer, irrigation) are significant. These findings have strong policy implications that are directed at agricultural and rural development as a whole, and poverty reduction and food security objectives in particular.

Judging by the qualitative evidence, it may be interesting to trace links between resources and household livelihood strategies. Take the case of land. The practice of children equally sharing the inherited land led to fragmented farm holdings that are often insufficient to provide their owners enough subsistence means. With living old parent-owners, the granting of use rights to children follows more or less the same procedure, but with even smaller farms as parents retain part of the property for their own farming. This is common practice in the two villages. These divisions also created different qualities of farm land due to different access to irrigation water, different terrain, and different potentials (cash vs. food crop) and vulnerabilities (direct exposure to strong winds, high-flooding risk). In addition, these sub-optimal farm sizes have been intensively cultivated over the years, with minimal inputs to preserve their fertility from lack of incentive or capital, leading to productivity decline that was observed to have started in the 1970s. These factors have pushed for livelihood diversification.

It may be said that labour is the most important resource that all farming households have. Its quality is defined by both formal and informal training, and experience. These labour qualifiers were not found to be significant and important indicators for crop productivity, except for farming experience which was highly significant for rice, and significant for coconut. This suggests that productivity in farming is enhanced by skills outside the formal education system. An interesting, though not conclusive finding is the negative relation between education of household head and the yield of abaca. The more educated abaca farmer is likely to divert a substantial amount of his labour to other-than-farm activities (e.g. construction work, company truck driving). This has important implications as abaca is a major cash crop for the household, and the country's export. Diversification involves allocating labour from farm to non-farm activities. When done in the agricultural slack season, it need not have adverse effects on viability of farm operations. But the more non-farm skills and the higher the educational levels, the more likely labour moves away from the farm.

The regression on crop productivity provides evidence of the effects livelihood diversification has on the way households allocate their assets and

resources. The impacts varied by the mix of livelihood portfolio over different crops. The way the household uses its resources is part of strategic livelihood decisions in which farming is but one of the many possible options that are considered (Ellis, 2000; Inhofe, 2004).

Box 7.3 The village is good for raising children; farming challenging, but not enough

Roberto (32 years) and Gerlie (29 years) both started young to work in Manila, where they met. Their marriage brought them back to Plaridel, finding the urban environment just not suitable for starting a family – too costly and polluted. Now, a young farming couple with 2 children of 7 and 3 years old, they seem satisfied with life despite living in a simple, less than basic one-room nipa hut, near Roberto's parents. There was this feeling that with their industry, some skills and family harmony, the future will turn out well. Roberto's mother is an active village health worker which explains for their awareness of family planning.

Roberto is actively farming on 5 family farm plots with user rights. His parents are already old and cannot do much farming anymore. Roberto and his brother-in-law do their respective share in farming family lands. All the year round, Roberto keeps busy with 2 abaca farms, 2 coconut farms, and 1 where he grows corn, sweetpotato and cassava for home consumption. Gerlie helps with planting and harvesting food crops, the rest of her time she spends taking care of the home and the children. She also supplements farming with bag making which she supplies to a local export supplier. Roberto kept honing his technical skills on electronics (i.e. radio/tv repairs, related services) as he believes this could help them in the future.

Roberto understands the erosion problem associated with farming annuals on sloping lands. He knows that the cogonal lands in the village followed the same cropping pattern years before. Some time in the future their farm will be in the same condition. To mitigate this, he rotates corn with sweetpotato, and has cassava as hedgerows. He also practices mulching. But the water erosion from heavy rains and typhoons could quickly turn the land barren. Meanwhile, the land must be productive for their basic food needs. (Case household 6).

The observed and perceived declining productivity of the eroded lands has pushed the young to offer their labour outside of own-land farming. As mentioned above, about 35 percent work as hired labour in other farms in or out of Plaridel (e.g. abaca stripping/fibre making, coconut harvesting, copra processing); 30 percent work in local construction, carpentry, stores and mills; 25 percent in handicrafts (mat weaving, bag making), either in the local export

factory or in the households' putting-out system[6]; and 10 percent go to Manila and other cities/towns to work. According to about a hundred participants in the focused group discussions on this issue, farming is no longer a desired occupation among the young. Furthermore, parents would rather have their children finish primary, elementary or secondary school to prepare them for outside non-farm work. About 90 percent of the next generation children of parents 40 years and above prefer non-farm work outside the village. A number dreamed of their luck abroad. Only the older ones (i.e. >50 years) are left to farming. As they put it, this is mainly "farming just to get by".

The situation in the study villages is typical of a village economy with fragile environments, where labour and land are the same basic and most important productive factors that small farmers have to contend with and capital is very minimal, if at all. Households could not break the bonds of the traditional farm structure as there is simply no capital accumulation that can be invested to improve outputs. Consequently, farmers have developed systems that are well-suited to their physical and economic conditions by adapting to a diversified livelihood portfolio. This includes on-farm diversification (crop portfolio, varieties, backyard chicken or pig-raising), off-farm or non-farm employment, and usually, mixes of these livelihood activities. All these are part of the adaptive mechanism to deal with constrained conditions and limited income-earning opportunities, and hedge against risk (Tomich *et al.,* 1995).

In general, the findings provide evidence on important points. First, households have partly provided their own food and increased incomes by engaging in mixed or rotating crops in multi-plots, and not by increasing yields of one crop. Second, in low productivity fragile areas, even on-farm diversification is not adequate to meet basic needs. Households engage in a mix of off-farm and non-farm work, whenever and wherever the opportunity comes (i.e. seasonal, part-time, part or full time migration.

7.5 The gender dimensions in farming and household activities

Gender can be understood as socially constructed roles of men and women in the areas of decision-making, different ownership and control over assets and resources, and management of liabilities, usually connoting power. In Filipino rural culture where tradition remains strong, gender has to be seen in the context of the Filipino household that is oriented towards a "harmonious family" of strong Christian value. That the "woman submits to the authority of the man" (as marriage vows would have it) is not understood as one of subservience but as a "rightful role" that is not in conflict with the idea of

[6] Putting-out system is an enterprise system where work is done in the households, usually paid by piece work, and collected by or brought to, the trader for the market. This is the system of the *romblon* native craft-making in Plaridel, which involves mostly women.

partnership and dialogue-based decision-making. This is indicated by the fact that more than 90 percent of the household surveyed revealed that major decisions are usually consensual by the couple, or with contributing adult children as the case may be. That the woman holds the purse is still the commonly-held view and practice. There are of course deviations because of personal differences. This gives the woman a psychological and social edge. Ethno-culturally, this seems to be stronger among the Waray-waray group (e.g. Alegre) than the Cebuano-Boholano mix, where women tend to be relatively subdued. However, there are gender-specific domain decisions (e.g. farm investment by male, household and food purchases by females), but which are still tacitly consented or commonly understood as such by the couple.

Certain farming and household tasks are gender-specific. Generally associated as male responsibilities are the physically demanding land preparation, abaca and coconut farming, copra drying, fibre stripping and drying, and selling cash crops as copra and fibre. Female responsibilities are planting and replanting of food crops, weeding, vegetable gardening, livestock feeding, and selling vegetables. There are also shared or complementary responsibilities such as harvesting, fertilizing, and grain drying. These may appear as gender-sequential tasks, particularly in food crops such as rice and rootcrops when the physically demanding tasks such as land preparation are usually done by men, and the meticulous tasks such as planting and transplanting done by women. Sharing or partnerships of tasks are common in planting, harvesting, or selling. This role substitution shows that this is not simply a gender issue but a resource (time, labour) allocation strategy, in so far as farm households are engaged in more than one own crop production, and usually a member works in another farm, or engaged in non-farm activity. This is critical because the ease by which roles and responsibilities are reversed or adjusted in a certain culture facilitates the adoption of a diversified livelihood strategy. In the case of the study villages, gender roles and reversals facilitated rather than hindered livelihood and domestic activities. A female spouse could easily manage farm and household affairs when the husband died (see Box 7.4, Case household 10). In another case the husband took care of both domestic and farm tasks when the wife went to Manila to work as domestic helper or in a factory (e.g. fishing households in Plaridel faced with diminished fish stock).

Household tasks such as cleaning the house, cooking, washing, and child care are considered the domain of female adult and children, while house repair, working animal care, and market-oriented livestock management are those of male adults and children. These patterns were evident in the two villages. However, in addition, women were more involved in household-based and factory handicraft work (e.g. mats and bags in Plaridel). As shown in Fig. 7.1b women make more hours than men.

In Plaridel, about six hours of the day are equally shared by women in performing occupational and household tasks, in Alegre only about five hours, most of which are spent in household activities. In the two villages, men spent

a little less than the women in both tasks. About 25 percent of the day is spent on children and personal care, mainly on the former. This is interesting since both men and women in both villages are engaged in total about 38 percent of the day in household and social maintenance activities, most of it in the care of children. Only about a third of this combined category is spent on income-generating activity. The survey data are not clear about whether the presence of children or the lack of work opportunities cause such a pattern. The informal discussion and the case studies, however, suggest the latter for the men and not for the women, since the women can simultaneously perform household-based occupation and domestic chores. The life course of households also matters in this case (discussed in Chapter 8).

Box 7.4 Female-headed compound household

Corazon, a 45-year old widow, heads a household of ten children including two married children, about a dozen grandchildren, and her father (76 years, who died towards the end of the fieldwork). The only child of a landed family, she inherited seven farms in Dulag (total area ca. 8.5 ha), and an irrigated ricefield (>1.0 ha in Mayorga, tenanted by a nephew). Under her title ownership for 23 years, these are mainly administered by the married son living with her. The other children take turns in harvesting and sharing the income from the coconut lands. The coconut lands are least affected by the floods, and provided a relatively stable income source.

The household has both rainfed and irrigated rice fields. The former is dependent on rainwater or from the moderately flowing floodwaters from the river. This was not cultivated during the 2002 fieldwork due to the light drought, and there was too much water in July, 2003 flood. The irrigated rice field benefits from the NIA irrigation system. The share from rice and the corn harvest provide the household with enough staple food. Most of the farm income comes from copra. Rice, corn and rootcrops are mostly for home use, only the surplus sold. But gathering and selling tuba (a local coconut sap-based toddy) is an important supplementary income.

The household is wealthy by local standards because of various crop incomes from land, coupled with the remittances of a daughter who got married to a Swiss national. Remittances also helped tide over agriculture damages from the floods or drought by providing capital for seeds and other inputs, children's education, and purchases of household durables. Most of all, the second fiesta celebration at the end of the fieldwork was already held in their new house. Again, courtesy of the 'daughter abroad'. No wonder the villagers would say: land plus dollars equal food security. (Case household 10).

Time-allocation patterns showed that men or women in the two villages spent about 13 percent of the whole day, on average, for their respective occupations. The rest is divided between household, personal care, social-recreational activities, and rest and sleep. Occupational activities represent a mix of farm, off-farm or non-farm activities, which vary by the season, or weekly, or even daily. Both men and women in Alegre had as much time for recreation and social activities as the men in Plaridel (ca. two hours per day), but the women in Plaridel have less as they engaged more in household-based income generating handicraft work. However, all were never wanting in rest, sleep and recreation-social hours. Data show some measure for more productive use of time if opportunities were available (Figs. 7.1a and 7.1b). But interventions addressed to fully utilize household labour will need to be taken as a system of opportunities and priorities that are gender-sensitive. The relevance of the gender issue is the fact that, as the evidence suggests, the differences and reversals in gender roles are more of a facilitative than a constraining factor in the performance of activities, in resource-use decisions as well as in diversifying livelihood activities. Important too is the understanding of which agriculture and non-farm activities as well as special skills (home industry) will mostly involve either men (in cash crops, commercial livestock, specialized farming, and – partly – food crops) or women (in food crops, gardening, mat weaving and bag making).

The increasing number of female labour migrants, whether seasonal or semi-permanent, is a recent phenomenon. The cases suggest that it is not so much that wages are high per se (although this is what they hoped for), but rather from an urgent need to augment the income since farming or fishing can simply not be relied upon. An attitude of "whatever, for as long as there is something" dominates the move. This is also true of male labour migrants. This coping strategy became an adaptive strategy for some households in order to survive. The long-run effect on households where children are left to the care of husbands or old parents can only be conjectured, including its concomitant social costs.

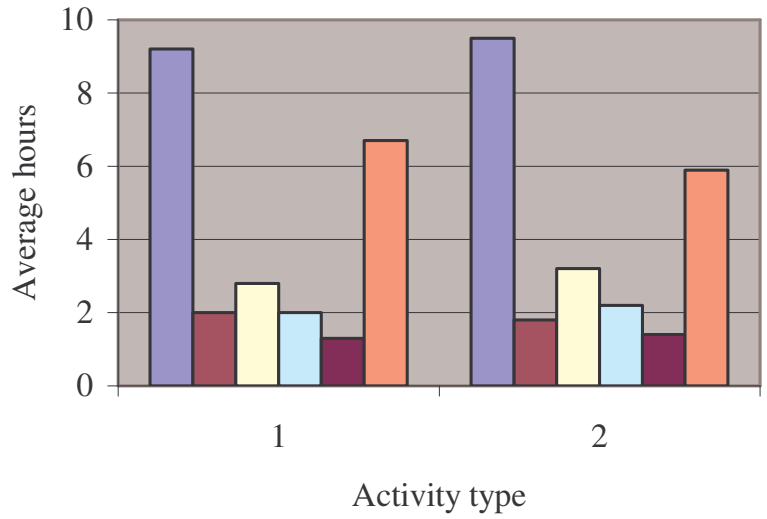

Figure 7.1a Time allocation of activities in average hours, male (1) and female (2) in Alegre

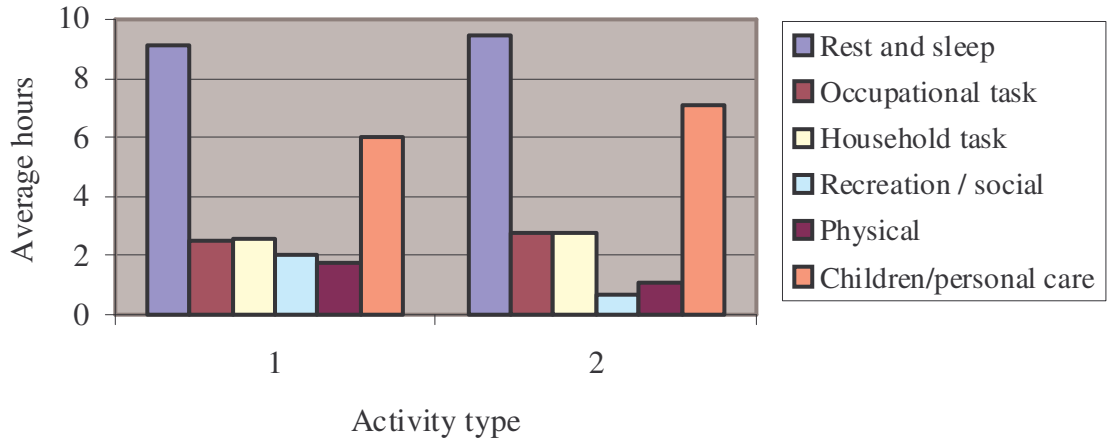

Figure 7.1b Time allocation of activities in average hours, male (1) and female (2) in Plaridel

Chapter 8
Livelihood diversification: factors and patterns

8.1 Livelihood diversification: the norm for households' survival

As said, this research uses a framework where the biophysical, socioeconomic and socio-cultural environments affect the way households make decisions about their livelihoods, and eventually food security. This chapter discusses the empirical evidence from the study villages on livelihood diversification, its influencing factors, and characteristic features.

The previous chapter discusses the relationship of the biophysical and socio-economic factors on farm productivity of the main crops grown in the two villages. The findings confirmed that in fragile areas, farming cannot sufficiently provide for survival. Thus, households combine farming with off-farm wage work and a variety of non-farm income-earning activities. A number of studies found that the strategy of a diversified livelihood portfolio is common among households in the less developed and developing world in order to improve incomes, reduce risk, and for seasonal (cyclical, temporary) or permanent migration for non-farm work opportunities as key to survival. Reliance on a single livelihood would be detrimental to household welfare (Haggblade, 1989; Tomich *et al.,* 1995; Reardon, 1997; Ellis, 2000; Niehof, 2004). Recent literature suggests that diversification to non-farm activities is more likely the result of stagnation in agriculture and not by agricultural growth, as in the growth linkage model that posits the establishment of non-farm enterprises arising from agricultural progress. Excess labour due to the lack of farm activity is pushed to find employment in the non-farm sector, locally or outside the area (Ellis, 2000). Usually though, this absorptive ability in non-farm employment is of the low productivity type that is reflected in the relatively lower levels of income among farming households. Agricultural wages also tend to be low. But for farmers, these are just relatively "good enough" cash at the end of the day.

8.2 Livelihood types and factors

The vivid description by Netting of "smallholders" as rural households who practice intensive, permanent, diversified farming on relatively small sized farms in (usually) densely populated areas, who produce for their own and the market, or are partially involved in small industry or off-farm work, aptly fits the profile of the farming households in the research sites (Netting, 1993). Decisions as to how households use their resources (e.g. labour, land, social network) to serve their own needs, and to respond to outside opportunities and address constraints and liabilities, follow a logic of social and economic rationality. In the process, these households have emerged into different types. Consistent with the framework of this research, the emergent household types

are based on livelihood strategies. In order to analyze household livelihood strategies, one useful way is to classify them is by the share of activity types in household income. The types of activity, farm, off-farm and non-farm, are referred to here as livelihood type.

Farm activity includes the "primary production of all unprocessed plant and animal products: crops, aquaculture, livestock husbandry, woodlot production, hunting, fishing and forestry (International Standard Industrial Classification, ISIC Group 1). While non-farm activity refers to "all economic activity outside of agriculture" such as self-employment, wage labour, and all other non-farm production whether full-time, part-time, or seasonal. It could be home-based, in a small or big factory, or itinerant (e.g. peddlers, traders). It may use indigenous technology, or with some degree of technical complexity. Off-farm activity refers to wage labour in farms outside one's own (Haggblade *et al.,* 2002:3). Technically, by nature of the activity, the latter is part of agriculture, but is treated separately in this study because of its important implication to resource use and management among households.

Livelihood type is the variable used as proxy for livelihood strategy, where the latter is understood as the way by which individuals in a household seek to structure their actions collectively, consensually, or that consciously some interaction has been done to reach a decision on the means of living (Anderson *et al.,* 1994; Pennartz and Niehof, 1999). Viewing "strategy" as an emergent attribute of households, Pennartz and Niehof further suggest that household members "adopt a comprehensive view of their situation, take account of the actions of others with whom they interact, and share common interests and objectives in the long run" (Pennartz and Niehof, 1999:47). Livelihood strategy reflects the manner by which household members balance out and make decisions on the use of resources (labour, land) in order to achieve the objectives of the household for sustenance and maintenance, and even the provision for old age.

Livelihood type one (LIVETYP1) refers to household livelihood strategies which result to more or less equal distribution of income earnings from farm, off-farm and non-farm sources; livelihood type two (LIVETYP2), when the share of farm income is greater than 50 percent; livelihood type three (LIVETYP3), when off-farm income is greater than 50 percent; and livelihood type 4 (LIVETYP4), when non-farm income is greater than 50 percent. This source-of income-based classification is a practical tool to look at household livelihood strategy since income is the measure and objective "target" by which households base their ability to provide for their needs, in complementation with their capacity to own-produce food. The types or sources of income are critical since they represent differences in resource allocation patterns, especially time and labour, which are the most important resources of poor households. Households (i.e. by way of members' independent action, or full or partial consensus), therefore, allocate their resources to achieve multiple objectives.

Consider the propositions below. It is to be noted that hypothesis 2 has been partly explained by the findings related to Hypothesis 1, that is, on farm

productivity (see Chapter 7). Low farm productivity largely pushes households to diversify their livelihoods in order to survive. This constitutes the link between hypotheses 1 and 2. The next step is to explore the other factors that affect livelihood type. Using multivariate analysis, livelihood type was initially regressed on 20 variables, and the results of the impact of significant variables on the livelihood type, as diversification strategy, over-all and disaggregated by type, are summarized in Table 8.1. Nominal regression was used to analyze relationships as is standard when dealing with categorical variables. The percentage predicted correct for the model overall is about 60 percent, with different degrees of percentage correctness when disaggregated (Table 8.1).

Hypothesis 2: Livelihood strategies are determined by farm productivity, market opportunities, by household specific factors (e.g. age, sex, education of household head and spouse, dependency ratio, inherited assets, labour availability).

Corollary 2a: Livelihoods are said to be secure when households have secure ownership or access to assets and resources needed for income-earning activities to sustain life, meet contingencies, manage risks or ease shocks without depleting the resource-base.

Corollary 2b: The generation, allocation and use of assets and resources are gender-specific.

8.2.1 Factors influencing livelihood diversification strategies

Farm wage worker

On the whole, the intensity of using labour resources for off-farm wage work (TENSTAT10) significantly affects the intensity of work in own farm and non-farm activities. Farmers engaged in off-farm work for wages (TENSTAT10) are 13 to 15 times more likely to have more of their incomes from farming or from off-farm sources, and, therefore, use a livelihood strategy classified as LIVETYP2 or LIVETYP3, respectively. That is, relative to the intensity of labour allocation to own farming and farm wage work. The mix of farm and off-farm activity is clear. As household members spend more time on labour in other farms, they would more likely be of the type LIVETYP3, and vice versa. Consequently, such types of households could not readily shift their labour resources to non-farm activities. Thus, the variable TENSTAT10 has a highly significant negative relationship with LIVETYP4. Qualitative data suggest that more males are engaged in off-farm activities, and these are usually established commitments to work in the cash crop farms. The latter provide some reliable means of important farm incomes. Farm wage labour is the most important predictor for all livelihood types. This also confirms that labour is the most important resource farming households have.

Value of farm produce

Total value of farm produce (TOTLVAL) is highly significant and positively related to LIVETYP2. When the value of the total farm produce is greater, households more likely will have more incentive to intensify own-farming. Effectively, this means less labour for both off-farm and non-farm activities. Thus, incomes will more likely come largely from own-farm production. Qualitative data also suggest that these are usually households with a relatively bigger cultivated area for cash crops. These findings are consistent with the highly significant negative relationship between size of cultivated area (AREACULT) and LIVETYP3 (that is, more off-farm income type).

Age of household head and working children

Statistical evidence showed that the older farmers more likely earn more than 50 percent of their incomes from farm sources (LIVETYP2). With most of their experience, skills and orientation on farming, the older farmers could not readily shift their labour to activities other than farming. Farming is what they learned and has always been part of their lives, oriented as they were with "respecting by using" the land of their forefathers, and honourably raising their family with the "fruits of the earth" (quotes are local folk saying).

The more working adult children (NWORK) there are in the household, the lesser the household becomes dependent on farming sources of income, and thus, the significant negative relation with LIVETYP2. Working children tend to work outside own-cultivated farms, and seek employment in other farms or elsewhere. This is shown by the significant positive relation of the number of working children with LIVETYP3. Though statistically not conclusive, qualitative data strongly indicates younger adults to prefer non-farm activities, and explicitly encouraged by most parent-farmers to do such type of work. But as they are in the village, they do help in farming and/or work in other farms.

Lifecycle

Though statistically not conclusive, lifecycle is negatively related to LIVETYP3. Qualitative evidence accounts that in the early phase of the household lifecycle, young farmers tend to be more engaged in off-farm work as they would have none or limited farm of their own. In addition, when households are in a later phase of the lifecycle and have a growing number of maturing children, households are likely to intensify own-farm production and off-farm activities as well as cash-crop farming (e.g. abaca, coconut) to feed and sustain a bigger household. This is corroborated by the significant positive relationship of number of working children both for LIVETYP2 and LIVETYP3 (see above); and a significant positive relationship of abaca yield with the dependency ratio (CWRATIO) was found (Chapter 7).

Size of cultivated area

The size of the cultivated areas (AREACULT) is highly significant and negatively related with LIVETYP3. So, the greater the area of farming, the

more difficult it is to be engaged in working with other farms, the more likely will incomes from off-farm work be depressed. This is consistent with the highly significant positive relation of the off-farm labour arrangement variable (TENSTAT10).

Actual household size

Actual household size (HHSIZE) has a highly significant negative relation with LIVETYP3, and a significant negative relation with LIVETYP4. So, the bigger the household, the more likely that its income does not come mostly from off-farm, and non-farm sources. The most plausible reasons are associated with the common household structure in the study villages. The bigger households are usually composed of the middle-age to older parents and the very young, with one working child. The other working age children are usually out of the village to work, or married and living separately. First, the male farmer will spend most of labour resources cultivating own farm food and cash crops, and supplement with working in other farms, usually the cash crops coconut or rice. This is basically to meet substantial food sustenance and other basic needs (e.g. clothing, shelter) of a bigger household. Second, the female spouse will have to divide her time between helping in the food crop cultivation (e.g. rootcrop, corn) or, seasonally, supplement with off-farm work as in rice, but mostly with domestic chores, to a large extent including child care. For both then, very little labour can be spent on non-farm activities, and the supplemental off-farm work would not be substantial. Only with households where there are more working adult children the contribution of non-farm sources of income will more likely be greater.

In his seminal theorizing on the peasant economy, the Russian economist, Chayanov, contended that households have a subjective calculation of the additional utility of labour determined by the interaction of the size and composition of the household, the number of workers and labour's productivity. The more consumers each household member-worker must support, the more significant is each unit of farm produce, both for food and cash income for other needs. This consumer-worker or dependency ratio is critical in the farmer's evaluation of the additional utility per additional unit of labour to determine the household's well-being. Farmers will increase labour only if they will gain more outputs, either for investment or consumption, but not beyond a point where the increasing drudgery outweighs the labour input (Durenberger, 1984). In this study, the highly significant variable household size could have more likely interacted with the number of workers, a variable sensitive to both the size and life cycle of a household, in a manner that households evaluate themselves as being better off by putting more labour in off-farm work. Households then would have taken a livelihood strategy with relatively greater off-farm income. One would expect this is a kind of behaviour in a farming community with opportunities in off-farm work in cash crops, where bigger households can optimize their income-earning capacity because they have more working members.

Table 8.1 Summary of the nominal regression on livelihood typologies

Variable	-2 log Likelihood of Reduced Model	Livelihood type (over-all)			Livelihood type 2 (LIVETYP2) Income from farm > 50%			Livelihood type 3 (LIVETYP3) Income from off-farm > 50%			Livelihood type 4 (LIVETYP4) Income from non-farm >50%		
Effect		Chi-square	df	Sig.	β	df	Sig.	β	df	Sig.	β	df	Sig.
Intercept	334.693[a]	.000	0	.	10.862	1	.000***	1.666	1	.497	13.761	1	.000***
Age of household head (AGEHHH)	344.608	9.915	3	.019	.092	1	.011***	.022	1	.656	.036	1	.299
Household size (HHSIZE)	345.046	10.352	3	.016	.016	1	.904	-.516	1	.023***	-.228	1	.081**
Size of area cultivated (AREACULT)	342.284	8.131	3	.043	-.080	1	.684	-1.448	1	.024***	-.049	1	.802
Value of farm produce (TOTLVAL)	355.155	20.462	3	.000	.000	1	.038***	.000	1	.394	.000	1	.793
Idle land (TENSTAT1)	343.389	8.696	3	.034	.207	1	.825	17.634	1	..	2.706	1	.031***
Farm wage worker (TENSTAT10)	343.187	8.494	3	.037	13.426	1	.000***	15.252	1	.000***	16.901	1	..
Lifecycle (LCYCLE)	344.961	10.268	3	.016	-.638	1	.283	-1.185	1	.136*	.451	1	.422
Number of adult working children (NWORK)	343.102	8.409	3	.038	-.374	1	.178*	.596	1	.104*	.000	1	1.000

Note: The chi-square statistic is the difference in –2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0. The reference category is LIVETYP1 (i.e. farm, off-farm, non-farm about the same proportion). Percentage predicted correct: overall, 59.6%; LIVETYP1, 19.2%; LIVETYPE2, 56.6%; LIVETYP3, 20%; LIVETYP4, 82.1%. [a/] This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom. *** highly significant; **significant; *not conclusive

Idle land

Idle and fallowed land (TENSTAT1) is highly significant and positively related to LIVETYPE4. Lands are laid idle mainly because of poor quality and capital deficiency. The former is related to the heavy erosion along the riverbeds (e.g. case household 5, 12), drought (e.g. case household 10), and the severe erosion of the uplands in Plaridel (e.g. case household 6). Under such conditions, the farming options open to a household are nil. Logically, the more idle lands there are to a household, the most pressing it becomes to resort to non-farm activities (LIVETYP4) for a living. This provides further evidence that the stringent bio-physical environment characteristic of fragile areas have pushed households away from the farms.

8.2.2 Synthesis of findings: livelihood type factors

On the whole, livelihood type has high significant correlation with being a farm wage worker (TENSTAT10), age of household head (AGEHHH), size of cultivated area (AREACULT), actual household size (HHSIZE), value of farm produce (TOTALVAL), life cycle of the household (LCYCLE), idle land (TENSTAT1), and number of working children (NWORK) (see Tables 8.1 and 8.2).

What could explain the non-significance of the other variables which were identified in the first place? The heterogeneity of conditions that reflect any or a combination of variables such that they, taken singly, do not show significant relation to any of the livelihood type. The evidence, in fact, in various studies as to the hypothesized relationship of household and individual-related (e.g. household income, landholding, size of farm), and other socio-economic variables to the non-farm share of employment or income, is mixed. It was also found that poor rural households have difficulty in gaining access to non-farm activities due to lack of skills or capital (Reardon, 1997, 2001; Reardon *et al.,* 2000).

Biophysical factor

If left idle or fallowed, a field plot was simply labelled TENSTAT1. It is classified here as a biophysical factor since local accounts and observations strongly suggest that most of the idle lands are found on the upland or sloping lands, or eroded river beds. The households then would not have the incentive nor the capital to give them priority to work on because of their low productivity due to poor land quality (i.e. degraded, infertile). The farmers' order of preference would reasonably put resources first on the land of which they expect better return. Even rice lands, which are important for both food and cash, were left idle because they were either eroded or did not have adequate moisture due to drought (case households 5 and 10).

Table 8.2 Summary of significance and ranked importance of predictors by livelihood type

LIVETYP2 *(Farm income >50%)*	LIVETYP3 *(Off-farm income >50%)*	LIVETYP4 *(Nonfarm income >50%)*
(13.4) Farm wage worker***	(15.2) Farm wage worker***	(2.71) Idle land***
(.09) Age of household head***	(-1.45) Size of area cultivated***	(-.23) Household size**
(.00) Value of farm produce***	(-.52) Household size***	
(-.37) Number of working children*	(-1.18) Lifecycle*	
	(.60) Number of working children*	

*P-value (Significance level): p<0.05 ***; 0.10 <p>0.05**; 0.15<p>0.10*

Thus, the occurrence of idle land is highly significant and positively related to LIVETYP4. It is the most important indicator which accounts for the households' search for non-farm income earning opportunities. This evidence corroborates the findings relating to hypothesis 1 where land quality (e.g. slope of coconut, soil quality of rice) is an important factor in determining farm productivity.

Socio-economic factors

The evidence on the significant variables that impact on household decision-making resulting in the different livelihood strategies, i.e. livelihood types, highlights the importance of household labour and how this is allocated in response to changes in the resource environments. Household labour performs many different roles which are socially constructed and defines the relationships, both internal and external, and influences decision-making as to labour use (Gardiner, 1997). These relations change within households because of changing demands on labour for household work and income-earning activities, as well as changing capacities, opportunities and constraints over the life cycle.

Tenure arrangement, particularly as farm wage labour (TENSTAT10), has a highly significant positive relation and is the most important predictor for households whose incomes are largely farm-based. This is a factor that captures the critical significance of labour as the single most important resource of poor farming households, with land as a scarce factor, both in size and quality. This is also more of a capacity factor (i.e. labour availability) which is highly dependent on the opportunity as well as limitations of off-farm and non-farm work.

Off-farm work (i.e. from production to postproduction activities) in cash crop farms, such as coconut, abaca, and rice, provided such opportunity. But households make labour allocation decisions among different activities. The intensity of labour use to off-farm activities determines the magnitude of income-earnings. But effective intensity of labour shift to off-farm work is limited by the season, and only made possible by often established relationships with landowners, or farm labour teams. These influencing factors could bind the labour shifting strategy of households, and thus, households could either be of the LIVETYP2 or LIVETYP3. This relation is consistent with the non-conclusive finding on the negative relation of the number of working members (NWORK) with LIVETYP2, and positively with LIVETYP3. That is, the more working members there are, the greater the likelihood that labour will be intensively used in off-farm activities rather than in own-farm production. This strategy is logical in the sense of availing of the opportunity to earn additional income from wages as well as to mitigate the risks of income loss from future harvest which could be prey to strong wind, storm or flood. It is also logical in a situation of low income due to low yields and/or low or unstable farmgate prices.

Revolving around the households' decisions on members' labour allocation, size of area cultivated (AREACULT) is highly significant and negatively related with LIVETYP3. This means that the smaller the size of own-farm cultivated the more likely that household labour is available for work in other farms and non-farm activity, if any. The bigger farm sizes are usually devoted to cash crops which require relatively more labour. The smaller the farm size cultivated, the lesser will be the total value of farm produce (TOTLVAL); the lesser the farm income, the more the households need other income to sustain itself.

The highly significant and negative relation between household size (HHSIZE) and LIVETYP3 and LIVETYP4 reflects the highly competing labour demands on adult members for farm work, household maintenance, and care of the young. The bigger the household size the more intensively will labour be used in own-food and cash crops to feed and maintain the household. The composition of households in the villages is biased towards the younger and school-age group, as the older children are either married and live separately, or have migrated to the city or town to work. A highly significant and negative relation of household size to both LIVETYP3 and LIVETYP4 reflects this composition. But with more working members (NWORK), the more likely will household labour be shifted to off-farm work. Though not conclusive, this could explain the negative relation to LIVETYP2, and positive relation to LIVETYP3; thus, the tendency towards a bigger share for off-farm income. Likewise, the release of labour away from the farm will tend to reduce its income.

The earlier in the life cycle a household is, the greater is the likelihood of using labour to off-farm activities since young couples usually do not yet have their own farms to work on. Young farmers will also need to cultivate work group relationships by working in other farms (i.e. relatives, friends,

neighbours) early on to hedge for livelihood security as the household size expands. On the other hand, the older and mature phase in the life cycle will tend to have less labour for off-farm activity because of age, and the likely big household size argument, which tends to demand more own-farm and household work. Hence, the negative relationship with LIVETYP3. The statistical evidence, however, is not conclusive.

A variable that captures both the biophysical (i.e. relatively good land, better yield) and socio-economic environments (better market, price) is the value of farm produce (TOTLVAL). A highly significant and positive relation with LIVETYP2 show greater reliance on farm incomes if it has higher value.

8.2.3 Parallel evidence from the case households

The sample cases summarized in Table 8.3 corroborate and qualify the findings of the statistical evidence. Estimates of their various income shares effectively classified the case households into farm income-based (LIVETYP2), and non-farm income-based (LIVETYP4) households. How the variables found significant in the statistical analysis impact or explain their livelihood strategies, and results in these typologies, will then be explored.

It is interesting to note that no case household is classified as off-farm income-based (LIVETYP3) category. First, because actual income estimates were not known during the selection process and only the different mix of livelihood activities was one of the criteria to approximate livelihood strategy. The other criteria included life cycle, land use, and distribution of farms across the agro-ecological zones within the villages. Second, and importantly, this could be taken in the light of the findings of this study on the explanatory variables on livelihood types, which may be explained as follows.

Statistical findings suggest that the availability of household labour that could be released for off-farm work (TENSTAT10) is highly significant and positively related to off-farm income-based type of households (LIVETYP3); and is the most important predictor. The data from the cases showed that no case household had this kind of labour availability for off-farm work adequate enough to make a substantial contribution. If any, it is a relatively smaller share. Also, the case households have relatively bigger household size than average of five, and most have only one working son. Those with more had the other children working in non-farm activity (Case 12, carpentry, irregular), or part-time farming (Case 10). The bigger household size (HHSIZE) composed of younger members, and the bigger cultivated area on cash crops plus food crops (AREACULT) have contributed to the households' decision to put more of their labour resources to own-farming. Thus, the resulting relatively bigger income share of 50 percent of such cases as farm income-based (LIVETYP2). On the other hand, the other 50 percent of the cases had more non-farm incomes (LIVETYP4) for various reasons. Cases 2 and 8 did find more opportunities in mat and bag weaving, both home-based and in the factory, due to some connections and demonstrated ability to do the work. Cases 5 and 9 totally went out of farming and put their labour and capital

resources in business and fishing, respectively, which provided them better incomes. Case 5 was faced with degraded farm lands, went out of it, and made good trading business. Case 9 was mostly a non-farm household over the life cycle because they had very little and not so productive family land, and had to depend mostly on fishing. Case 11 also had to venture beyond farming, and found trading agricultural produce, including *tuba*, as their means of survival. What is clear from this second set of cases is the impact less quality or degraded lands have on household livelihood strategies, and the incentive to make use of non-farm work opportunities when capacities and linkages work out – that is, moving away from the farm, and non-farm activities as major livelihoods.

On a methodological note, it is interesting how the cases confirmed the statistical findings, but also enriched and qualified the interrelations between variables. While the statistical analyses highlighted patterns of significant and important predictors, the following cases qualified these by the heterogeneity and complexity of circumstances, and understanding the unique nuances of household and individual behaviour; a large measure of which were response decisions on household labour allocation among farm, off-farm and non-farm activities.

Farm income-based households

Case households 1, 3, 6, 7 of Plaridel, and households 10 and 12 of Alegre could be referred to as belonging to LIVETYP2 with farm shares ranging from 66 to 95 percent. These are also the households with relatively bigger farms (3-9 ha.), or more cultivated fields which are either owned, with family use rights, or sharecropped. These are very small farms by global standards, but most of these case households are considered relatively "better off" farmers by village standards. Except for case household 3, where six of the seven hectares are still in the early phase of tree crop farming, 75 to 100 percent of the farms are grown with the cash crops coconut, abaca and rice. Copra and abaca have had relatively better price in the last three years. Most of these households are in their mature years, have relatively bigger household size (6-12 members) though with few working children. The older children are either out to the town or city for work or were married and living separately. Those left are young children or grandchildren, some in school. With just one or two working children, the demands of relatively bigger farms and household work for bigger households are great enough, concentrating household labour more in these activities. Within this category, Case households 1 and 6 have lower shares from farm incomes (66-75%) because of remittances (Case 1), smaller household size and some off-farm activity (Case 6), and some less time-intensive special skills (Cases 1 and 6) that allowed them to have additional incomes.

Table 8.3 Selected livelihoods information of case households

Hh No.*	Hh size	Life cycle (age of wife)	Age of Hh head	#Working children	Farms: number of plots, size (hectare estimates), and land use			Livelihoods (ranked by order of importance)		
					Owned	Tenanted	Family use rights	1	2	3
1	12	55 mature	59	2	3- 2.5 has coconut 2- 1.5 has abaca 2- 1.0 ha abaca, root-crops, banana 1- 0.5 ha corn/ rootcrops	1.0 ha abaca 1- 1.0 ha coconut	none	Farming, including wild animal hunting, tuba processing (66%)	Services and remit-tances (25%)	Off-farm (9%)
2	10	42 developing	40	None	none	1- 0.25 ha corn, rootcrop, vegetables	1.0 ha. coconut 1- 3.0 has abaca (7.0 has forest)	Bag/ mat weaving (65%)	Farming (25%)	Off-farm (10%)
3	7	55 mature	55	1	1- 1.0 ha rice, coconut, cacao	none	1- 6.0 has corn, sweetpotato, banana, trees/ pasture	Farming (90%)	Trading (10%)	none
4	4	45 mature	51	1	4- 4.5 has abaca (3 plots new)	5- 0.300 ha corn, sweetpotato, vegetables	none	Fish vending/ pig raising (75%)	Farming (23%)	Sari-sari store (2%)
5	5	48	50	none	0.25 ha rice 0.5 ha coconut 2- 8 has only half with abaca	1- 0.25 rice	none	Abaca/copra trading/ retail-ing (90%)	Pig-raising (7%)	Farm-ing (3%)
6	4	29 early	32	none	none	0.75 ha coconut 2- 1.0 abaca	0.25 ha corn, rootcrops 1- 0.8 ha coco-nut with plantain	Farming (75%)	Bag making (22%)	Servi-ces (3%)
7	6	34 early, developing	37	none	1- 0.25 ha coconut (mortgaged)	1- 1.0 ha rice, coconut	1.0 ha coconut with plantains 1- 0.8 ha abaca	Farming (95%)	Services and crafts (5%)	

8	5	48 mature	54	1	Undetermined inherited, not cultivated	2.5 coconut 3- 0.3 ha vegetables	none	Bag/ mat weaving (60%)	Farming (40%)	
9	9	42 developing	46	1-abroad + 1	none	1- 800 sq m coconut, plantain	none	Fishing (80%)	Bag/ mat weaving (20%)	
10	10+	45 developing	Female head	5	3- 1 has coconut 1- 2.0 has coconut, taro, plantain 1- 1.25 has rainfed rice 1- 0.5 ha sweetpotato, 40 calamansi trees 1- 2.5 has rice, corn, root-crops 1- 1.5 has rice	none	none	Farming with tuba trading (80%)	Remit-tances (20%)	
11	6	27 developing	31	none	none	1- 1.0 ha. coconut, corn. rootcrops	1- 0.5 ha coconut	Trading and tuba (64%)	Off-farm, carpentry (22%)	Farm-ing (14%)
12	6	52 mature	58	4	none	1- 1.25 ha coconut, taro, plantain reduced to <0.5 ha from river erosion 1- 1.0 ha corn, sweetpotato, uncultivated 1- 2.5 has rice 1- 0.25 ha sweet-potato, squash, school garden, free	none	Farming (85%)	Off-farm, carpentry, pig raising (15%)	

** Note: Case households 1-9 are from Plaridel and Case households 10-12 are from Alegre*

The relatively younger households (Cases 6, 7) in the early and developing phase of the life cycle do not have their own lands, but earn more from the family farms where they have use rights. With lesser children, the younger wives could devote part of their time to home-based mat and bag weaving for additional income. The female spouse (Case 6) also helps in food-crop farming, but only in the nearby farms because of the very young children. With no working children yet and nobody to work on the family land (Case 7), all of male labour is used on cash crop farming.

Cases 10 and 12 are untypical in their household structure and socio-economic status (Case 10), and self-image borne out of leadership and technology know-how (Case 12). Yet, similarly, they are dependent on farming to a large extent. Case household 10 is a female-headed (i.e. widow) complex household, which owns all its cultivated farm lands, and benefits from a daughter's foreign remittances. The challenge for this household is to farm as intensively as possible because all the three married sons and one married daughter depend on their share of the farm produce partly for the survival of their respective families, though living separately. While one son is doing the administration, a scheme of rotating harvest of the coconut lands among the children would not be enough to sustain an expanding household. The children could share from the total harvest of rice, corn and rootcrops for food. The household of one married son is already venturing in non-farm activities (i.e. driving a motorcycle taxi, the wife in furniture business), while the others are still finding their ways. Corazon, the head matriarch, has her share added with her earnings from buying and selling *tuba*, having enough for her own basics and socials. The remittances are used for the education of some children, and to maintain two houses (i.e. village, city).

Case household 12 is full tenant in all farms, and its long-term relationship with the owner made secure farming these lands. A farmer-leader, farm expert, and with good credit connection with the local rural bank, Ruel has banked on these capacities and contacts to make it good in farming. But in these last few years, an increasing occurrence of natural calamities (typhoons, floods, drought) and pest infestation (rice black bug) took their toll. One farm by the river was substantially eroded and greatly reduced from >1.5 hectares to <0.5 hectare, while another farm by the creek was laid idle because of lack of capital to pay the needed labour and seeds. Two married sons are helping him in the rice farm but they have their own separate households. Another single son has moved into carpentry work, but on an irregular basis. Ruel himself has grown cynical, and puts the blame on government. But he stuck it out with his rice farm. He felt he had to prove his worth in farming. The incentive to move out of farming is nil. After all, he is the village's acclaimed farmer leader. Besides, their household is small, and soon a daughter will be finishing her studies in the city and most likely find regularly paid non-farm employment.

All these factors have pushed households to use their labour resources on their own farms having a mix of cash crops (coconut, abaca, rice) and not much surplus labour to engage in other activities. Their engagements in off-

farm and non-farm employment are mostly seasonal, or in between periodic work in own farms.

Non-farm income-based households

Case households 2, 4, 5, 8, 9 and 11 have greater income shares from non-farm sources, ranging from 60 to 90 percent. The biggest contribution came from trading, retailing and peddling, and local small industry (i.e. bag and mat weaving), which are either home-based putting-out system or factory employment. These case households have relatively good access to farm land and most have allocated resources (except 9, mainly fishing) to farming activities. But each has specific circumstances enabling them to shift substantial labour resources to non-farm activities.

In Case household 2, Dario had just turned back to farming the family abaca farms after more than a decade of non-farm work mainly as a driver in Manila. With 9 children to feed, and the older ones only helping with household work, wife Isabel had to double time with bag and mat weaving to provide for the household needs. Meanwhile, Dario has newly planted the family abaca farms and works as part of an abaca group for wages. Savings from previous city employment were just enough to redeem the mortgaged abaca farm, build a less than basic small house, and tide over the transition from the city to the village.

Case household 4 gets relatively better off from Mercy's fish peddling and backyard pig-raising. This enterprising Boholana wife has good experience with trading goods: selling mats in Manila, and bringing back shallot onions and other agricultural produce to Baybay. Savings from this venture and abaca sales enabled them to buy their current farmlands. But a substantial part of savings were used for the hospitalization of their second child sick with typhoid in 1998. Since then, they were in and out of debt. Their farmlands are newly planted with abaca, and coconut income was also not substantial. Husband Mamer is more interested in small-time gardening (e.g. tomato, eggplant, sweetpotato, corn) for cash. He is also one of the village police. But since Mamer and Mercy have only a teenage daughter with them, life is not that pressing. And Mamer can even afford to gamble and drink, which creates problems at times.

Case household 5 (see Box 7.2) completely went out of farming and focused on abaca and copra trading business, retailing and pig-raising. Its inherited rice and coconut farms have all been degraded, and are no longer productive.

Case household 8 gets substantial income mainly from *romblon* bag making in an export factory based in Plaridel. With exhibited industry and quality performance, Jose and Dinia earned good relations with the local management. Both Dinia and a son are regular factory workers, with husband Jose also employed during peak order season. They also make the *romblon* twines at home that are supplied to the factory on piece-wage basis. And Jose is an industrious vegetable farmer, which skills he learned as a young farmer in his home place: a commercial vegetable area in another province, Cebu. He

rents vegetable plots in relatively fertile newly opened plateaus on the mid-hills, setting up some kind of irrigation system. He has cashed in from eggplants and other vegetables. With such industry, the couple were able to save. But savings was just enough to build a modest small house, and defray expenses from Jose's fall accident. Because of this, he lost some good income source from tuba gathering. Remittances from a son in Manila aided him to invest in vegetable farming. When these remittances dwindled, he had difficulty in funding vegetable farming with the high cost of seeds and fertilizer.

For members of case household 9 (see Box 6.2) farming is simply not in their veins. Any short-lived farming early on was simply to be a family hand. Victor tried his luck to raise his growing family (9 children) from factory work in Manila to bakery employment in Plaridel. Finally, he had to take after his father's occupation, fishing, which he actually learned at a very young age. They also invested in children's education even if only in the local public schools. With luck a daughter got employed in Singapore. Her remittances enabled Victor to buy a motorboat. He felt achieved as the more successful fisherman in Plaridel. Teresing adds to the household coffers by weaving mainly mats, at times bags. Meanwhile, other children get higher schooling with the help of the Singaporean dollar.

The above cases illustrate succinctly the different factors (as those in the regression variables) that influence decision-making of households with repect to the mix of livelihoods they pursue to provide for their food and sustenance. Certain points may be highlighted. First, poor quality of farm land is a more constraining factor than ownership, or access, per se. The lesser the quality of the land, the more likely will households engage in off-farm and non-farm activities depending on labour availability and opportunities. Second, the more households put their resources in cash crops and relatively productive farms, the greater the share from farming will be, and, with just one or no working child, the less labour spent on non-farm activities, the less income they will have from non-farm sources. Third, on-farm diversification is a strategy in itself, but often not rewarding enough especially in degraded lands. Food crops remain an integral farm activity to a greater or lesser degree in all types of households to provide for staple and supplemental food. It is not a matter of food versus cash crop, but more matter of strategies in resource allocation to produce both to a greater or lesser degree combination. The intensity of food crop farming usually depends on available plot, the household size, and the availability of the farm help-spouse, usually the woman. The more she is engaged in non-farm work, or in household work and especially the care of children, the lesser is her time for food crop gardening. The intensity of cash crop farming depends largely on labour available and capital. Finally, livelihood strategies are the result of the interplay of such factors as quality and size of farms (of whatever tenure arrangement), value of farm produce, skills and opportunity for off-farm and non-farm employment, age of household head, household size, life cycle and number of working children.

8.3 Livelihoods in the villages

The case studies suggest that households in the two villages adapt a multiple-activity scheme because of an interplay of factors. Examples are: low incomes due to low farming productivity, hedging against the risks brought about by natural calamities or poor harvest, availability of labour due to seasonality or less farm work, bigger household size, avail of non-farm opportunities in the service and small industry market niches, and having special skills. Similarly, survey evidence shows that the strategies households use in certain livelihood portfolios differ and depend, in large measure, on the behaviour of households and individuals in the allocation especially of labour for farm, off-farm and non-farm work. When land is of such poor quality that it is left idle or fallow, labour is usually released in favour of non-farm work. Other factors include size of cultivated area, value of farm produce, household size, age of household head, life cycle and number of working children. The latter two were found are not conclusive. Nevertheless, and intuitively, they are important to note as they relate to each other, and to household size.

The literature on livelihood strategies has documented the diversity of livelihood options open to households. These strategies depend on the contextual setting (e.g the biophysical environment, history), the tangible (physical, financial capital) and intangible (social capital, education, skills) resources needed and available, the related vulnerabilities, and the ways by which the external environment (e.g. economy, policy, institutions) facilitate, constrain, or encourage certain behaviours (Reardon, 1997, 1999; Ellis, 2000; Swift and Hamilton, 2000; Niehof, 2004).

Based on various surveys in less developed and developing economies, roughly 40 percent in Latin America, 45 percent in Africa (30-50% in Sub-Saharan Africa, 80-90% in South Africa), and 35 percent in Asia, of rural income comes from non-farm sources. Furthermore, rural poor households often lack or do not have access to the better-paying non-farm jobs. Many are engaged in activities with low wages, are unstable, and usually with low growth potential. (Ellis, 2000; Reardon *et al.,* 2001). Yet national figures may reflect that this trend towards out of own-farm activity is associated with modernization, where the share of agriculture employment and income decreases while manufacturing and the service sectors increase. This seemingly rosy picture of development, however, begins to be blurred when the poor and the food insecure are figured out largely among the poor farming households. The following features of the distribution and patterns of livelihood strategies in the study villages will be instructive.

8.3.1 Distribution of households by livelihood type

Each farm household works on 3 to 4 field plots on average, with various tenure arrangements. A farm could be own-cultivated (48.3%), share-tenanted (50.6%), rented-in for cash or share (2.9%), leased (1.2%), or mortgaged (2.9%). Given land resources (i.e. different farms in relation to its various tenure arrangements), labour (i.e. including other working-age members),

minimal capital, if any, and the opportunities and constraints facing them, households consciously make decisions, and eventually are classified here as households which draw their livelihoods more or less from farm, off-farm and non-farm incomes.

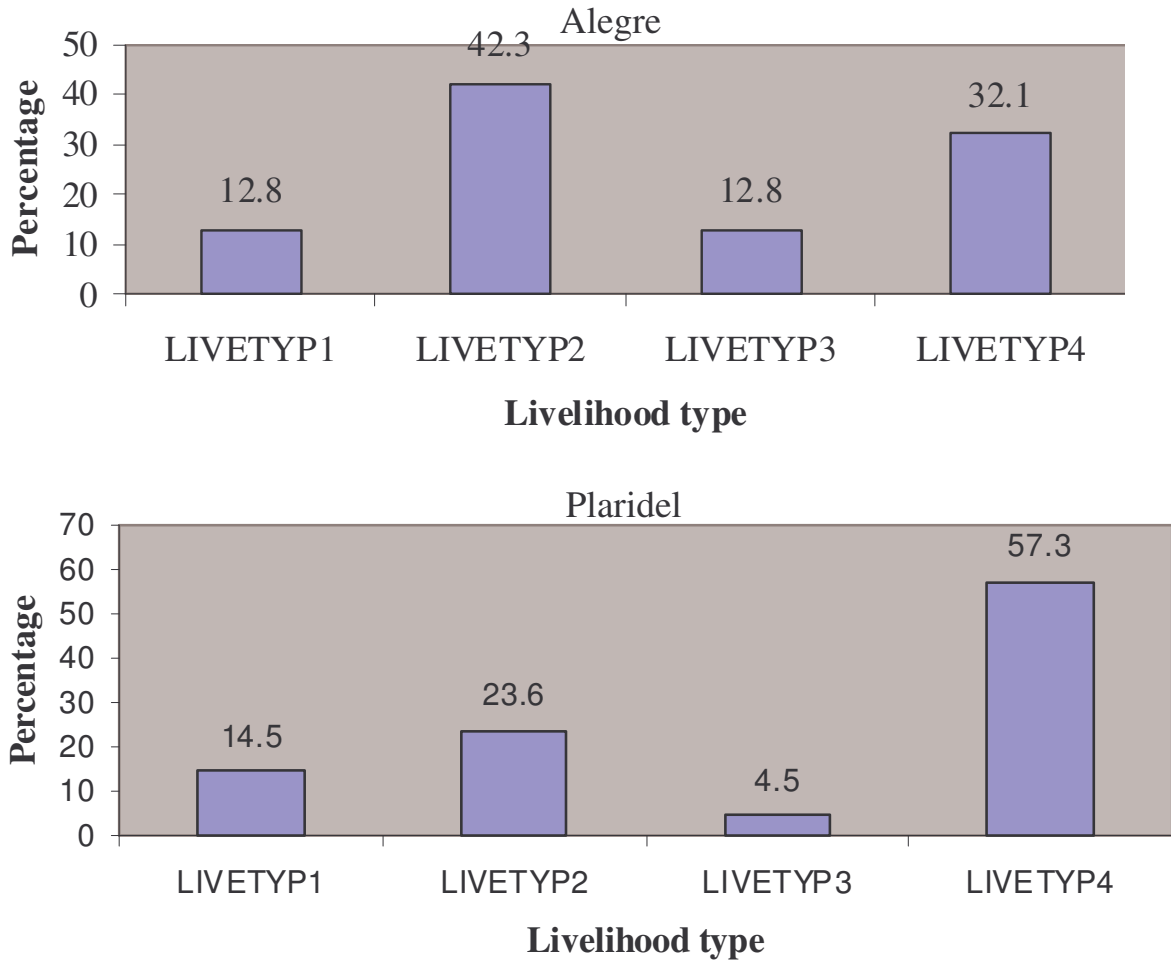

Figure 8.1 Percentage distribution of livelihood type in Alegre (n=91) and Plaridel (n=109)

The percentage of households with about the same proportion of farm, off-farm and non-farm incomes is not much different in the two villages (ca. 13.6%). Overall, about 47 percent of households have more than 50 percent of incomes from non-farm sources. This is pulled up by the higher figure in Plaridel than Alegre (57% versus 32%), showing the relatively more non-farm opportunities in the former. This is because of the greater employment opportunities provided by a thriving small industry (i.e. the *romblon*-based handicraft export factory, household-based micro-enterprises); relatively bigger commerce, trade and services; and the relatively better support linkages the residents of Plaridel have outside the village. Alegre's income is largely more farm-based than that of Plaridel (farm income, 42%; off-farm income,

12%). With a hilly and mountainous terrain, almost 50 percent of Plaridel is forest and public domain, while a greater proportion of its farms are eroded or left idle. Alegre has relatively more lands devoted to coconut, rice, sweetpotato and taro for the market, which hire labour at 45, 54, 26, and 11 percent of total labour requirement for each crop, respectively. Being mainly farm-based with small farm size, low yields and prices, explain the lower per capita income per day of Alegre at 0.64 USD against Plaridel's 0.90 USD. Despite the non-farm opportunities in Plaridel, its daily per capita income is below the 1 USD poverty threshold, showing that off-farm and non-farm wages are low. Evidently, the mix of livelihood activities could not provide adequately for the food needs.

8.3.2 Patterns of livelihoods

The livelihoods of households in the villages are classified as farm, off-farm and non-farm. From survey data it appears that the two villages differ in the distribution of income shares from farm, off-farm and non-farm incomes. Plaridel has 57 percent from non-farm income, 38 and 6 percent from farm and off-farm sources, respectively. Alegre is just about the reverse with 59 percent from farm, and 28 and 13 percent from non-farm and off-farm sources, respectively (Figure 8.3). This confirms the finding of the relatively higher percentage of households in Alegre classified as LIVETYP2; and relatively more households in Plaridel of LIVETYP4 category than Alegre. The non-farm income of Plaridel is four times, farm income is 1.3 times, and total is twice that of Alegre, as suggested by survey data. The off-farm income in Alegre is about 10 percent more than in Plaridel (Table 8.4).

Table 8.4 Income distribution (in '000 Php) by village, May 1, 2001-June 30,2002 reference period, n = 200

Village / n	Farm	Off-farm	Non-farm	Total
Alegre, 91 hhs	484.58	105.22	225.36	815.16
Paridel, 101 hhs	628.19	95.8	950.55	1674.54

Farming and off-farm livelihoods

In the two villages, farm diversification is common and has become an adaptive strategy. The usual mix of cash and food crops is often found in various tenure arrangements: whether tilling own lands, wage labour, or as share tenant, since many work in two or more farms. In addition, many households would have one or two pigs and few native chickens in their yard. Many earn wages from cash crop production and produce own food using intercropping or rotating scheme of corn and rootcrop, and growing plantain in fringes of the field. These are the energy food sources for the rest of the year when rice supply is used up. Rice has been reported as the major staple among Filipinos, but this is more or less a part of the consumption picture of the

urban and the relatively better off in the rural areas. In the study areas, rice is the preferred or status staple, but eaten mostly for a few months after harvest from in-kind wages, as long as supply lasts.

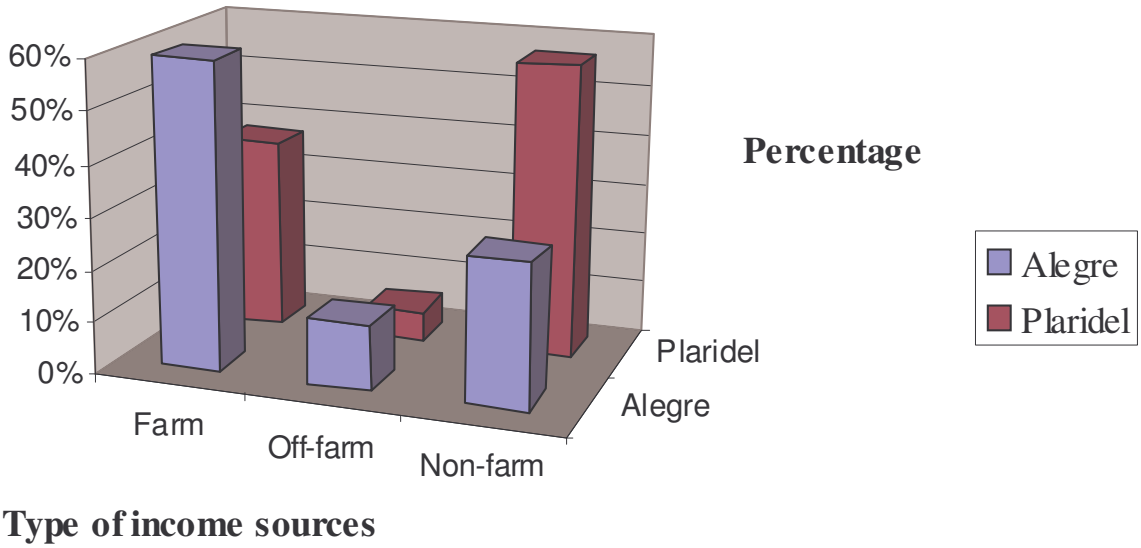

Figure 8.2 Distribution of income sources by farm, off-farm and non-farm by village; Alegre (n=91) and Plaridel (n=109)

Production figures in Table 8.5 include the imputed value of home consumed items. The major cash crops in Alegre are coconut (copra, whole nuts), rice, and taro, while Plaridel has abaca (fibre) and coconut (copra). Rice could be grown for cash in Alegre as there are at least 25 percent of the farmers who produce some surplus. Rice is mostly subsistently grown in Plaridel with 75-83 percent farming only on less than 0.5 ha plots. Food crops such as corn, sweetpotato and vegetables are grown in small plots or gardens, mostly for home food, or given. In Alegre, taro is grown by 27 percent of households and has, reportedly, been an important income source. The petioles and leaves are harvested weekly, sold during market days, providing a reliable source of household income. Compared with commercial sweetpotato, the profitability of taro per hectare is 3-4 times greater. While men are mainly involved in abaca and coconut, the farming and selling, especially rootcrops and corn, activities of women are those of the food crops, and they mostly control the income earned.

Specialized farming (vegetables) and farm-based activities (tuba gathering, abaca and coconut by-products) also contribute to farm incomes. Of relatively current interest, a few farmers have specialized in vegetable farming such as eggplant, okra, stringbeans, bitter gourd, cabbage, and bell pepper, which contribute significantly to their income. As gleaned from the case households, the main constraints are capital for seeds and fertilizer, pest infestation (cabbage), and drought. By-products such as the dried abaca bark

(*umbak)*, and coconut shells, twigs and coir are also getting connected to the furniture and handicraft markets on an irregular basis. So far these potentials are largely untapped, and the farmers have been left to fend for themselves.

The off-farm income in Alegre consists mainly of farm wages (91%), and a smaller share from tuba gathering (9%). While that of Plaridel consists of farm wages (68%), *tuba* gathering (31%), and a small share from exchange labour. The latter does not constitute cash payment, but the rendering of one's farm labour in another's farm, in exchange of the other's labour during one's farming season, usually in activities of intense labour needs like planting, harvesting, and threshing.

Non-farm livelihoods

As studies in Asia, Africa and Latin America also found, households in the study villages have engaged in non-farm activity because of "push factors" such as low farm productivity and incomes, and risky farming because of drought or floods (Hazell and Haggblade, 1993; Reardon, 2001:396) and to a certain extent from "pull factors", such as the expected ready cash returns from non-farm rather than farm work. Seasonal labour in the farm enables farmers to get non-farm employment (e.g. carpentry, construction, domestic service). Time allocation studies found farmers engaged in non-farm work even during the peak farm season for about 3-4 hours a day (Haggblade *et al.,* 1992). They do this for a host of reasons, like smoothing out variation in consumption and income over the year due to cropping seasonality, or simply in response to the lure of urban employment as stepping stone to success. Household size and structure (i.e. life cycle, number of working children), and skills and capacities of members, affect the ability of the household to release labour to non-farm work.

The commerce, trade and transport sector shares more than a third of total income of the villages (34-37%). This includes those engaged in the retail business, agricultural produce trading, food processing, and construction. Interestingly, this significant contribution of the aggregate local commerce and trade to the village economy was not explicitly appreciated by the local people during the group discussions. This is probably because the sector benefits more households but in relatively smaller amounts, compared to the fewer households receiving relatively bigger remittances. Remittances from spouse and children (26%), and services (14%) ranked next most important in Alegre, while Plaridel had small industry (16%) and remittances (15%). Alegre has a relatively bigger share and absolute amount in remittances because of the substantial remittances of children from abroad, while in Plaridel these came mostly from domestic urban sources (Table 8.6, Figures 8.5 and 8.6). Migration to work, usually in cities or bigger towns, has become part of household strategies to improve their chances of survival and welfare, which could be seasonal, temporary, or permanent, by one or more members (Pennartz and Niehof, 1999; Ellis, 2000).

Table 8.5 Distribution of farm income by crop by village and by livelihood type of households

Crops/ No. of farmers:	Abaca		Coconut		Rice		Sweet-potato		Taro		Others*	
Alegre (n=91)	n.a.		78		26		16		25			
Plaridel (n=101)	96		89		31		33		n.a.			
Percentage of farm income (%):												
Alegre	n.a.		39.5		28.6		3.5		16.3		12.1	
Plaridel	33.2		20.4		26.2		1.6		0.5		18.1	
Total income ('000 Php)												
Alegre: 484.58	n.a.		191.46		138.73		16.77		78.92		58.71	
Plaridel: 628.19	208.72		128.16		164.62		10.10		2.94		113.73	
% of cultivated area (has..): owned (O); not owned (NO)	O	NO	O	NO	O	NO	O	NO	O	NO	Total O	Total NO
Alegre: (has. / %)	…	…	65	52	25	64	100	86	100	68	69	61
<0.5	…	…	18	31	50	23	…	7	…	27	17	26
0.51-1.0	…	…	18	13	25	9	…	7	…	5	14	10
1.1-2.0	…	…	…	2	…	4	…	…	…	…	…	2
2.1-3.0	…	…	…	2	…	…	…	…	…	…	…	1
3.1-5.0												
Total = 100%												
Plaridel: (has. / %)	51	56	64	55	75	83	100	77	…	…	61	65
<0.5	25	16	20	34	12	13	…	15	…	…	20	20
0.51-1.0	11	23	8	11	12	4	…	8	…	…	9	13
1.1-2.0	5	5	8	…	…	…	…	…	…	…	6	2
2.1-3.0	5		…	…	…	…	…	…	…	…	2	…
3.1-5.0	3		…	….	…	…	…	…	…	…	2	…
5.1-7.0												
Total = 100%												

** Includes vegetables, and farm by-products such as umbak (dried abaca bark), fuelwood, coconut shell, etc.*

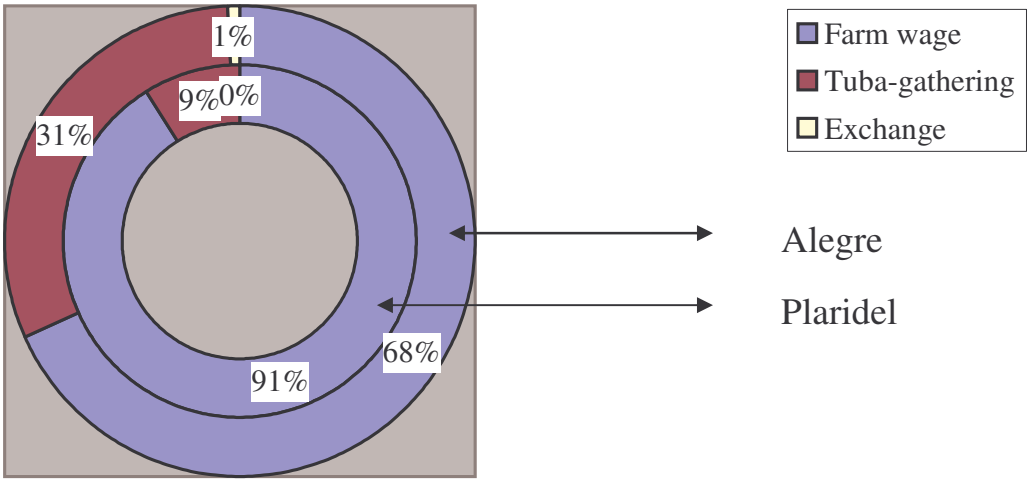

Figure 8.3 Percentage distribution of off-farm income in the study villages; Alegre (n=91) and Plaridel (n=109)

In similar vein, Jones posits that in an economy where a traditional subsistence agriculture (of low technology and productivity) co-exists with a modern industrial sector, rural-urban migration occurs because of increasing desire for material success, environmental vulnerability of the rural areas, and overpopulation (Jones, 1990). The evidence in this study has so far pointed to the environmental degradation-led push to earn better to cater for basic needs, as well as other aspirations, especially better education and overall improved welfare. Importantly, labour in the villages and the urban areas are connected not only by improved transport but also by the support of kin who have established themselves in the city. But in many cases, this support was difficult to sustain among growing households which usually had to live separately near their work stations. Among the twelve case households in this study, six households have started out with employment in Manila, but factory and shop closures and the economic pressures of a growing family in costly city living brought them back to the village, where food can be had from own farms, and the support system of relatives or neighbours is not difficult to come by.

Small industry in Plaridel benefits for about 50 percent from households. It consists mainly of the contribution of *romblon* craft by an export factory (i.e. producing mostly bags) to local employment which involves about a hundred households during the peak season (September-January), 16 home-based micro-enterprises (e.g. bags, wine holders, placemats, furniture and utility boxes) and mat weavers, involving about two hundred households. The presence of markets and backward linkages from suppliers for handicraft products serving both the domestic and foreign markets enabled this industry to thrive, particularly since the mid-1990s. In 1995, fifteen women were originally trained by a male weaver through the support of the Department of Trade and Industry (DTI) in support of the then established export factory,

which was relocated from Mindanao because of the proximity to raw materials. This grew out of the indigenous mat-weaving craft, for which Plaridel, together with some neighbouring villages, was known since the early 20th century. Made possible by the availability of raw materials early on, the current input linkages are shifted to *romblon* suppliers from two neighbouring islands (Himokilan and Apid). Local supply has dwindled, a situation which needs urgent measures for the industry to be sustainable. Overall, at least 95 percent of those engaged in this trade are women, enabling a greater number to earn incomes in their homes, even while tending children or doing other chores. This specialized industry concentration certainly serves as a critical focal point for program intervention (e.g. technology, skills and design training, credit, marketing) to mobilize the rural economy which will have further income and employment benefits. With already a significant number of households with craft skills, a seed organization for promotion (e.g. UP-WARD), and a supportive local government, Plaridel has the potential to become the growth centre for the advanced development of an outward market-led craft industry.

Services include personal, domestic and occupational services. Though a smaller share in Plaridel's income, services contributed more than double the amount in Alegre. Population and the relatively greater number of businesses served could explain the figures. The other contributions by local government employment, self-employment, other paid employment, and pensioners are of a similar pattern. It may be noted that the gift and donations share in Alegre is significantly bigger than is Plaridel, which meant that there were more households in the former that were poor enough and needed the support of family, friends, as well as institutional support.

Table 8.6 Classification and value of non-farm income sources of survey respondents by village, June, 2001- May, 2002 (in '000 PhP: 1 USD=55 PhP); Alegre and Plaridel

Income source	Alegre (n=91)	Plaridel (n=109)
Fishing	0	71.43
Commerce, trade, transport	77.47	347.02
Services	30.85	76.83
Small industry	2.30	155.47
Local government employment	12.47	60.98
Other paid employment	17.84	72.55
Other self-employment	3.20	3.74
Retired/pensioners	11.00	15.12
Remittances	59.19	146.82
Gifts and donations	11.04	6.00
TOTAL	225.36	950.55

Fishing is also an important source of income in Plaridel, but not in Alegre. Fishing, however, has declined in importance compared to the pre-1990 years because of the substantial reduction in the fish population in Plaridel waters. Now one must have a motorboat to fish in the distant seas. Capital investment is just too high for most. A number of fishermen's wives have resorted to work in domestic services, either locally, in nearby towns, or in Manila, leaving the children to the care of husbands, with the help of bigger children or grandparents. Their earnings have contributed substantially to household survival, while the male spouses make do with whatever work is available. This strategy of effective extended family support enabled the households to organize for child-care and of pool of resources to meet household welfare needs (Peterson, 1993).

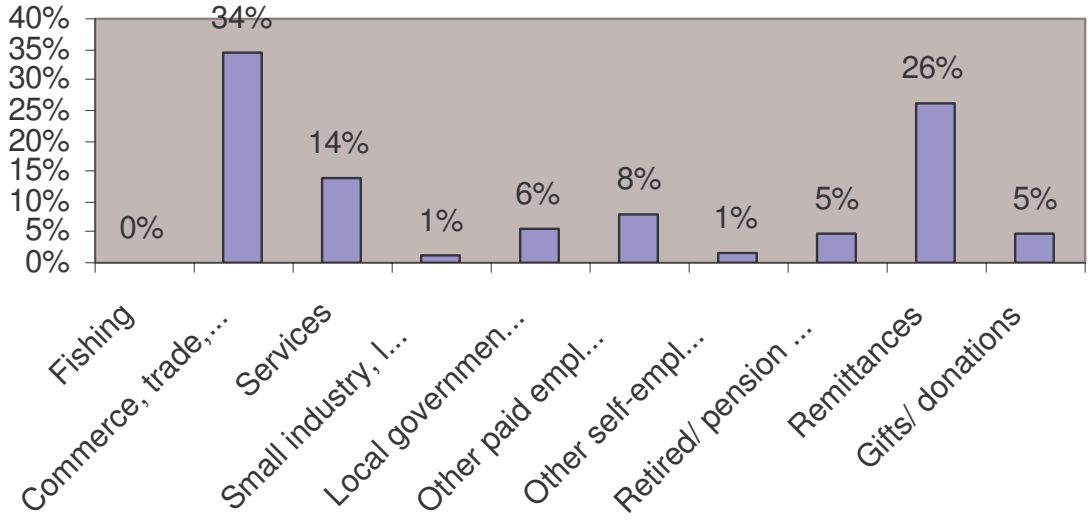

Figure 8.4 Distribution of non-farm income sources in Alegre, n=91, 2002

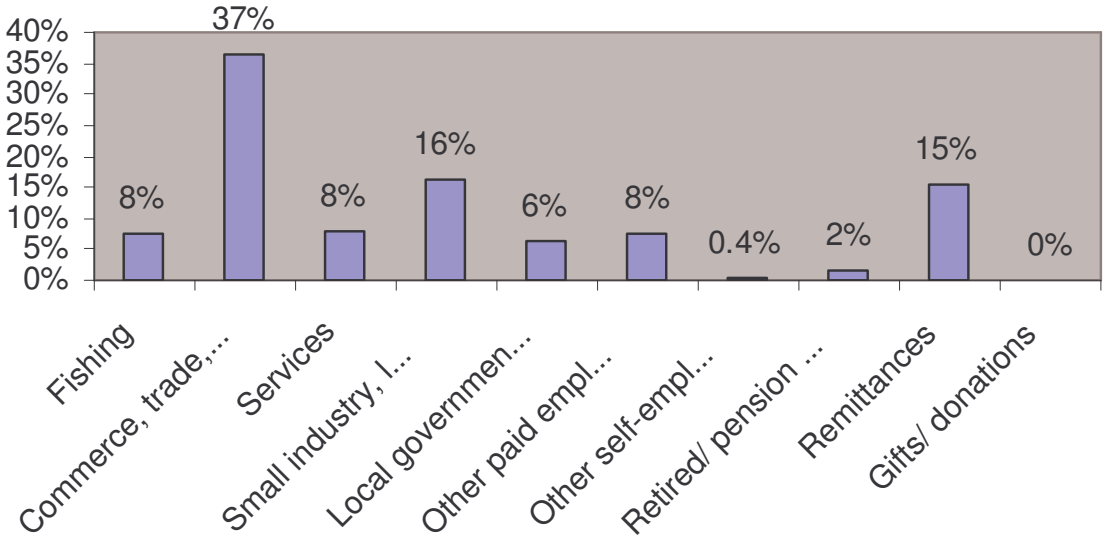

Figure 8.5 Distribution of non-farm income sources in Plaridel, n=101, 2002

8.3.3 Income distribution

The average annual total income of the lowest quintile of respondent households is about 28,300 Php* (514 USD), while that of the highest quintile is about 101,365 Php* (1,843 USD) (Table 8.7). This means that the highest quintile households actually receive, on average, just a dollar a day per capita income, for a household size of five. Age is not significant among households in the lowest quintile, but becomes more significant in the higher income brackets, especially among the more mature households. That is, the extremely poor include both the young and the more mature households for one reason or another. Also, on average, some improvements in resources and income could be observed over the life cycle and starts to be significantly higher on the average from about the 50 percentile. Nevertheless, the low levels are reflecting the very slow progress in livelihoods, resources and income generation, if at all.

Table 8.7 Average annual total income by quintile, total and by age category, in actual Philippine peso

Age category (Age of HHH)	20 (lowest quintile)	40	50	60	80 (highest quintile
Average	28,287.56	44,148.60	52,890.40	64,079.93	101,363.20
Less than 35 years	28,693.20	44,032.37	44,762.00	49,687.40	84,492.97
35-49 years	28,630.40	38,505.59	51,164.78	61,481.87	84,092.32
50 and above years	27,767.91	48,190.94	59,526.00	79,339.86	128,712.94

**Note: 1 USD = 55 Php*

8.4 Livelihood strategies over the household life course

As generally observed, a livelihood strategy is not a one-time event, but evolves over the life course of a household in response to changing socio-economic conditions, household circumstances and composition, acquired experience and skills, employment opportunities and constraints. The concept of life course signifies the changing dimensions in the family and social, residential and livelihood dimensions of the household from formation to maturity or dissolution. This is different from the variable life cycle (LCYCLE) that uses as proxy the age of the female spouse, and reflects the length of the childbearing period: a definitive temporal patterning relative to household size, assets and resources such as land, labour and capital. The concept of life course refers to the evolution of activities of members of the households from family time concentration to those of making a living, including the provision

of dwelling, the management and use of resources for the well-being of its members, dimensions that can be captured in the concept of life-course career (Pennartz and Niehof, 1999). The life cycle variable indicates a particular stage of the life course of the household during the study.

In terms of life course, the older households mostly started with farming, and most are still farming combined with off-farm and non-farm activities to a greater or lesser degree depending on the number of working children, and the match of skills and opportunities. Farmers above 60 years of age usually farm, producing barely enough for their sustenance. Many of the middle-aged and the approaching-maturity households tried out urban employment initially, and returned to the village to farm, and their members work for wages off and outside the farm. The return to the village was always because of economic reasons: loss of job and/or cost of living pressures of city life as the household expanded. For younger households, parents may have initial influence on their livelihood decisions, or their orientations for decision-making. In our cases, either one or both of the spouses had worked in the urban areas while single. Just a few years after living together, they returned to the village due to economic pressures and to avail of the support system while starting a family there, or were requested to work for the family farm to contribute needed manpower. In recent years the younger households tend to be caught in the bind of less outside-farm and constrained farm opportunities, and the consequent economic pressures.

The life courses of the case households revealed interesting patterns of motivations and logic, the forces of circumstances where households have little or no control, and, thus, have to cope or adapt in certain ways. Tracing their circumstances, their motivations and decisions for each change in livelihood also reveal changes in asset or resource generation, incomes or wealth, and the reported well-being of the household.

8.4.1 Sample cases

To highlight these points, two case households are chronicled below to show livelihood changes over the households' lifecycle, some nuances in their decision-making processes and related factors. Their life-course summary is presented in Table 8.7.

Case household 2 (Plaridel)

Dario is the third of seven children, and together with another brother, farms their parents' abaca lands in *sitio* Babag, and coconut in *sitio* Malbago. Dario was only seven years old when he became his father's farm hand. Barely out of childhood at eleven years old, he went to Cebu city, out of spite, and earned his food by working in a shellcraft factory. He stayed for free with an uncle who was one of the middle managers. After about 1.5 years, he went back to Plaridel to finish elementary education. In the 1970s, a number of villagers went to Manila when farming was largely disrupted because of the insurgents in the mountains of Plaridel. In the 1980s, a few had established themselves in

relatively good positions in some companies. Dario was one of those who dreamed of, and started his luck in Manila at sixteen, where his six-months' stepping stone was work in a bakery as a *"panadero"* (baker assistant). Another six months earned him a lawn-maintenance job, then as janitor for three months in another company where many from Plaridel were employed. An accident cost him this job. When fit to work again, he got a job in a sawmill where he learned to drive a 10-wheeler loader. It was during this period (1984) that he met his wife, Isabel, who had roots in Plaridel. She grew up in Davao city (Mindanao), finished tertiary level education, and tried her luck in Manila as store cashier. But the children came one after another after getting married. Isabel worked for only eight months, and then had to be full time housewife.

With a relatively small-paying job in the sawmill, Dario's young family lived very simply in a shack as a squatter for twelve years, and saved enough to redeem the mortgaged family abaca farm They had two children when the sawmill closed shop in 1987; it did not survive the deep economic downturn in the early 1980s. For six months, Dario had to drive a public utility vehicle, until he landed another driving job in a garments factory with better regular pay. But adjusting to economic changes, the factory retrenched labour in 1992, and Dario was laid off. They had their fifth child. Dario was only driving a jeepney (a public transport vehicle 16 or so passengers), irregularly. Although having some savings, because of the high cost of city life sustaining a household of seven became unbearable. Pregnant with their sixth child, Isabel and Dario went home to Plaridel in 1994. There was hope with the redeemed abaca farms which sustained them until 2000, when he again worked as heavy-equipment driver with a construction company on the highway in Leyte and Samar. He planted 120 new plants. Until 2002, abaca farming became a part-time activity. In Plaridel three more children came. Construction work, however, ended in 2002. In January, 2003, Dario had to go back to abaca. Off the family farm, he also worked in other's abaca fields in another village.

The mid-1990s ushered in the birth and growth of the *romblon* bag making cottage industry. Isabel grabbed the opportunity in contract-selling of bags and mats at home, supplying the factory and mat micro-entrepreneurs. In 2000, they transferred to a new very basic house on a rented lot with a small garden. They could grow vegetables, sweetpotato, and corn for own food consumption.

It would seem that life in the village was better since both spouses had incomes from farm, non-farm and off-farm sources, and they had the support of kin for children's care, while school for the children was very near home. The eldest daughter also got a scholarship from the nuns in Cebu through the local Church project, and is assured of a better job. Isabel did not even feel the pressure of controlling the family size, not going to the local health centre for advice. She had some good spending spree with her kin. A family member commented they could have done better with good financial management.

Since farming has mainly been with abaca and the coconuts grown by his parents, Dario is not really concerned with the problem of erosion despite

the high erodibility of their sloping fields. The upper slope of the coconut farm has been eroded from heavy rainwater. Not much time to conserve the land, he said. Work and income to raise eight children are more immediate concerns. The there is relaxing with friends to dispel the worries of such enormous responsibility in difficult times. While farming in the meantime, Dario is actively looking for non-farm work especially heavy truck driving which he considers fitting for him, yielding regular and better pay. He thinks that only through this could he save enough capital to invest in their abaca farms for the future of their children. "Industry, youth and health are what we have to survive on".

Case household 8 (Plaridel)

Like many young villagers in the early 1970s, Dinia tried working in a store in Cebu city, but was ordered back to Plaridel by her family. Jose, a native of a vegetable farming area in Cebu, came to Plaridel to work and stayed with a relative. There he met Dinia, and a brief courtship eventually led to marriage. Jose is known for his industry in farming. He started early in their marriage (1974) to work in the abaca and coconut farms of Dinia's parents. He also planted rootcrops (*estaring,* cassava, sweetpotato) and corn for their own food. Dinia was more of a full-time housewife bearing two children in two years. Her mat weaving during spare time supplemented their farm produce.

But Jose wanted to venture on his own, and not depend on Dinia's family. He brought his young household to his home in Cebu, where grew vegetables. For thirteen years, vegetable farming all provided for the household's needs, with four more children and with Dinia as full-time housewife. But vegetable farming suffered in the late 1980s with unstable prices and irregular output from the drought of 1987-1988. In 1989, they were forced back to the farms in Plaridel, as nobody worked on Dinia's family farms. He also got a good income from tuba gathering. Again, Dinia tried to supplement their farm income with mat weaving. With these difficulties, Dinia's sister who worked in Singapore helped paying for the schooling of their first child. The second child worked in Manila in 1990, and for about five years sent remittances which capitalized Jose's vegetable farming. A good harvest sustained the household, and generated some savings. These, however, were used up to build their current house and for the medication of the third child who had a kidney problem. The second child got married, and the remittances were no longer possible, causing a decline in vegetable farming. Dinia helped through the difficulties by gaining employment in the bag factory, which opened in 1995, and became a regular worker together with their young son and Jose during his off-farm hours. During the peak season for bags (October-February), all three are usually working in the factory with less time devoted to farming. They also raised one or two pigs in their backyard which also needed some capital. Vegetable farming, tuba gathering and bag making sustained them, enabling them to save. But these savings were used up for medication when Jose fell from the roof of a two-storey house, as well as tide over their lost income due to the accident. They even incurred some debt. Bouncing back, Dinia continues to work in the factory, and Jose with his vegetable farming.

Table 8.8 Livehood changes over the life course of case households 2 and 8

Case household 2: Dario and Isabel (18-year period)			Case household 8: Jose and Dinia (28-year period)		
Year	Event/ reason/ pressure	Livelihood	Year	Event/ reason/ pressure	Livelihood
1984-1987	Married/ lived in Manila. Wife full-time home/2 children care. Lived in a shack, squatter area. Savings used to redeem mortgaged abaca farm of parents.	D: driver in a sawmill W: worked as store cashier for only 8 mos.; stopped cause of pregnancy	1974-1976	Married/ lived in Plaridel. Birth to 2 children	J: farming in wife's family land (abaca, coconut, corn, rootcrops) D: housework and mat weaving
1988-1992	Company closed. Birth of 3 more children. Transferred to another own-built shack near work; mate-rials given. Life was getting harder.	I: driver of public utility vehicle; then garments factory (2 yrs.)	1976-1989	Went to husband's place (Dalaguete, Cebu). Birth to 4 more children. Savings to build house, education of children. Income not enough.	J: vegetable farming, tuba gathering (stewardship of public land) W: full time housewife
1992-1993	Laid off from factory (retrenchment policy). Life became much more difficult esp with wife pregnant again, 6th child.	D: irregular jeepney driving (6 months)	1989-1995	Back to Plaridel; difficulties in vegetable farming, low price, irregular other incomes. Nobody works on wife's family farms.	J: Farming and tuba gathering W: mat weaving
1993-2000	Went home to Plaridel; wife pregnant; 1st child in grade 1. Built wooden one-room house from savings. Birth to 3 more children. Total 9 children.	D: abaca farming in parents' land	1990-1995	2nd child worked in Manila. Remitted money home, used as capital for vegetable farming. 3rd child had kidney problems. Spent savings for medication.	J: vegetable farming, good result

Case household 2: Dario and Isabel (18-year period)			Case household 8: Jose and Dinia (28-year period)		
Year	Event/ reason/ pressure	Livelihood	Year	Event/ reason/ pressure	Livelihood
1998-2002	Both decided wife should work to earn additional income. Mats very important, seasonal factory work. Eldest daughter got Church scholarship with nuns (Cebu). Secure work after vocational school.	I: handicraft at factory; home-based mat weaving.	1995-2002	Export handicraft factory started. Had good relations with management. Remittance stopped due to difficulties; vegetable farming slowed, lack of capital.	J, D and adult son: handicraft factory, all in peak months/ orders. H: farming less time, tuba gathering till 2002, had accident
2000-2002	Highway construction provided work option, better regular pay. Svings used to build existing house (ca 20 sq m) on a rented lot with garden plot on sloping land. Children helped earn in summer, esp. when father got sick.	D: driver, heavy equipment truck; part-time abaca farming I: also gardening corn, sweetpotato, vegetables. C: gather firewood/sell	1997 2002	Built house from savings of vegetable farming. H fell from roof; spent up savings for medication, and tide over lost income from tuba gathering. Land mortgaged for expenses.	-do-

8.4.2 Discussion of life course patterns

Households may be qualified by their resources, diversity of circumstances and capacities, different farming alternatives in a mix of agro-ecological niches, the opportunities for off-farm and non-farm activities. Also, the processes of growth, maturation and dissolution of parental assets, and how new households are organized (i.e. joint or separate from parents) influence the strategies that children take as they start their own household. Many decisions on livelihood strategies are rather ad hoc in nature. It is difficult to determine whether this is because of the collective or cooperative processes of decision-making, or is the outcome of bargaining within households among members with differential powers – men over women, old over young (Eder, 1993).

The cases show how the different careers, such as those of family, economy, and residence, intertwine over their life courses. Also, the life course can be placed in the context of historical time as is done in the cohort approach (Ryden, 1965; Pennartz and Niehof, 1999). Early in the life course of a household, the decision of a livelihood strategy has been wrought out by circumstances, capacities and skills, and many times by the male spouse's initial aspiration. There is some distinct difference in initial aspiration as to the period when the couples started their union. The couples married in the 1970s and earlier on (Jose and Dinia, and others) tended to have more orientation on farming, while those who married in the 1980's onward (Dario and Isabel, and others) started out in Manila. The earlier and older households took on from their parents and grandparents who were mainly farmers on more productive lands. Further decisions depend on the relative success of the initial choice of strategy, which is dependent on the economic environment, the burden of increasing household size, competitiveness of skill or capability, and social network. If successful, then more likely the decision would be to hold on to the initial decision, until aspirations and objectives change, or until the experience of failure. Often, the reason for the change (i.e. to return back to the village) is a mixture of household (increasing number of children) and economic (factory closure, high cost of living) circumstances.

When in a volatile economic situation, households which start working in the city have adult members with low education who are unskilled, and do not have an adequate support system, they are more likely to return to the village. Low wages and less skilled work in the cities can be precarious because of their mostly contractual nature. Factories or shops may close due to economic problems. Workers and households of rural origin take village life and farming as the last or intermediate solution. The village becomes a safety net where a growing household can benefit from the support of kin for food and sustenance. Migrating to the city of single individuals can work out better because simply sending remittances home is a more economically viable option. A number of housewives found work in neaby towns or Manila as domestic help or in sales. But the social cost may be high, in terms of the quality of child rearing or the marital relationship. Six of the twelve case households started out to work and stay in the city, but all returned back to the

village and engaged in a varied mix of livelihood activities, depending on the opportunities and often falling back on farming partly for food and sustenance.

In circumstances of changing livelihoods, one sees common patterns of cooperation (use rights of family land, living with in-laws, supporting education of a child), livelihood diversification (farm, off-farm, non-farm), and fosterage (children left to husbands, or parents when wife is away to work). Previous studies observed that one reason for relatively large family size is the practice of cooperation where older siblings help in the education of the younger ones**,** or dependence on the relatively successful siblings (Peterson, 1993). Family social responsibility has been a value among Filipinos for generations. It is not surprising that for most of the case households (except the enterprising, or the family planning-educated wife), controlling the number of children did not appear to be an important consideration. Extended family support is also typically evident for household survival especially in the early developing phase and in times of stress or crisis, as is also elucidated in other Philippine studies (Peterson, 1993; Mula, 1999; Balatibat, 2004).

A study of an ethnic minority in the northern Philippines found that some families are more successful than others because of the location and quality of their farms, the availability of a water system, and a selfless concern and cooperation among members (Peterson, 1993). Here, the case studies singled out as significantly supportive for household sustenance, such practices as the use rights of family land from either the husband (Case 2), or the wife (Case 8); food and cash contributions in times of financial stress; and remittances for livelihood investment (Cases 8 and 9). Other cases show the importance of substantial remittances for household expenses and durables, such as house construction or appliances (Cases 1 and 10); and human capital investment, such as education of siblings (Case 9). The cases also highlight different livelihood strategies, and the level of success achieved by them. These differences could be explained by a mix of individual and household attributes such as motivations, connections, skills, financial assets, land quality, and the circumstantial and condition-related factors (e.g. sickness and accidents, closed factories, non-farm work opportunities) in the social and economic spheres.

The evidence of the lifecycle (LCYCLE) variable may not be statistically significant, but this does not necessarily mean its non-significance in real life experiences. The significance, however, of the variable household size (HHSIZE) could imply the embedded reality of household structure, including the number of working children (NWORK) and the dependency ratio (CWRATIO). Anthropological studies in the Philippines have documented the critical relevance of household structure in relation to livelihoods and survival strategies (Peterson, 1993; Resurreccion, 1999). The availability of resources over the life course of the household can range from scarcity (e.g. no or little land, less labour time due to child care) in the early phase when the household starts to expand, to that of relatively increasing resources (e.g. established farm or non-farm work, additional working

children, land tenanted or owned, social network) as the household develops and matures. With more dependents (CWRATIO) particularly in the early and developing phase, households will more likely intensify the production of cash crops. The evidence pointed significantly to the intensification of abaca farming (Tables 7.1 and 7.2). In addition, the statistical evidence on the highly significant negative relation of household size with LIVETYP3 and LIVETYP4 reflects the household composition in the study villages. This could only mean that the bigger households are mainly composed of very young members, with at best only one additional working adult, since the other adult members may have gone outside the village to work, or are married and live separately. Thus, the situation is determined by the highly competing demands of child care and own-farm work for food and cash, and insuffient labour available for off-farm and non-farm activities.

Savings of households, if any, come from non-farm income sources. The case households used these to redeem the mortgaged family farm, to hire farm labour, build houses, or to defray cost of sickness and emergencies such as accidents. Often, when savings are not enough, households avail of credit from local money lenders such as *suki* traders, and usurers. Many households are on the dissaving end because of non-judicious investments like the buying of vehicle, gambling, or misplaced generosity with relatives. These tended to ruin the feasibility of farm improvement plans or overall household welfare.

There is no doubt that education is valued among all the case households. It is seen as an investment in upward mobility. To most this upward mobility meant moving away from the farm. Education is not just an individual, but also a household matter. Better work and better pay of a child in some non-farm employment means remittances to help the sustenance of the household in the village, a source of capital for farm investment, a help in the education of siblings, and some kind of old age security of parents. These are common expectations of the village households. Remittances from abroad are expected for bigger expenses such as house renovation or construction, fiestas, or the purchase of durables. However, better education is not the norm. Children have at most a non-skill-oriented public secondary education. Many dropped out after the primary or intermediate grades. Without skills training, they have very limited non-farm options, and usually start in low-paying menial jobs. These low skills also drive them out of the competitive urban labour market into the less appreciated farm work.

The countryside, just as the urban area, is in a state of flux. Decisions on family size, economically productive activities and urban migration, socio-cultural norms of husband-wife relationships, division of labour, care of children, views on what is proper and not, vary from household to household. There is, however, an increasing tendency among the young to limit the number of children, and fewer households choose only-farming options. Notions on equity between husband and wife, their complementarity, and relative independence especially of women, with greater pressures among women to contribute to household income, are changing. In fact, many women

(e.g. fishing households, micro-enterprises) are the main income earners in business or trade, or as an outside-based domestic helper.

8.5 Gender in the generation, allocation and use of assets and resources

The previous chapter discussed gender roles and responsibilities in farming, where the males are mostly involved in the physically demanding cash-crop agriculture, such as abaca and coconut, and in fishing. Women are largely involved as farm help in rice farms, in vegetable gardens, and in the production and sales of food crops such as sweetpotato and taro. Consequently, the control of incomes rests basically on the spouse responsible for their generation, although both husbands and wives reportedly (at least 90%) pool their incomes, and decide jointly on various matters. But this could actually mean that "joint decision" is an end-agreement. At least some discussion has been made before reaching a decision although one spouse may have a bigger say on certain specific items. Survey data showed that farming investment is usually the responsibility of the male spouse, and household expenditures of the female spouse. Relatively bigger household expenditures such as renovation or repairs are usually done by the male spouse, or, at times, jointly. The incomes from the female spouse such as from taro mat and bag making, domestic/personal services are usually used for household expenses, and especially for children's food and clothing. But it is not so much "power" perceived as control, but the socio-culturally constructed "authority" that is invested in the male spouse as head of household among Filipinos, which is rooted in pre-Hispanic culture, and reinforced by Christianity. The latter upholds the natural role of the woman as the man's help, and partner in procreation. There are also instances where women stick to the traditional role voluntary because of personal satisfaction in taking care of the home, especially the care of children. Others have difficulties in finding quality alternate, do not have the necessary skills or appropriate opportunity, and some because of jealous husbands as similarly observed in other studies (Eder, 1993). In these cases, women were constrained in earning incomes themselves, which renders them dependent on their husbands. Households with single earners, especially farming-based, were the lowest income households.

Not one among the households during group discussions and those whom I informally talked with complained of male authority, because as the women would say "*pwede man sab mi magbuot*" (we can also have our ways). It is not, therefore, a matter of subjugation but one more akin to the morality of care. In the first place, it is not power-play in bargaining per se which is the bone of contention in case of conflicts, but having much less resources to use, or decide on. Financial constraint rather than dependence, is the issue. So in many cases, it is the woman who fights the man for not having done what he should do, or not being responsible, enough. The burden of financial responsibility first rests on the male, and child care, household upkeep, and

food quality on the female. Thus rests the balance, which is captured by the socially accepted norm of gender equity, not equality.

I found a stronger tendency for a male "authority figure" among the Waray-warays in Alegre than among the Cebuano-speaking households in Plaridel. It is not clear whether this is due to ethnic differences or modern influences of more progressive community such as Plaridel, or a mix of culture and economic influences. As the Waray-waray male farmers would say, "the woman is the cared-for homemaker that the man must provide for". In fact, the practice of pinning bills on the bride's wedding gown, while the newly wed couple dances, is widespread in the Waray-waray region. This bodes a good financial start for the couple, and ceremonially places upon the wife the responsibility of good financial management. In Plaridel, the women would say, "*pareho lang*" ("just the same") when it comes to resource decision-making. In a number of households in Plaridel where the female spouse is the main manager of a non-farm micro-enterprise (I counted at least 20 business and micro-enterprises) constituting the main income source, the reversal of roles comes out very clearly. There are also three times more females in local government service in Plaridel than in Alegre. Given more non-farm employment activities where Plaridel women are involved in, women contribute more to household income and exhibited a more active role in household decision-making about resource use. On average, the female's more active productive role enables her to exercise greater voice in decision-making. Findings in some Southeast Asian studies suggest that as to the households' financial matters, women usually held the purse strings. This means that they could have considerable influence on the general household welfare in the short and long run. As such, they can become agents of change (Eder, 1993). But, there are also extreme cases of dominance of either the male or female spouse in both villages, which may be attributed to idiosyncratic differences wrought out by family history, class status, and industry. The spouse who brings home a greater part of the income can exercise more power in the bargaining for resource allocation.

Except for a few established farmer-landowners (Table 8.5, at most 4%; Table 8.3, Case 5 and 10) who cultivate relatively bigger farm sizes (5 or more has.) of cash crops (i.e. coconut and abaca), farming in both villages has not been able to produce sufficient income as to generate enough savings for investment. The resources generated by both male and female from income, regardless of who controls them from point of receipt, are often just barely enough for meeting basic needs. In dire circumstances, it is not uncommon to reduce or adjust the quality of food consumption. Often, farm investment (i.e. wage plus food capital, other farm inputs) was made possible on credit from *suki* trader- financiers whom farmers sell their produce to.

The main sources of capital, if any, come from non-farm employment and, in some cases, remittances. The cases show that savings from the non-farm income of the male are invested on the farm such as purchase of farmland or inputs (Cases 1, 3, 4, 8), redeem mortgaged farmland (Case 2), or build a house (Cases 2, 3). The survey data, in fact, showed that non-farm

income is statistically highly significant in improving the productivity of abaca farms, implying the plowing back of income as investment. In very few households, the non-farm income of both husbands and wives who both manage business enterprises are further invested in the enterprise (Case 5). The same pattern could be found in the household-based *romblon* micro-enterprises, which were basically enterprises of non-farming households. The contribution of remittances varied. For two cases (Cases 8 and 9), the remittances of children were very important in specialized vegetable farming and fishing capital. Statistical evidence showed that remittance was negatively related to the productivity of the cash crop, especially abaca, indicating that remittances are more likely not plowed back to farming, exhibiting more the income-labour substitution effect, reducing the intensity of farm labour, and reduced productivity. Other cases also indicated that remittances were used for consumption purposes such as the purchase of durables and house building or renovation, and food supplement.

Savings are consciously made for ceremonials (e.g. fiestas, weddings) which constitute a very important part of village life and are celebrated with a strong sense of social responsibility for the household, kin and community. One is considered in dire straits when not able to provide for such. Outsiders would squirm at the lavishness of ceremonial food which could last about three days in case of fiesta, that is before and after the fiesta proper. But this "thanksgiving" food offering open to all invited and uninvited visitors represents a form of achievement, a household yearly objective. For the villagers believe that "it is by giving that one receives". Evidentl, the spirit of joy during such occasions is genuine, even affective. A number of households belong to the lower quintile, and are on the dissaving end. Credit for farm and human capital investment, and household needs could be had from the *suki* trader or *sari-sari* store in order to survive. For the non-credit worthy, they could live on the generosity of parents, kin and neighbors. The relatively substantial savings of the four case households, generated from farm or enterprise, were spent for emergencies such as morbid sickness or accident. With negative balances, they found difficulty in bouncing back.

Resource generation, allocation and use are gender-specific, viewed from the perspective of a socio-culturally accepted norm of equity. Mostly, decision-making is in the end consensual. The process of negotiation largely depends on such equity value, but could be exercised by either sex to a greater or lesser degree, depending on income contribution, and qualified by the socio-culturally influenced individual traits.

Chapter 9
Food security assessment: coming full circle

9.1 Nutritional status and health: the final score

The findings, thus far, provide evidence that the less favourable land resource and the prevailing socio-economic constraints led farming households to diversify their livelihoods. The livelihood strategies which emerged varied as to how household members allocated their resources, especially labour, in growing crops for food and/or cash, and responsed to non-farm opportunities. Struggling to make the best use of whatever they have, the niggardliness of land, the meagre resources (especially capital), the lack of institutional services, and the lack of access or inability to adopt technology, have brought the households' incomes at poverty levels, that is, a per capita daily income of less than a dollar. Still, households have survived in times of financial and food crises, through the social support network of kin, neighbours and friends; through own-production of food; from wild foods; or food donation. These "safety nets", which still abound in the rural areas, have, in fact, drawn back to the villages the households who tried but failed to make it in urban settings.

This chapter deals with food security as gauged in terms of the component on food adequacy. That is, how the previously linked (captured in Hypotheses 1 and 2) complex interrelationships of the biophysical and socio-economic resource environments finally, though indirectly, affect the nutritional status and health of household members. In effect, this is coming full circle in the attempt to assess the food security situation in fragile areas, where the biophysical environment is the context and initial point of analysis, and nutrient adequacy and health are the final outcomes. The literature illustrates that a child's nutrient intake, often used as an indicator of a country's nutritional status, depends to a greater or lesser degree on household food availability and access (Kataki, 2002; Babu and Rhoe, 2002). These factors basically reflect conditions in food production, its availability, and household income, the latter being a catch-all proxy for food access. However, a child's final health depends not only upon nutrient intake, but also on health-related factors such as the quality of drinking water and sanitation. It is some kind of a cycle which could be either a virtuous or a vicious cycle (Berman *et al.,* 1994).

In the attempt to investigate food security in a holistic manner, the final step taken in this study is to find the effect of the connecting variables, as identified in previous hypotheses, on nutrient adequacy. These variables include livelihood strategies (i.e. livelihood type as proxy), income, the food budget (i.e. disaggregated into non-purchased and purchased food), and socio-economic, demographic and health-related variables. It must be noted that in this integrative assessment of food security, nutrition security, which is also understood as nutrient adequacy, is embedded in the multi-dimensional concept of "food adequacy".

This chapter discusses the evidence on the nutritional status and health of households and individuals in the research villages. Hypothesis 3 expresses the food adequacy indicator in terms of nutritional status of individuals. The achieved nutritional status is viewed in terms of the household production of health framework as it takes more than just the intake of food and nutrients, but also how these are availed and assimilated in the body and result in health of the individual. Health-related factors such as sanitation and hygiene, drinking water, morbidity and care, affect how food is effectively transformed into nutrients and effectively used by the body. These health-related factors were included in the regression analysis (Berman *et al.,* 1994). Thus, hypothesis 3 is expressed as follows:

Hypothesis 3: Nutritional status is dependent on dietary intake, economic variables (income, the food budget), health-related variables (e.g. morbidity, care, sanitation, drinking water), household and individual specific characteristics (livelihood type, education of caregiver, level of nutrition knowledge of caregiver).

Corollary 3a: Individual nutrient intake is dependent on individual and household specific characteristics (age, sex, equivalent household size, dependency ratio), education of mother, nutrition knowledge of mother/caregiver, time allocation, total food budget, non-bought food, own-produced food, prices, and income.

Nutritional status was analyzed in a two-step process. First, nutrient intake of the individual was regressed using the identified variables in Corollary 3a. Then, the health status (health of children as proxy), using weight-for-age as the dependent variable, was regressed on the same set of variables. To provide context, a background on available food, patterns of consumption, and the food security timeline of the villages are described below.

9.1.1 Food sources and availability

Assessing food availability involves a complex process of interaction between agents involved in production, processing and marketing (comprising the productive structure of the agriculture and food sectors). It is greatly affected by the food system. The use of the term "system" here does not refer to a rigorous analytical framework, as in the physical sciences, but to a way of articulating the social relations in the production structure and food consumption as a whole.

Patterns of food sources and consumption

On average, households spent 70-80 percent of their income on food. Many households though do not have enough income to buy the basic food that provides adequate nutrients. Food is obtained from various income sources,

from own production, and from gifts or donations through family or neighbour support. Commonly own-produced are the main (rice, corn) and supplementary (banana, rootcrop) staples. Backyard and field gardens also produce own vegetables and some fruits (see Table 6.10, Chapter 6). Backyard home gardening, however, is quite limited. During lean months, most of the poor rely on plantain and rootcrops as the main energy sources. Lean months occur during off-season for rice or during the southwest monsoon season when fish is scarce and fields are difficult to cultivate or to access during heavy rains. Food donations and gathering from the wilds or in neighbouring fields are not uncommon.

It has been noted that the two villages have periods of three critical hunger months (i.e. February, July-August) in a year. These occur after festivities and school opening, when cash is at its lowest, and coincide with the waiting time for harvest. The villagers call this period "*pagbitay sa iro*" (literally 'hanging the dog'), alluding to dog's meat as the food of last resort. In Alegre, these are the low harvest months from July to August especially when the previous harvest incomes are used for the June fiesta, school expenses and debt payments. In Plaridel, this is the month of February, after the December-January festivities and fiesta, the school opening, and the southwest monsoon months (see Chapter 6, 6.7.3, food-security timeline).

In another Philippine study, Garcia found that rural households obtain about 14 percent of all foods consumed from own-production, in farms or gardens. This tends to reduce calorie deficits, as these farms provide sources of energy foods such as rice, corn, plantain or rootcrops (Garcia, 1990). The literature also suggests that the allocation of resources is influenced by the wages and share of earnings of wives to total expenditures, whether income is received from agriculture or own-production, and by household demographics (size, composition, age of husband) and education. Household expenditure tends to be positively related to women's market wage income, and negatively to their involvement in subsistence farming. Specifically, the food budget is determined by the wife's income contribution. The greater the wife's income share, the less likely will consumption of calories and protein occur, and the greater the variety of food. Also, the wife's education is strongly correlated with food expense, after controlling for income. This is through education's earning capacity effect, which tends to improve her income contribution. It was also observed that more educated women are generally better informed about the importance of nutrition and food-nutrient options (Wolfe and Behrman, 1984; Garcia, 1990). This implies that women's use of their labour largely affects household welfare via income contribution, food, and child care-work time trade-off.

Direct observation in the villages for more than a year and focused group discussions generated Table 9.1. This table summarizes the kind of foods that are own-produced and bought in the two villages. Households produce their own staple food to a greater or lesser degree, but usually not enough to sustain the food needs for a year. So in slack months, these are bought or donated by relatives or neighbours among the really poor

households. There is, relatively, more own-food production in Alegre than in Plaridel, while Plaridel households rely more on bought food.

It may be noted that more households in Alegre are dependent on farming as livelihood (Chapter 7). Thus, it is more self-sufficient in staples with relatively bigger areas for rice, corn and rootcrops. Also, more households maintain vegetable gardens, produce their own food, and are commonly serving traditionally favorite vegetable dishes, especially of taro leaves and petioles, and camote tips. Taro provides more self-sufficiency in nutrients as the tuber is an energy source, and the leaves and petioles good sources of vitamins and minerals, in addition its being a cash crop.

Though households reported own-producing some of their food, this is less in Plaridel compared to Alegre, as the former's farming activity is concentrated more on the cash crops of coconut and abaca. Also, instead of tending home gardens, Plaridel women are more engaged in household-based crafts such as mat, bag or twine-making. Although Plaridel is also reported as a fishing village, it is not self-sufficient in fish because of the seriously dwindling catch. Fish, just like in Alegre, is mostly bought.

The survey shows that about 90 percent of the decisions, overall, are jointly made. Validating this result revealed that "jointly made decisions" usually means mutual consent or agreement on decision item(s), which decision may be associated more with either the male or female spouse. For example, respondents said that the decisions on the specifics of food preparation and small expenses are basically the domain of the female spouse. Farming and big expenses are the domain of the male spouse, usually the head of the household, or the one with the biggest contribution to household income. The working child who contributes substantially usually has an important say in decisions what his contribution is used for, such as on capital investment or farming (Chapter 8, Table 8.3, Case households 9 and 8, respectively).

9.1.2 Food security timeline

Chapter 7 suggests that the decisions on land use varied among farming households as the opportunities, constraints, and specific household circumstances they face differ. The bases for such decisions ranged from number, size, distance and characteristics (e.g. fertility, terrain) of farms, land tenure, capital particularly for seeds and labour hire, labour availability (especially with abaca stripping and copra processing), availability of planting materials, farming goals and behaviour. These differences in land use are reflected in differences in livelihoods; and, thus, in differences in food-security status among households.

One useful way of showing this is simply through the food-security timeline (FST, see Chapter 6, Tables 6.11 and 6.12), which was generated mainly through focused group discussions. In the literature, the food-security timeline accounts by month over a year period, the household livelihood activities, incomes, food and cash. From this, one draws relevant associations

between cropping patterns, the incomes and food sources from them, other income sources, in relation to food and cash status of households (Bergeron, 1999). While the FST chart is cursory, it provides a practical, quick glance at village food security, particularly the food availability and access components, leading on to further questions and in-depth inquiry.

The FST revealed that men and women have fully used their labour throughout the year in various economic and non-economic activities. The returns from the productive occupation are not sufficient to compensate for the shortfalls in incomes during slack periods, like February and July-August, nor fully cover cash needs for domestic and social activities. These are the seriously lean months, and the rest of the months are periods of food inadequacy.

Alegre

The peak incomes from crops and farm labour combined for both men and women is from April-June and December. Farm expenses are heaviest in March and December, and June figures the heaviest domestic expense due to the fiesta.

The least food months are the months of July-August and February because incomes of crops by both men and women are relatively low while still in the aftermath of high domestic expenses from the fiesta and opening of classes. These are also non-harvest months for rice. The month at which cash is lowest is February, because crop harvests are minimal while farm and domestic expenses are relatively high, and households are still recovering from the December expenses. What sustains the food needs of households during these periods are the incomes and own-production of vegetables and rootcrops, and to some extent, the external domestic remittances of some members, and the generosity of relatives, neighbours and friends. Many households are reportedly in state of continuous indebtedness, with cash inflows being less than the expenditures.

Plaridel

The months of the least food and cash in Plaridel neatly coincide with those in Alegre, in July-August and February, albeit for different reasons. Combined crop farm incomes (i.e. mainly from annuals) in April-June are offset by farm expenses of the commercial crops of coconut and abaca, while the latter's incomes are spread out throughout the year. July-August are monsoon months when farm activities and fishing are low in these months while the expenses for the opening of classes are high. Reportedly, this is a very difficult period for most households. Also, the high domestic expenses for the Christmas and the fiesta season in December-January take their toll in February.

The household-based mat and bag-making among women compensate largely for shortfalls in farming income providing significantly the cash and food needs of the households. These, however, are also seasonal with a peak in April to May when the orders are relatively high for the holiday and social-events. The off-farm wage labour among men in coconut and abaca farms, and

farm incomes for both men and women also peak during this period. These sustain the needs of households for farm and school expenses.

9.2 Nutrient adequacy and intra-household distribution

9.2.1 Nutrient adequacy in macro- and micro-nutrients

The NEDA Millennium Development Goal report is to a certain extent positive that, on average, the country can reduce extreme poverty by 50 percent in 2015. This, however, will be difficult in Region VIII since it has a higher than national average poverty incidence of 38 percent. The regional malnutrition figure is even dimmer, and will most unlikely be improved by 2015 (http://www.nscb.gov.ph/ru8MDG_progress_report.htm 17-10-2006). The food supply over consumption ratios for calories and protein are relatively adequate at the national level, but not so in the research sites as can be seen in Table 9.1. While food is available from the macro-level food supply data, based on the food balance sheets (FBS), many cannot afford to buy the food they need (NEDA, 2005).

In Table 9.1, the national statistics show that despite general improvements in nutrient adequacy (i.e. except calcium) from 1993 to 2003, intake is still below the RDA except the substantial improvement in niacin intake. The improvement is a reversal of the 1978 to 1993 national nutrition surveys data which showed a marked decreasing trend in adequacy level for most nutrients except protein (92-96%), vitamin A (87.6-88.1%, 1987-1993 surveys), and niacin (85-88%). The adequacy level of energy decreased from 94 to 88 percent; iron, 71 to 65 percent; calcium, 76 to 67 percent; thiamine, 74 to 68 percent; riboflavin, 74 to 57 percent; and ascorbic acid, 104 to 73. These changes have been attributed to decreases in the consumption of major food sources such as cereals and cereal products, fish, meat, fruits and vegetables, and the increasing trend of the consumption of convenient yet less nutritious food, even in the rural areas (FNRI, 2001; 2006). The improvements in nutrient adequacy in the ten year period (1993-2003) could well reflect improvements in the overall economy, the initiatives of the Philippine Plan of Action on Nutrition (Chapter 3), and, thus, increased food consumption. The 2003 nutrition survey of FNRI found that 97 percent of Filipino households buy fortified foods even though only 16 percent are aware of them. They are widely available in all areas in the country. These fortified foods carry the *Sangkap Pinoy* seal (i.e. the indicator for enrichment) and include commonly used household foods and condiments such as noodles, cooking oil, flour, margarine, milk, and snack items (FNRI, 2006). These alleged improvements, however, are not evident among the households in the research sites.

The food consumption and intake survey of this study was conducted in the same year as the 6th national nutrition survey in 2003. The latter is a single-shot survey while this study had three rounds over the year. The survey found the adequacy level of niacin by age and sex groups in the two villages consistent with the observed significant improvement at the national level. This could be due to the abundance of niacin in local food sources especially

from the home gardens, and the noted increase in vegetable consumption (http://www.fnri.gov.ph/wp/fruitintake.htm 12-09-2006). Still, the adequacy level of all other nutrients is alarmingly far below the national averages. Especially acute is the deficiency in vitamins A, vitamin C, thiamine and iron which range only from 35 to 60 percent of RDA, whether by village, by age or sex groups. This presents a risky health condition for all, and a serious threat to human capital.

Table 9.1 Average percent adequacy of RDA of nutrients, national (1993 and 2003), and research survey data by village, age group and sex (2003)

Category/ Nutrient	Energy	Protein	Cal-cium	Iron	Vita A	Vita C	Thia-mine	Ribo-flavin	Niacin
National*									
1993	0.88	0.96	0.67	0.65	0.88	0.73	0.68	0.57	0.88
2003	0.99	0.98	0.57	0.60	0.91	0.75	0.86	0.68	1.56
Village, 2003									
Alegre	0.54	0.87	0.80	0.51	0.45	0.37	0.35	0.55	1.70
Plaridel	0.46	0.72	0.61	0.47	0.36	0.26	0.31	0.39	0.93
Age group (years)									
Less than 5	0.52	1.00	0.82	0.61	0.39	0.44	0.47	0.75	1.81
5-12	0.46	0.80	0.61	0.48	0.43	0.44	0.35	0.52	1.47
11-19	0.36	0.61	0.48	0.34	0.36	0.26	0.24	0.32	0.97
20 - above	0.57	0.80	0.78	0.52	0.41	0.25	0.33	0.43	1.21
Sex									
Male	0.49	0.81	0.74	0.61	0.41	0.32	0.34	0.48	1.32
Female	0.51	0.76	0.65	0.35	0.38	0.30	0.32	0.44	1.24

**Source: FNRI, 2001; 2006*

Comparing the two villages, the adequacy levels for all nutrients are relatively better in Alegre than Plaridel (Table 9.1). The income factor cannot explain this since Alegre has a lower per capita income than Plaridel. The most plausible reason for this is the important contribution of own-food sources provided by home gardens (i.e. vegetables especially stringbeans, peanut, sweetpotato, and taro) which can be found more in Alegre than in Plaridel. Taro and sweetpotato petioles and leaves, and stringbeans are very important parts of the diet in Alegre.

Among the age and sex groups, children (especially those under 5 years), and adults tend to have better nutrient adequacy than the 11-19 year olds, and males over females. Children under 5 years are critically deficient in Vitamin A, C, riboflavin and calories. All others are seriously deficient in these vitamins, as well as in iron, calcium, and calories.

Next to niacin, protein and calcium adequacy levels are relatively higher though still less than adequate. Only the children under 5 years are found adequate in protein presumably because the mother prioritizes their food needs. The males, the children and adults tend to be more adequate in protein than the teenagers and the females. In general, the energy adequacy level is only about 50 percent, which has serious implications for the growth of children and young adults as well as for the work stamina of adults. Both farming and non-farming employment in the rural areas are physically demanding.

Despite the limitations of the food budget, priorities are clearly reflected in the finding that the pre-schoolers and adults have, on average, a slightly better adequacy rate than the older children and teenagers. This shows the importance given to the very young as parents are naturally inclined to do, and to the adults because of work requirement. Between the sexes, the males showed a bit better-off adequacy on the whole. In the villages, the men tend to eat more because of their heavier physical activity in farming, construction, or carpentry.

However, these existing differences in nutrient adequacy levels between age and sex groups are not significant, which means that there is a more or less similar pattern of nutrient inadequacy levels between the groups except the better off picture for all nutrients among children less than 5 years of age.

9.2.2 Nutrient intra-household distribution

Table 9.3 summarizes the inequity index based on the food-calorie share ratio formula used by Bouis and Peña. This is the ratio of the individual's share of household micronutrient over calorie intake (Bouis and Peña, 1997). Just as in their research, this study survey found no significant differences in ratios by sex or age, which indicate equitable distribution of food and nutrients within the household. However, there is a slight positive bias for all nutrients in favour of children below 5 years old. This case should not be surprising as usually children are given priority in situations of food constraints. Also, women tend to be slightly favoured with calcium, vitamin C and thiamine which reflects sensitivity to their needs, particularly a carry over of the food and nutrient needs of pregnant and lactating mothers (Table 9.2).

9.3 Nutrient intake determinants and nutritional status

9.3.1 Determinants of nutrient intake

Chapter 3 details the findings of important earlier Philippine studies on food consumption and nutrition using different models, nature of specification, degree of sophistication, and context. Variables specified included age, sex, education or nutrient knowledge of mother or caregiver, incomes, resources, food cost, time allocation (i.e. sex disaggregated), among others. Overall the findings are mixed, which implies that the results are contextual and dependent on model specification.

Table 9.2 Summary of inequity index of intra-household nutrient distribution by age group and sex, 2003

Category	Protein	Calcium	Iron	Vita A	Vita C	Thiamine	Riboflavin	Niacin
Age group (years)								
0-<5	1.11	1.29	1.07	1.21	1.16	1.19	1.31	1.13
5-12	1.04	1.13	1.04	1.10	1.09	0.94	1.01	1.05
13-19	1.03	1.07	1.04	0.99	0.99	0.94	0.94	1.02
20-above	1.00	0.99	1.02	0.93	0.84	0.96	0.94	0.97
Sex								
Male	1.03	1.05	1.03	1.02	0.93	0.98	1.01	1.02
Female	1.02	1.10	1.03	1.01	1.00	0.99	1.00	1.01

In an attempt to comprehensively organize the volumes of rich and diverse literature on nutritional status, Smith and Haddad (2000) grouped its determinants into immediate factors (i.e. interaction between dietary intake and health condition), the underlying factors (i.e. childcare, health environment and services), and basic factors (e.g. resources, incomes), which conforms to the UNICEF model. Considering all the factors, they argued that eventually nutritional status is a good indicator of the socio-economic status and health of a country. On the other hand, Kataki expounded on the Food Systems Model (FSM) as one that focuses on achieving adequate nutrient intake to improve human productivity, especially of the vulnerable groups to malnutrition such as women and children. These latter two views are similar in articulating three key influences: food production, intake, and care and health. In addition, Kataki further stressed the critical importance of food production and access at the household level, and observed that crop-related technologies such as genetic improvement and crop systems could influence access by the household to food and nutrients (Kataki, 2000). Hence, the "basic determinants of the causes of malnutrition are similar to the environments within which the food systems concept exists including the biophysical, political, economic, social and associated policies, which describes their complex and dynamic interactions. A favourable environment will facilitate the achievement of the common goals depicted in both" (Kataki, 2000:16).

This study specifies individual nutrient intake as dependent on individual and household specific characteristics (age, sex, equivalent household size, dependency ratio), mother/caregiver characteristics (i.e. education, nutrition knowledge), resources and economic factors (i.e. time allocation, total food budget, non-bought food, own-produced food, prices, income). Using multivariate regression analysis, the model was tested for nine nutrients (Tables 9.4a and 9.4b). The model used the converted nutrient equivalents (i.e. using first the Philippine food composition table, FNRI) for each nutrient as the demand variable. The health evaluation software of the FNRI was used to generate the nutrient conversions, and the SPSS program was used to run the regression. The explained variance, R^2, of the nutrient

intake determinants ranges from 17 to 25 percent, and adjusted R^2 from 12 to 16 percent.

The data shows the high significance and positive influence of the total food budget and the time allocated to home and personal care on the intake of most nutrients. It should be noted that the food budget variable accounts for both purchased and non-purchased food, and presents realistic food consumption data. Food budget, and not income, was found highly significant, most probably because of a better reporting of consumption than incomes per se. Earlier on, exploring nutrient intake determinants, Tan found low income elasticities (i.e. <1) for all ten nutrients included, and concluded that this was an indication that income is a limited indicator of nutrition level in the Philippines (Tan, 1974). The Laguna study of four villages in Luzon, Philippines revealed that the real income variable was not found to be significant, yet the non-farm income was found to be a slightly significant determinant of household food security (Rola *et al.,* 2002).

A greater time allocated to home and personal care by the mother has a highly significant and positive impact on most nutrients (i.e. vitamin A, riboflavin, thiamine, calcium, iron, protein). Time allocation to household tasks is highly significant and positive for protein, while it significantly and negatively influences the intake of vitamin C. Further, the time allocated for rest and sleep, and physical activity (i.e. walking, exercise) is highly significant and negatively influences the intake of niacin. These differences on the impact of the different nutrients could very well be related to the type of food sources, whether these are bought or own-produced. The impact, therefore, has implications on the effect of labour spent on work or home care as well as wage or income earnings, especially those of the female spouse. These are consistent with the findings of a central Philippine study in the mid-1970s, which focused largely on women's time allocation. How women make use of time between home and market (i.e. outside home work) is critical especially among low-income households, where direct welfare goods (i.e. child/sick care, food preparation) are likely to be more time intensive, and the availability of goods or services substitutes (e.g. day care, convenient water) for time are likely to be low. Thus, low family income may force women to seek for wage employment resulting in reduced child or household welfare. The study then argued that the extent and nature of this reduction in welfare depend on the trade-off between welfare (e.g time for home, childcare and garden food crops) and economic factors (e.g. wage labour) in the household as revealed in how women use time (Popkin, 1975). Rola *et al.,* also found that the share of productive time of adult household members was also considered a determinant of household food security. The higher the share of productive time compared to reproductive and leisure time, the more food secure is the household (Rola *et al.,* 2002).

Own-produced food is highly significant and positive only for the intake of iron and thiamine. This implies that the food sources of iron and thiamine (e.g. greens like taro and sweetpotato tips/petioles, mungbean, *malunggay*) are grown by the households in own farms or gardens, or asked from neighbours.

The limited number of nutrients of significance means that the existing home gardens per household have very limited food-nutrient sources. Greater diversity of food grown in home gardens can be a rich source of vitamins and minerals within the reach of poor households. So, improving the diversity and quality of food and nutrient sources in home gardens will tend to have positive impact on the intake of other nutrients. This non-market-based availability of food would have substantial impact on the nutrient intake of households in the short run, since the poor households do not and will not have substantial improvements in their purchasing power at such time.

Food prices were not significant except for iron. This is reflective of the fact that the basket of food consumed by the respondent households consists mainly of the minimum basics (see Tables 9.3a and 3b). Thus, the observed minute changes in their prices do not really affect their consumption.

The findings as to the household demographic variables (i.e. household size, age of the household member, dependency ratio) are interesting with differential impact on the intake of various nutrients. Actual household size is highly significant and negative for riboflavin, protein and thiamine. It is significant and negative for calories. The age of the individual is highly significant and negatively influences the intake of calcium, riboflavin and iron. The dependency ratio is significant and negatively influences only the intake of vitamin C. These highly significant and differential influences on the different nutrients reflects interactions between food consumption (i.e. thus, nutrient intake), household size, household composition, and the resulting labour availability. The latter again will impact on time allocation for home, market, or farm and garden. The interactions defined in the Popkin model showed a systematic set of relations between household size and composition, consumption and female labour force participation, which showed interactions between economic and household welfare factors. Consumption and household size are inter-related, in the sense that the ages and number of children are likely to be important determinants of consumption (Popkin, 1975). In a later Philippine study, Garcia found that household composition affected consumption. An increase in the proportion of pre-schoolers caused lower food expenditures. He found no significant results for family structure (i.e. nuclear versus extended). The latter simply implies that there could be more complex processes not captured in the model. Larger households and pre-school children tended to experience deficits in their diets (Garcia, 1990).

The sex variable is not significant except for vitamin C where it is highly significant and negative. The latter implies that food sources of vitamin C tend to be more consumed by the males than females. The findings for the rest of the nutrients are similar to other Philippine studies. No sufficient evidence of sex biases was found (Evenson *et al.,* 1977; Bouis and Peña, 1997).

The education of mother variable is highly significant and positive on the intake of calcium, niacin, and vitamin A; significant and positive on riboflavin; yet negative on the intake of calories, vitamin C and iron. Only the finding on niacin is consistent with the Tan study, as she found non-

significance of the education variable overall. The latter was attributed to traditional eating habits which includes foods rich in niacin (Tan, 1974). The study of Evenson *et al.,* found a positive correlation between mother's education and the variable "mother prepares food" with diet quality. Educational differences yielded these different effects. Findings reflect the general awareness of mothers of the importance of vitamin A and calcium, and not so of the other nutrients. With more education, the intake of calories, iron and vitamin C tended to be negatively influenced. This could reflect changes in food habits and food choices with the more educated mother.

Nutrient knowledge is significant and positive only for calorie intake. This could be due to the lack or ineffectiveness of nutrient knowledge or lack food choice. Poor households do not have a choice but to take care of the basic nutrient for all members. The intake of the other food and nutrients simply faces the food access constraints, and availability to the extent of limited own-food production. Despite the claims of positive impact of nutrition campaigns by health workers in the area, nutrition awareness has not really been translated effectively into food consumed because of other intervening factors such as the significant variables elaborated in this section. Health workers complained that many children naturally dislike eating vegetables, and that they needed to be forced or trained to do so. School children also tended to buy cheap junk foods which are readily available in local *sari-sari* stores.

On the whole, the study showed a greater probability that households and individuals in less favoured areas will have higher nutritional status when the food budget is improved, when mothers are better educated to take care of the home and its food needs, when household size is planned to a reasonable minimum, and when food is available from non-bought sources. As the food budget includes both bought and non-bought food, the food budget can be improved not only by improving income but also by intensifying the home production of nutrient-rich food crops. Currently, the cultivars of existing home gardens are quite limited, and need to be improved in diversity of food-nutrient sources.

The results also show that mothers need to carefully organize their time for home care (e.g. child care, food preparation) as these activities have a large impact on nutrient intake. Nutrient knowledge of mothers or caregivers per se is not necessarily translated into better nutrient intake unless the highly significant factors identified above are in place. There is no sufficient evidence of age-sex biases on nutrient intake.

Table 9.3a Summary of the significant variables affecting the intake of energy, protein, calcium and iron

Nutrient	Energy		Protein		Calcium		Iron	
R^2/Adj. R^2/ Constant	0.20 / 0.12 / 1419.78		0.22 / 0.16 / 61.06		0.17 / 0.12 / 897.34		0.21 / 0.16 / 9.74	
Variables	Std. β	t (Sig.)	Std. β	t (Sig.)	Std. β	t (Sig.)	Std. β	t (Sig.)
Actual household size	-.015	-1.85 (.07)**	-.21	-2.73 (.01)***	-0.11	-1.36 (.18)	n.a.	n.a.
Age of individual	n.a.	n.a.	n.a.	n.a.	-0.26	-3.24 (.00)***	-0.14	-1.66 (.10)**
Dependency ratio	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-0.11	-1.45 (.15)
Primary educ., unfinished	n.a.	n.a.	-.11	-1.47 (.14)	n.a.	n.a.	-0.20	-2.82 (.00)***
Elementary educ., unfinished	n.a.	n.a.	n.a.	n.a.	0.19	2.29 (.02)***	n.a.	n.a
Elementary educ., completed	n.a.	n.a.	n.a.	n.a.	0.14	1.67 (.10)**	n.a.	n.a.
Secondary educ., completed	-0.17	-2.34 (.02)***	n.a.	n.a.	n.a.	n.a.	-0.18	-2.63 (.01)***
College educ., unfinished	n.a.	n.a.	n.a.	n.a.	-0.10	-1.38 (.17)	n.a.	n.a.
College educ., completed	0.11	1.55 (0.12)	0.12	1.70 (.09)**	n.a.	n.a.	n.a.	n.a.
Nutrient knowledge	0.13	1.65 (.10)**	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Time allocation: Rest and sleep	-0.12	-1.58 (.12)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Time allocation: Household task	n.a.	n.a.	0.16	2.00 (.05)***	n.a.	n.a.	n.a.	n.a.
Time allocation: Home & personal care	n.a.	n.a.	0.14	1.64 (.10)**	0.17	2.15 (.03)***	0.16	2.10 (.04)***
Time allocation: Physical activity	n.a.	n.a.	n.a.	n.a.	0.11	1.49 (.14)	0.14	2.04 (.04)***
Total food budget	0.21	2.66 (.01)***	0.22	2.80(.01)***	0.12	1.54 (.12)	0.09	1.29 (.19)
Non-bought food	n.a.	n.a.	-0.19	-1.45 (.15)	n.a.	n.a.	-0.19	-1.44 (.15)
Own-produced food	0.23	1.54 (.13)	0.22	1.66 (.10)**	n.a.	n.a.	0.28	2.09 (.04)***
Mean food price	n.a.	n.a.	n.a.	n.a.	0.11	1.43 (.15)	0.13	1.74 (.08)**

*Significance level: .*** = 05>p<.00, highly significant; **=.10>p<.05, significant; .20>p<.10, not conclusive*

Table 9.3b Summary of the significant variables affecting the intake of vitamins A and C, thiamine, riboflavin and niacin

Nutrient	**Vitamin A**		**Vitamin C**		**Thiamine**		**Riboflavin**		**Niacin**	
R^2/Adj. R^2 /Constant	0.18 / 0.14/ 184.22		0.13 / 0.08 / 61.21		0.19 / 0.15 / 0.27		0.25 / 0.20 / 0.80		0.19 / 0.14 / 23.67	
Variables	Std. β	t (Sig.)	Std. β	t (Sig.)	Std. β	t (Sig.)	Std. β	t (Sig.)	Std. β	t (Sig.)
Actual household size	n.a.	n.a.	n.a.	n.a.	-0.20	-2.62 (.01)***	-0.34	-4.48 (.00)***	n.a.	n.a.
Age of individual	-0.13	-1.56 (.12)	-0.22	-2.42 (.02)***	n.a.	n.a.	-0.17	-2.21 (.03)***	n.a.	n.a.
Gender	n.a.	n.a.	-0.17	-2.25 (.02)***	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Dependency ratio	-0.12	-1.50 (.14)	-0.15	-1.86 (.06)**	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Primary educ., unfinished	n.a.	n.a.	n.a.	n.a.	-0.14	-2.03 (.04)***	n.a.	n.a.	n.a.	n..a
Elementary educ., unfinished	0.16	1.96(.05)***	n.a.	n.a.	n.a.	n.a.	0.14	1.86 (.06)**	n.a.	n.a.
Elementary educ., completed	0.14	1.57 (.12)	n.a.	n.a.	n.a.	n.a.	0.10	1.32 (.19)	0.23	2.90 (.00)***
Secondary educ., unfinished	0.14	1.69 (.09**)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.10	1.31 (.19)
Secondary educ., completed	n.a.	n.a.	-0.18	-2.27 (.02)***	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
College educ., unfinished	n.a.	n.a.	-0.15	-2.02 (.04)***	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
College educ., completed	0.28	4.03(.00)***	n.a.	n.a.	0.09	1.32 (.19)	n.a.	n.a.	n.a.	n.a.
Time allocation: Rest and sleep	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-0.14	-1.96

(.05)***

Nutrient	**Vitamin A**		**Vitamin C**		**Thiamine**		**Riboflavin**		**Niacin**	
R^2/Adj. R^2 /Constant	0.18 / 0.14/ 184.22		0.13 / 0.08 / 61.21		0.19 / 0.15 / 0.27		0.25 / 0.20 / 0.80		0.19 / 0.14 / 23.67	
Variables	Std. β	t (Sig.)	Std. β	t (Sig.)	Std. β	t (Sig.)	Std. β	t (Sig.)	Std. β	t (Sig.)
Time allocation: Social activities	-0.11	-1.52 (.13)	-0.14	-1.90 (.06)**	n.a.	n.a.	n.a.	n.a.	-0.11	-1.51 (.13)
Time allocation: Home & personal care	0.23	3.02(.00)***	0.14	1.62 (.11)	0.20	2.78 (.01)***	0.23	2.98(.00)***	n.a.	n.a.
Time allocation: Physical activity	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0.11	1.62 (.11)	-0.13	-1.75 (.08)**
Total food budget	0.15	2.08(.04)***	n.a.	n.a.	0.21	2.84 (.01)***	0.31	4.26 (00)***	0.18	2.43 (.02)***
Own-produced food	n.a.	n.a.	n.a.	n.a.	0.14	1.96 (.05)***	n.a.	n.a.	n.a.	n.a.

*Significance level: ***=.05>p<.00, highly significant; **=.10>p<.05, significant; .20>p<.10, not conclusive*

9.3.2 Nutritional status: the model and indicators

The study uses the household production of health framework adapted from Berman, *et al.,* (1994) and uses nutritional status as the indicator of health. Children's nutritional status is the dependent variable using the anthropometric measure, weight-for-age of children, as proxy. The independent variables include socio-economic variables as income, total income, per capita income, food budget, food purchased, food own-produced, nutrient knowledge of mother or caregiver; and health variables such as hygiene and sanitation, morbidity, and drinking water availability.

For the purpose of this study, the weight-for-age is used, which is a good enough indicator since age is well estimated with the known birth dates. The logic behind the use of children's nutritional status as the main dependent variable to explain health of a household or community rests on the generally accepted principle that nutritional status is manifested through the life cycle. A malnourished child will more likely be a malnourished adult and a malnourished adult will tend to get malnourished children because of an impaired income earning capacity, the inability to access health services, and the inability to provide a sanitary environment for the household. Indeed, such malnourished households get caught in a malnourishment cycle (ACC/SCN, 2000; Kataki, 2000). Therefore, the nutritional status of children is a good indicator of the health of the household, community or country.

Anthropometric measures in the villages

Standardized Z-scores were used for the anthropometric measures in order to eliminate the bias of age differences by simply presenting as percentages for a reference population. The standardized Z-score is given by the formula:

$$\text{Z-score} = \frac{\text{(Weight or height of child)} - \text{Medium value of reference population}}{\text{Standard deviation of the medium value of reference population}}$$

The Z-score for weight-for-age, for example, refers to the weight of the child expressed as the number of standard deviations above or below the median for children in the reference population of the same age and sex. The study applied the Philippine standard used by the FNRI where the survey data was processed.

The weight-for-age in children is grouped into two categories: less than 5-years old, and 5 to 12-years old. A child is normal, underweight or overweight based on a standardized Z-score. Other indicators such as weight-for-height and height-for-age are complementary anthropometric indicators. A child is said to be "wasted" with low weight-for-height; and "stunted" with low height-for-age. Unlike underweight and being wasted, the process of stunting is a long-run measure of deprivation.

Table 9.4 summarizes the distribution of anthropometric measures as normal, above or below normal by village, by age group and sex of children. As a whole, Alegre fared better than Plaridel in terms of percentage normal children as well as deviations from normal. This showed that a relatively

better off daily per capita in Plaridel did not give an assurance of normal weights and heights.

Table 9.4 Summary of percentage distribution of weight-for-age, height-for-age and weight-for-height based on standardized z-scores by village, age group and sex, 2003

Category	Weight-for-age		Height-for-age		Weight-for-height	
Village						
Alegre	Underweight	10.2	Underheight	44.4	Thin	1.6
	Normal	88.2	Normal	54.5	Normal	86.1
	Overweight	1.6	Aboveaverage/tall	1.1	Overweight	12.3
Plaridel	Underweight	56.6	Underheight	54.0	Thin	23.9
	Normal	43.4	Normal	45.1	Normal	75.2
	Overweight	n.a.	Aboveaverage/tall	0.9	Overweight	0.9
Age group						
0-<5 years	Underweight	29.4	Underheight	47.1	Thin	11.1
	Normal	68.7	Normal	51.0	Normal	81.7
	Overweight	2.0	Aboveaverage/tall	2.0	Overweight	7.2
5-12 years	Underweight	25.9	Underheight	49.0	Thin	8.8
	Normal	74.1	Normal	51.0	Normal	82.3
	Overweight	n.a.	Above average/tall n.a.		Overweight	8.8
Sex						
	Underweight	30.3	Underheight	54.5	Thin	10.3
Male	Normal	68.5	Normal	43.6	Normal	86.1
	Overweight	1.2	Above average/tall	1.8	Overweight	3.6
Female	Underweight	24.4	Underheight	40.0	Thin	9.6
	Normal	74.8	Normal	60.0	Normal	77.0
	Overweight	0.7	Above average/tall	n.a.	Overweight	13.3

The table shows that Alegre has a better nutritional status than Plaridel in all anthropometric indicators. These results are consistent with the fact that Alegre has a better status of nutrient adequacy for all nutrients than Plaridel. However, the children 5-12 years old are relatively healthier than those below 5 years of age, despite the latter figuring better in terms of nutrient intake (Table 9.4). This means that the nutrient intake of children below 5 years has not been effectively translated into better nutritional status. This is most likely related to morbidity since the children in a household live in the same home environment and drink the same water. It should be noted that short-term morbidity was found highly significant and an important variable affecting the nutritional status of the under fives and not of the schoolchildren. Smaller children are prone to suffer from cough and colds and other forms of infection,

which weaken the body and lessen the assimilation of nutrients into the body system.

The relatively higher normal figures for weight-for-height for all age groups and sexes simply follow from the relatively higher percentage of normal growth both for weight-for-age and height-for-age indicators. The distributional patterns are mainly explained by, and consistent with, the nutrient adequacy situation in the villages.

There is a greater percentage of females who are normal in weight-for-age and height-for-age measures, and they tend to be more overweight than the males. This could be a consequence of the fact that the males do more physically demanding work and their energy adequacy level is less than the females (Table 9.4).

Determinants of children's nutritional status

The correlation coefficients, R^2, and adjusted R^2, suggest that the regressions have better explanatory power on the nutritional status of children below 5 years than children of primary school age (Table 9.5).

Nutrient intake is the major determinant to nutritional status or health, and this is taken as a basic given. Considering this study's general findings on nutrient intake, this would also mean that the variables which have greater impact on the children's nutrient intake would include the food budget, time allocated to home care, mother's or caregiver's education, the availability of non-bought food and household size. Nutrient knowledge per se was not found to be significant, and there was no sufficient evidence of sex bias. To account for the other nutritional status variables in addition to the determinants of nutrient intake, drinking water, education of mother, livelihood type, morbidity, and total farm full income were found highly significant and most important variables affecting children's nutritional status overall.

The quality of drinking water should matter much to health as this affects the quality of food, as well as ingesting and assimilating it in the body. Plaridel households have three drinking water sources that are either piped into, or sourced out by them. Alegre households have difficulty of access to potable water within the village, and source it mostly from the outside. These distinct differences in home sources of drinking water have clarified the differential effects of water quality on children's health

Primary schooling of a mother is highly significant and important at least to the pre-schoolers' health. A younger child's needs are very basic, comprising food and care received directly from home, friends or neighbours. The child's environment falls within the range of its mother's attention. Higher education of a mother and her (or, the caregiver's) knowledge of nutrition are highly significant and positive on the nutritional status of school age children. This could most probably be because the food and nutrient needs of schoolchildren are more demanding as they are fast growing up with more physical and mental activities, and their home and outside-home environments need careful assessment and provision. A recent study in Benguet, Philippines found that the mother's role in food and nutrient adequacy is important. They

figured that inadequacies in vitamins A and C among children are partly explained by the lesser control of the mother on their food intake while out of the house. Even at home, mothers cannot fully enforce good eating practices (Blijham *et al.,* 2006). Some home management ability such as care and discipline of growing school children is required and this is a function of the mother's or caregiver's knowledge and skills acquired through better education and training.

The variable, livelihood type of households, especially that where off-farm income is dominant (LIVETYP3), is also highly significant and positively correlated with pre-schoolers' health. Why this should be the case with the off-farm type of households is not quite clear directly. It should be noted that this livelihood type reflects the greater contribution of the male spouse to income because he does the off-farm activities usually in the cash crops such as abaca, coconut, or rice, and the female spouse therefore tends the home while he is away. So, the relationship is not difficult to comprehend via time allocation effects where the female spouse or mother has more time to spend with the child which affects positively his nutritional status.

Though not conclusive, it was found that the predominantly farming livelihood type (LIVETYP2) variable is negatively related with the health of schoolchildren, while the non-farming livelihood type (LIVETYP4) variable is positively related with the pre-schoolers' health. The former can be explained via time allocation effects because farming households engage more farming activity time for both spouses in order just to make ends meet because of the low productivity of farms in the study areas. This impacts negatively on the schoolchildren more because the smaller child's care time could not be compromised. In a time-constrained situation, there is some kind of bias in favour of the younger child. The latter could be explained via the food access effects which tend to give priority first, again, to the younger child. Any improved capacity to avail or buy quality food means first priority is given to the younger child. This is because of food access or income constraints. From these results, it is clear that both time and income constraints of poor households favour the food and nutrient intake of younger children and puts the nutritional status of schoolchildren in a precarious situation. This, of course, has far-ranging implications for the physical and mental capacity of the developing human capital, that is, of a school child, which can result in various types of impairments.

Total farm full income includes all produce in the farm which are sold and those consumed in the home. This variable is highly significant and positively related with health of children below 5 years, yet it has a significant and negative effect on school children's health. This again highlights the contribution of non-traded or home-grown food and nutrient sources since the income variable per se has no evidence of significance. More significantly is the trade-off between food, care and goods in favour of the pre-schoolers. The fact that this trade-off is biased against schoolchildren further confirms how pressing the food and income constraints are among the poor households.

Table 9.5 Summary of the significant and important variables affecting children's health

R^2 / Adj. R^2	0- <5 years old 0.69 / 0.64		5-12 years old 0.36 / 0.23	
Variables	Std. β	t (Sig.)	Std. β	t (Sig.)
Drinking water source	-0.35	-4.74 (.00)***	-0.51	-2.24 (.03)***
Short term morbidity	0.28	3.51 (.00)***	n.a.	n.a.
Total farm full income	0.25	3.44 (.00)***	-0.18	-1.84 (.07)**
Primary school, unfinished	-0.24	-3.20 (.00)***	0.48	n.a.
Primary school, completed	-0.22	-2.89 (.01)***	0.56	2.87 (.01)***
Off-farm income>50%	0.18	2.40 (.02)***	n.a.	n.a.
Hygiene	-0.14	-1.93 (.06)**	n.a.	n.a.
Sanitation	-0.12	-1.62 (.11)	0.13	1.35 (.18)
Non-farm income>50%	0.11	1.42 (.16)	n.a.	n.a.
Elementary education, unfinished	-0.10	-1.32 (.19)	1.04	2.88 (.01)***
Elementary education, completed	n.a.	n.a.	1.39	3.12 (.00)***
Secondary education, unfinished	n.a.	n.a.	0.86	2.73 (.01)***
Secondary education, completed	n.a.	n.a.	1.00	3.14 (.00)***
College education, unfinished	n.a.	n.a.	0.37	2.41 (.02)***
College education, completed	n.a.	n.a.	0.45	2.95 (.00)***
Nutrition knowledge	n.a.	n.a.	0.24	2.55 (.01)***
Actual household size	n.a.	n.a.	0.15	1.60 (.11)
Income from farm>50%	n.a.	n.a.	-.014	-1.44 (.15)

Significance level: 0>p<0.05= highly significant; 0.05>p<0.10=significant; 0.10>p<0.20= not conclusive

With pre-school children, short-term morbidity is highly significant and important as they are more sensitive and prone to contracting illness of whatever kind. Hygiene (i.e. toilet practices) is a significant variable for the health of preschoolers but not with primary schoolchildren. This implies the relative sensitivity of children less than 5 years to hygienic practices and conditions. There is no conclusive evidence for garbage disposal.

9.4 Taking stock: building the linkage relationships

Tables 9.6 and 9.7 summarize the significant and important variables of the three proposed linked hypotheses of this study. The nature and degree of relationships of the variables have been elaborated in the discussions in Chapters 7 to 9. The results show that the linkage from the nature of the biophysical environment of less favoured areas to nutritional status condition (as proxy to food adequacy) is complex yet discernible from the micro-level data as designed in the study. Various methods and tools were used to collect the data that capture selected indicators of the three dimensions of food security, and the results elaborated in the previous chapters. The conceptual framework that identified the different resource environments, that is, the biophysical and socio-economic resources, proved useful in operationalizing the selected linkages. Thus, the multi-dimensional scheme of food security investigation using the livelihood approach can help in identifying opportunities for policy action by a closer study and review of the relevant policy variables that came out of the results.

Through associative deduction from the findings on the three hypotheses, the conclusions about the linkage relationships are as follows. Starting with hypothesis 1, the biophysical environment, through the crop productivity framework, is a logical step in starting the analysis of farming households, since farming is their basic activity irrespective of whether done on a subsistent or commercial scale. This provides an understanding of the factors that determine crop performance and the interlocking relationships between crops (food and cash crops) in the diversified farming systems of poor households. Together with the qualitative information gathered from the focused groups and case studies, opportunities and constraints, food availability and, to a certain extent, food access, are defined. These in turn give reasons and the context why farming households opt for other types of livelihoods, which leads the investigation to hypothesis 2.

In less-favoured areas, on-farm diversification is not enough to sustain households in meeting even their basic needs. Households engage in different livelihood portfolio, which is a mixture of farm, off-farm and/or non-farm activities, depending on the opportunities present within and outside the village and their available resources, particularly labour and time. These different livelihood portfolios give rise to different livelihood types, which are important for targeting policy interventions because of the different characteristics within each livelihood activity in terms of resource use and constraints faced. The analyses regarding hypothesis 2 involving the determinants of the livelihood types inter-correlate with the results for hypothesis 1, as elaborated in Chapter 8. The findings on hypothesis 1 show how highly significant and important the different livelihood types are for the

Table 9.6 Summary of the significant and important variables of Hypothesis 3

Level of significance	Variables of nutritional status of children per age group		
	Nutrient intake variables	<5 years old	5-6 years old
Highly significant	(+) Total food cost[/a] (+) Time allocation, home/personal care[/a] (+) Primary/elementary education, mother (calcium, iron, vit A, thiamine, niacin) (+) Time allocation, household task (protein) (+) Time allocation, physical activity (iron) (+) Own-produced food (iron, thiamine) (+) Secondary/College education, mother (vit C) (-) Secondary/College education, mother (calorie, iron) (-) Age of individual (calcium, vit C, riboflavin) (-) Gender (vit C) (-) Actual HH size (protein, thiamine, riboflavin) (-) Time allocation, rest & sleep (niacin)	(-) Drinking water (+) Short term morbidity (+) Total farm full income *(+) LIVETYP3 (off-farm income)* (-) Primary education, mother	(-) Drinking water (+) Primaryeducation, mother (+) Elementary/ secondary/ college education, mother (+) Nutrition knowledge
Significant	(-) Actual Hh size (calorie) (-) Dependency ratio (vit C) (-) Time allocation, physical activity (niacin) (-) Time allocation, social activity (vit C) (+) Primary/elementary education, mother (riboflavin) (+) Secondary/college education, mother (protein) (+) Nutrient knowledge (calorie) (+) Own-produced food (protein) (+) Time allocation, home & personal care (protein) (+) Mean food price (iron)	(-) Hygiene	(+) Total farm full income

Level of significance	Variables of nutritional status of children per age group		
Not conclusive	(+) Time allocation, home & personal care (vit C) (-) Time allocation, rest & sleep (calorie) (-) Time allocation, social activity (vit A) (-) Dependency ratio (vit A, iron) (-) Actual HH size (calcium) (-) Age of individual (vita (-) Non-bought food (protein, iron)	(-) Sanitation *(+) LIVETYP4 (non-farm income)*	(+) Sanitation (+) Actual HH size *(-) LIVETYP2 (farm-income)*

Note: [/a] most nutrients

Table 9.7 Summary of the significant and important variables of Hypotheses 1 and 2

Level of significance	Hypothesis 1				Hypothesis 2		
	Y_1 = productivity (i.e.) yield per crop				Y_2 = Livelihood type		
	Abaca	Coconut	Rice	Sweetpotato	LIVETYP2	LIVETYP3	LIVETYP4
Highly significant	(+) Cropping pattern (+) Non-farm income (+) Share tenancy (-) Remittances	*(-) LIVETYP 4 (non-farm)* (-) Slope *(-) LIVETYP 1 (same %)*	(+) Production cost (-) Value of HH labour (-) Season (+) No. years farming (-) Fertilizer use (+) Owner-cultivation (-) Selling price (+) Irrigation water	(-) Slope (-) Age of farmer	(+) Farm wage worker (+) Age HHH (+) Value of farm produce	(+) Farm wage worker (-) Size of area cultivated (-) Actual HH size	(+) Idle land
Significant	*(-) LIVETYP 3 (off-farm)* (+) Dependency ratio	(+) No. years farming (-) Off-farm income	(+) Share tenancy *(+) LIVETYP 4 (non-farm)* (+) Loam soil	(+) Variety	(-) No. of working children	n.a.	(-) Actual HH size
Not conclusive	*(-) LIVETYP 4 (non-farm)* (-) Education HHH (-) Selling price	*(-) LIVETYP 3* *(-) LIVETYP 2* (-) Share tenancy		n.a.	n.a.	(-) Lifecycle (+) No. of working children	n.a.

n.a. not applicable

productivity of cash crops (i.e. abaca, coconut, rice) via the arguments on labour availability (i.e. substitution or complementary) and capital investment.

Hypothesis 3 details the determinants of nutrient intake and nutritional status articulating the relationships involving the final indicator of food security, that is, food adequacy. Findings show that livelihood type is a significant variable affecting the nutritional status especially of children below 5 years old. The relative importance of the resources (i.e. via substitution, complementation), labour and time, are embedded in the variable, time allocation (e.g. home/child care), which is one of the highly significant and important variables affecting nutrient intake.

Importantly, the above findings illustrate how the livelihood approach has been able to identify the significant and important factors of farm performance and livelihood choices. The total farm full income, as food access indicator, proved to be highly significant in nutritional status in hypothesis 3. In the final analysis, the variable, livelihood type, is the critical link between hypothesis 1 and hypothesis 3. Thus, livelihood type is, effectively, the catch-all variable that reflects the dynamics of resource choice and use, especially labour and time, plus the other significant farm and socio-demographic variables (e.g. farm wage worker, age of household head, value of farm produce, cultivated area size, idle land, household size, working children).

The elaboration of the three hypotheses in multivariate relationships via the core livelihood concept has enabled the identification of the other significant variables affecting food security in each of its three dimensions. These variables also represent opportunities for technology, institutional and policy interventions, which will be discussed in the following chapter.

Chapter 10
Conclusions and policy implications

10.1 Summary of conclusions

This study investigated the linkages between resource environments, livelihoods and food security by looking into the factors affecting livelihood strategies using micro-level data from two Philippine villages, representing different agro-ecologies and fragility characteristics. The research framework used emphasized the importance of the resource environments (biophysical, socio-economic and socio-cultural) which condition livelihood decisions (Chapter 4). These decisions are made by household members, and are partly influenced by the specific characteristics of households (e.g. size, dependency ratio), and socio-economic circumstances (e.g. wages, value of produce, working children). The dynamics of household decision-making vary (cooperative, authoritative, mixed) but predominantly hinge on the household head and/or the household member who contributes substantially to the coffers (Chapters 7 and 8). Food security, finally gauged by nutritional status and health, is the outcome of a series of interrelated relationships and decision-making processes along the production-consumption chain (Chapter 9).

In the following sections, the conclusions drawn from this thesis are grouped into those which address the research questions, and those which constitute the lessons learned from the approach, concepts and methodologies applied in the research. Importantly, these two sets of conclusions are related since the set of findings have been drawn from an integrative approach using the livelihood systems framework within the context of the biophysical and socio-economic environments, with the impact of these factors on crop productivity as the starting point of analysis. This was the logical start taken since farming is a basic activity of farming households, whether or not incomes or profits are gained. The characteristics related to fragile areas are basic considerations. Thus, the specific nature of fragility of the land where farms are located condition livelihood decisions (see Chapters 4, 6 and 7). The other factors that link the resource environments to the food security situation, as elaborated in Chapters 7 to 9, have an impact on the diversity of livelihood portfolios. Hence, the differences in incomes, assets and resources, food consumption, and finally nutritional status and health.

In the livelihood approach, the livelihood strategies that generate the household livelihood portfolio are the key processes used to analyze the three dimensions of food availability, access and adequacy. The farming households of the research communities were classified into livelihood types based on a greater than 50 percentage contribution of various income sources, namely farm, off-farm and non-farm. The livelihood types were used as variables to represent livelihood strategies. They were used both as dependent variables and regressed on bio-physical, socio-economic and demographic factors, as well as independent variables where nutritional status was regressed on.

10.1.1 Research question-based conclusions

The main research question is phrased as "How do the livelihoods of farming households impact household food security in the context of ecologically fragile environments?" In summary, livelihoods affect the food security of farming households in the less favoured areas via the effects of the interactions between the biophysical, socio-economic, demographic and health-related factors on nutritional status. These effects are summarized as income effects (through the food budget, access effects and capital investment), resource use effects (through labour and time shifts between work, home and own-food production), and socio-demographic and health-related effects (Table 10.1). In this thesis, the interactions were explored through the analyses of linked interrelations expressed in three hypotheses. In the process, the indicators of food security could be gleaned from the farm and food systems data, and crop productivity (availability); from the livelihood portfolio, income levels, and resource use (access); and from nutritional status of households and individuals (adequacy).

The livelihood portfolios of farming households are characteristically diversified because farming alone cannot provide adequately for even the most basic needs. Poor land quality and less technology inputs, to start with, negatively condition productivity resulting in low crop yields in the case of fragile lands. This highlights the critical importance of land quality as the initial conditioning or constraining factor. When poor land quality is already a constraining factor, farming becomes a precarious livelihood base. This pushes households to seek out other income sources. This is addressed in hypothesis 1 which covers the first specific question (see Table 10.1).

The results from investigating Hypothesis 1 show how low yields of crops arising from poor land quality, inadequate capital resources and less labour intensity (due to competing labour use in other crops, and other work) result in low farm incomes. Idle lands are highly significant and positively related to non-farm income-based livelihood. Lands tended to be left idle when they are degraded (usually on the upper slopes or hillsides), and with inadequate labour (when used in off-farm or non-farm work), or lack of capital (due to low farm income, other income deficiencies). The relative importance of the identified biophysical and socio-economic factors was also determined, differing with various crops and livelihood types. These factors helped define the structure of access, use and control of the resources of production, in this way determining the benefits to farming households. Households in the lower socio-economic strata have little access, use and control, and constitute the impoverished sector. Most households in the research villages are in this category.

When households shift their labour to off-farm, non-farm or domestic uses, farm labour decreases or becomes less intense than previously, tending to decrease crop productivity. These labour shifts are indicated by the highly significant and negative effects of LIVETYP4 (non-farm livelihood type) and LIVETYP3 (off-farm livelihood type) on the productivity of the main crops such as coconut, abaca and rice. Thus, a vicious cycle of poor land quality,

low productivity, low income, low farm labour intensity, low productivity results. Even earnings from the export-oriented cash crops (coconut, abaca) could not generate enough capital for further farm investment. Only those households who received remittances and non-farm incomes could generate financial capital. Yet the sustainability of such capital flows depends on the regularity and stability of receipts, which in many cases are lacking. Further, the role of non-farm income and remittances as capital sources, availability of labour (from off-farm work opportunities), security of use rights, production cost, dependency ratio, wages, and farming experience all affect crop performance, but their impact varies with the crop, whether for cash or food, because of the differential impact on resource availability and use as well as incentive.

Labour migration for greener pastures, either seasonal or long-term, by male (main in first wave) or female (increasing in current wave), has gained importance starting in the 1970s triggered by the insurgency-pushed decline in the rural economy, and further sustained by the slow economic recovery. While remittances have helped build up capital and assets in some households, labour migration had a negative impact on labour resources both for farm and off-farm work, especially with the cash crops which are major income earners in the villages.

There were no gender biases found (i.e. female or male performs tasks with no social stigma), though gender assignation of roles and responsibilities exist in work and domestic activities on socio-cultural grounds. Certain livelihood activities and the associated major resource such as labour are differentiated by gender. Cash crop farming and selling, heavy farm operation such as land preparation, off-farm employment, and non-farm work in carpentry, construction, and fishing are male domains. Domestic services (paid or unpaid), household-based micro-enterprises such as native craft, retail store, home gardens, farm work as planting or weeding, and vegetable trading are those of the females. Farming the more distant fields (vegetables in the high lands) tends to be the domain of the males. All others may be male or female.

Table 10.1 Summary of the links between the hypotheses and the research questions and the corresponding significant variables

Hypotheses on:	Research questions addressed	Significant variables	
		Bio-physical/ technology-related	Socio-economic, demographic and health-related
1- Crop productivity: Coconut Abaca Rice Sweetpotato Taro	• How does the situation in ecologically less favoured areas affect the choice and generation of livelihoods	(-) slope (-) wet season (+) cropping pattern (-) fertilizer use (+) irrigation (+) variety (+) loam soil	(+) non-farm income (+) share tenancy (-) remittances (-/+)LIVETYP4 ; (-) LIVETYP1; (+) LIVETYP4 (coconut) (-) LIVETYP3 (abaca) (+) LIVETYP4 (rice) (+) production cost (-) value of household labour (-) selling price (+) dependency ratio (+) years in farming (-) Age of farmer
2- Livelihood type: LIVETYP1 (control) LIVETYP 2 LIVETYP3 LIVETYP4	• What is the mix of livelihoods households in less favoured areas engage in, and why? • What are the assets and resources available to these households? What are the conditioning and constraining factors to their use? • How are the livelihoods, budget allocation and resource use differentiated according to age, gender, and the household life course?	(+) idle land (LIVETYP4)	(+) farm wage worker (-) household size (-) size of area cultivated (+) age of household head (+) number of adult working children (-) lifecycle
3a. Nutrient intake (9 nutrients)	• What are the conditioning and constraining factors which produce	Not applicable	(+) Total food budget (most nutrients) (+) Time allocation, home/personal care

	differential effects on household food security and intra-household distribution of food and nutrients?		(most), household task (protein), physical activity (iron, niacin) (-) Time allocation, rest & sleep (niacin/-calorie) (+) Primary/elementary education, mother (most) (+) Own-produced food (iron, thiamine, protein) (+/)- Secondary/college education, mother (vita C, protein / calcium, iron) (-) Actual household size (protein, thiamine, riboflavin, calorie (-) Age of individual (calcium, vita C, riboflavin) (-) Dependency ratio (vita C/ vita A, iron) (+) Nutrient knowledge (calorie) (+) Mean food price (iron) (-) drinking water quality (+) short term morbidity (+) total farm full income (-) primary education, caregiver (+) LIVETYP3 (off-farm type) (+) hygiene (+) LIVETYP4 (non-farm itype) (+) sanitation*
3b.Nutrient adequacy Child's health: (<5 years) (5-12 years)			all of (<5 yrs) variables plus: (+) elementary education, caregiver (+) secondary education, caregiver (+) college education (+) nutrition knowledge (-) LIVETYP2 (farm type)

Ethnographic data on land quality in the research sites showed that land degeneration clearly resulted from a mix of man-made and natural causes. Population pressure starting from the 1960s, led to increasing encroachment on the forest and use of marginal lands. Commercial ventures (e.g. logging, quarrying) of the wealthy and powerful led to the deforestation of the watershed. Crop shifting cultivation systems by small farmers such as the continuous growing of annuals on sloping lands with shorter fallow periods without the benefit of sustained conservation measure resulted in erosion, especially in the hilly lands. Gullying and mass-wasting in Plaridel and river erosion in Alegre occurred because of strong wind and water from super-typhoons which regularly visited the areas from the 1950s to the early 1990s. El-Swaify (1997) reported that these latter types of degradation could occur even in the absence of human disturbance.

Pender (2004) cited several studies on the association of different farm or crop systems with different agro-ecologies, physical and institutional infrastructure, and market opportunities. Just as in these studies, relatively high value cash crops are grown in areas with suitable agro-ecologies with better market access and infrastructure. Cash crops are important as they provide a substantial share of farm and off-farm incomes. For households that largely depend on farming activities, improving the productivity of cash crops and developing related industries or micro-enterprises serve as growth points. These have important implications for science and technology policy such as the research, development and extension programmes for relevant cash crops.

Regarding Hypothesis 2, it was found that the identified significant biophysical, socio-economic and demographic factors have differential impact on the different livelihood portfolio. For mainly farming households, the significant factors are farm wage work (+), age of household head (+), and value of farm produce (+). For those households who mainly live from off-farm wages (LIVETYP3), the significant factors are farm wage work (+), size of area cultivated (-), and household size (-). For those classified as mainly non-farm income-based households (LIVEYP4), idle land (pushed by land degradation) is a highly significant and most important factor that motivated people to seek out livelihoods away from the farm. Also, the two villages differed as to predominant livelihood type: Plaridel is more of the non-farm income source (LIVETYP4), while Alegre is more of the farm income source (LIVETYP2). With low farm productivity, Alegre had lower per capita income than Plaridel.

In less-favoured environments, survival means engaging in both cash and food crop farming, whether on one's own farm or in wage work, or in non-farm work. Non-farm employment was associated with the growth of the indigenous local industry and services sectors, which in turn were facilitated by improved local entrepreneurship, better access to markets, road infrastructure, and institutional support system (e.g. technology and design, financial support, trade promotion). The latter made Plaridel a relatively better-off village in terms of the socio-economic status of households. In the local handicraft industry, women gained more access to income-earning

opportunities and had money to spend for home, food and children's needs. Non-farm employment is higher in a community more linked to the industrial market and a more vibrant local economy (e.g. Plaridel versus Alegre), where rural non-farm enterprises are more in number. This made Plaridel better than Alegre in food access terms, but not necessarily in terms of food adequacy as the results in Hypothesis 3 show.

The age of the household head was found to be significant only with respect to mainly farming households (LIVETYP2) since the younger generation tended to seek non-farm employment or migrate. The older ones who are more oriented to farming, remained in the sector. Via the decisions on resource use, labour is a highly significant and important variable affecting the household livelihood portfolio decisions, both in terms of supply (i.e. number of working children, household size), and as a beneficial or a constraining factor (i.e. engagement in off-farm activities, lifecycle). Actual household size is significant and negatively affects LIVETYP3 and LIVETYP4 through shifts in labour time to domestic activities, and more importantly so with LIVETYPE3. The number of working children tends to negatively affect farming through labour shifts away from the farm, and positively on off-farm work. The latter is not conclusive. Though not conclusive, the effect of the household life course on LIVETYP3 tends to be negative, which reflects the tendency of the young farmers to engage in off-farm work. Trade-offs in labour and time allocation were apparent in the different patterns of livelihood generation with cash crops being negatively affected as labour is shifted away from them. Assets and resources generation tend to be better among the mainly non-farm household type compared to the farm and off-farm livelihood type households, and usually from the remittances of members working outside the village, especially those married or working abroad.

In hypothesis 3, the significant factors affecting the nutritional status and health of children were determined using a two-step process. First, the significant factors affecting nutrient intake were identified, with nutrient intake assumed to be the major determinant of nutritional status. Subsequently, the anthropometric measure weight-for-age of children (as nutritional status and health indicator) was regressed on specified economic, socio-economic (including the livelihood types of households), and health-related variables The factors identified for both the nutrient intake and weight-for-age regressions determine the nutritional status and health of children, which is used as a proxy for the health of the household and the community.

For nutrient intake, total food budget was found to have a highly significant and positive effect on most nutrients, except vitamin C, indicating that this nutrient can be obtained in various food sources in the communities. The evidence for calcium and iron was not conclusive. Other highly significant factors include time allocation for home and child care, education of the mother, nutrient knowledge of caregiver, own-food production, age of individual, and actual household size. These, however, have differential effects on different nutrients, possibly reflecting the availability of or access to the various nutrient food sources. The significantly negative effect of house-

hold size and dependency ratio on calorie intake is reflective of the fact that availability of or access to energy sources of food is limited, and thus, individual intake diminishes with increasing mouths to feed.

Highly significant factors affecting the nutritional status of children by order of importance include the quality of drinking water, education of mother, short-term morbidity, total farm income, off-farm livelihood type households and short-term morbidity (only for children under five years) and nutrition knowledge of mother or caregiver (only for children 5-12 years). Hygiene was found significant only for the under fives. The findings for sanitation, household size and the other livelihood types were not conclusive. Non-farm livelihood type was found to have a positive relation with the nutritional status of 0-<5 years, and farm-based livelihood type household is negatively related with the nutritional status of school children. These imply a preference for younger children with food budget improvements from non-farm income sources, and the negative effect on nutritional status by relying mainly on farm incomes, respectively. Although level of education and nutrient knowledge of caregiver highly mattered in children's health, these could not fully impact nutrient adequacy and better health basically because of the combined effect of income constraints, limited own food production such as in gardens, limited diversity of wild foods, and food donations that cannot simply be depended on.

For children under 5 years, only protein and niacin were adequately met, and, only niacin was met for 5-12 year olds. On average for all children, their intake was about 50 percent of what was considered adequate based on the national nutrient standard (vitamin A, about 41 percent; vitamin C, 44 percent; iron, 54 percent; calcium, 71 percent; thiamine, 41 percent; and riboflavin, 63 percent). On the whole, children under 5 years were only slightly better off in nutrient adequacy. There were very few cases of chronic morbidity, yet even short-term morbidity affected greatly the health of children because they were already weak to start with owing to inadequacy of most nutrients.

On average, the energy adequacy level was only about 50 percent, which is significantly lower than the national average of 99 percent. This has serious implications for the health and growth of children, and the health and work capacity of adults. Generally, the younger children had better nutrient adequacy levels compared to the adults, which showed the priority given to them particularly in the constrained conditions of farming households in the LFAs. The food-fair share ratio shows evidence of bias in favour of the younger children. Although differing in degree, the nutritional status of the teenagers, adults, between the villages and of the sexes shows a similar pattern to that of the school children. The males figured slightly higher nutrient adequacy levels but there was no significant evidence of sex bias as shown in the estimates of the food-fair share ratio.

10.1.2 Lessons learned from the approach and methodologies

Application of the pattern theory in the stepwise articulation of relationships in crop productivity, livelihood type, and finally nutrient status has been made feasible by using the livelihood approach. The latter made it possible to put the relationships in the context of the biophysical environment, thus, necessarily starting with the crop productivity relationships. The research framework has enabled the identification of the critical factors in the biophysical and socio-economic environments that influence household livelihood decisions, represented by the different livelihood portfolios as livelihood types. Using livelihood as the convergent concept enabled the research to focus on households as the level of analysis for investigating livelihood decisions. At the same time, the concept of livelihood enabled viewing the backward links to farming productivity, thereby leading to the critical role of the resource environments, starting with the biophysical environment as a conditioning factor. Various livelihood types reflect the different combination of incomes, resource generation and allocation resulting in some socio-economic status of the household. These interactive processes impact on food security in terms of food availability, access, and adequacy. In effect, the livelihood approach proved useful in identifying the significance and importance of the linkage variables among the three sets of relations.

The use of both quantitative and qualitative tools in data collection and analyses in such complex sets of relationships has been definitely rewarding; one without the other would have generated less meaningful findings. Multivariate analyses (MVA) and grounded theory together resulted in outputs where validity and reliability reinforce each other. Qualitative information gathered from the FGDs, case studies, and other informal tools qualified and enriched the meaning of the resulting variable coefficients.

Using two sets of interview schedules for the focused formal surveys (production and socio-economics of households, food consumption and nutrition) provided the minimum data set required for the comprehensive analyses on food security as exemplified here. They correspond to the Family Income and Expenditure Survey (FIES) and the National Nutrition Survey (NNS) which are regularly undertaken in the Philippines by different agencies. But the interview schedules used in both differ in sampling design and period of administration. The linkage analysis used in this thesis could not be done with the current set up. This implies that the analyses done here can only be applied country-wide with some modification of the FIES instrument (e.g. stratify for area agro-ecology, farming, land characteristics), congruence of sampling design, matching of their reference periods and when surveys are conducted. In this Philippine context, the application of the protocol, which is tested in this study, of an integrated approach to food security assessment is feasible and does not need another set of national surveys. The existing FIES and NNS can be used with the relevant modifications. Location-specific programs or projects geared towards food security assessments can therefore use these two data sets (instead of another survey as is usually done with projects), and enrich the survey results with information from qualitative tools

in respective areas. It will indeed be useful to rationalize conducting the FIES and NNS based on a cost-effective and grounded food security agenda.

This thesis has formulated and tested a protocol for assessing food security in its three dimensions (availability, access and adequacy) using the livelihood approach. The results have shown its applicability and usefulness in identifying the significant and important factors that affect food (in)security by tracing the linkage relationships along the production-consumption chain. The findings have been contextualized within the biophysical and socio-economic environments surrounding the farming households, as well as within the internal realities of the households themselves.

10.2 Policy implications

Although is not intended to produce a blueprint for policy, this thesis hopes to inform policy action. Importantly, it is hoped that the results of the analyses here provided will contribute to rethinking of "strategic notions" or the context of critical "necessary and sufficient conditions", of what makes a difference in the development process that can transform the farming households in the LFAs into a viable and vibrant sector composed of healthy people.

It is often difficult to strike a balance between government responsibilities, needed public action, and scarce resources. There are many ideas and actions of opportunities to be seized, but these are often missed for a host of reasons. The diversity and the complexity of circumstances among resource-poor farming households in less favoured environments are difficult to deal with. The findings in this study suggest that complex interactions among various factors in the external and internal environments of the household lead to a diversity of strategies in the use of resources, and that decisions are coloured by economic and non-economic motives.

Often resource-constrained and many times inadequately informed, governments have been confronted with the challenges of poverty and food insecurity for decades. Experience has shown that the more conventional focus of policies or programmes for farmers to adopt a set of prescribed crops, or farming systems, or soil conservation techniques, have been quite limited (Barbier, 2000; Reardon, 2001). A greater likelihood of wider impact could be those policy approaches that promote improvements in the rural economy, and those that specifically target the variables identified to have significant impact on food availability, access and adequacy. These policy options also include overarching programmes that improve the research and development agenda of relevant cash and food crops, as well as improved access to information and technological innovations on appropriate and viable agricultural land use matched to market opportunities. Important too are the access to institutional support systems for skills development, capital, rural women livelihoods, home food production, nutrition, education and health services, incentives and opportunities in the rural non-farm economy, including market-related rural infrastructure. There is need to improve the capacities of local governments in

planning and operationalising developmental initiatives, and in rationalizing the allocation of their resources for rural development.

To policy advocates, policy makers and development workers alike, the orientation and direction should be that the challenges posed by the three components of food availability, access and adequacy be pursued interdependently, with matching policies and programmes that address technologies or innovations, infrastructures, institutions and governance. Literature suggests that without these, improving rural livelihoods or alleviating poverty and food insecurity will be less likely (Lacy *et al.,* 2003). Recognizing the critical role of livelihoods to reduce the incidence of poverty and food insecurity, Pender (2004:340) reiterated the argument put forward by a number of observers that "the key to the development of sustainable rural livelihoods is investment in an appropriate and socially profitable mix of physical, human, natural, financial and social capital, taking into account the diversity of contexts in developing countries".

10.2.1 Policy options for significant variables affecting land quality of fragile

Areas and related technologies

Chapter 7 discussed the interaction of important land quality characteristics with socio-economic variables that affect farm productivity, and eventually livelihood strategies (Chapter 8) and food security (Chapter 9). The policy options that impact on land quality variables such as idle land (degraded land, infertile soil, lack of capital), together with climatic characteristics (season) and technology (fertilizer application, variety, irrigation) tend to have a longer time perspective and are broader in scope. These are overarching concerns and, thus, would require the following basics.

Integration of the environment in agricultural land use programmes

There is need to integrate environmental conservation and ecologically-friendly land-use strategies in agricultural land-use programmes, with priority given to fragile areas. This, however, should be grounded on the basic requirement which to date is still inadequate: an updated comprehensive characterization of the agro-ecosystems nationwide, especially including an assessment of land quality properties versus land use. The first step could be the collation and synthesis of the fragmented available primary documentation of land use vis-à-vis the different agro-ecosystems from the different commodity-based research and extension institutions, based or affiliated in state universities or ministries, in addition to those with the Bureau of Soils and Water Management (BSWM).

These will need the collaborative efforts of the Department of Agriculture (DA) through the BSWM, the regional/local research and extension units of strategic or zonal state universities and the local government units, and the Department of Environment and Natural Resources (DENR). This collaboration should lead to a more cost-effective implementation of

existing programs in these agencies. However, management-wise, collaboration is an extremely demanding task and often the cause of failures. Mindful of past lessons, there is need to be sensitive and critical to these management demands, together with a rationalized and simplified multi-agency planning and implementing organization, to streamline operations. With the current official mandates, leadership devolves upon the BSWM of the DA. The LGUs will play a vital role at ground level operations (municipal agriculture and environment offices) but they will need to develop skills and capacities to undertake the tasks and responsibilities properly. Capacity development of the appropriate LGU units is critical to sustain the agro-ecology characterization updates, as well as building the knowledge-base for land-use development planning and decision-making at the local levels. The strategic zonal universities with research-extension capacities, the BSWM and the DENR should establish these mentoring-partnerships, sharing the tasks in complementation with each other's strengths and capabilities.

Appropriate land quality enhancement technologies

Farm-specific land quality enhancement technologies should be appropriate, available and affordable, and could use indigenous materials that are sensitive to the socio-economic situation of resource-poor farmers in less-favoured areas. This is easier said than done as experiences showed the non-adoption, for example, of bio- or organic fertilizers in areas where they were tested or introduced. The economic incentive that encourages adoption is critical, which is related to the benefits or profitability of the crop or farm system. Land quality enhancement technologies should be developed or tested by or with farmers themselves and viewed in the context of the crop or farm systems to be applied, as well as matching these with market opportunities. The triple criteria of appropriateness, availability and affordability of the technology or innovation require a mechanism that should be location-specific because of the diversity of farm and farmer circumstances and mixed livelihood systems. Scientists and researchers will need this type of sensitivity in technology generation and dissemination. The demands are both the "hard" technology (e.g. soil fertility replenishment, soil conservation) and "soft" technology (i.e. the "how" of innovations, their delivery, and use-markets matching).

Agriculture research, development and extension should also be sensitive to particular land quality in the development of farm technologies or innovations, and will need to have a full characterization of the required land quality to match with innovations. Often, the mismatch between the innovation, the biophysical environment and the socio-economic resources has led to the non-adoption or non-sustainability of adoption of promising technologies.

Degeneration of land quality in a watershed may call for a long-term, partly or fully subsidized program of regeneration of the watershed, either community-based or of wider-watershed involving various communities. Sourcing of funds will depend on the nature and interests of stakeholders, whether big private companies or interests are involved or government with

external donors. This would involve partnerships among the DENR, the relevant DA unit, BSWM, the relevant LGUs, and/or the National Irrigation Authority, the relevant research institute/ university and the local people.

10.2.1 Policy options for significant variables affecting livelihoods and food

Security

In addition to the land quality and technology-related variables, the policy options that impact on livelihoods and food security can be gleaned from the economic, socio-demographic and health-related variables identified as significant and important in Hypotheses 1 and 2. Relevant to the findings, the following policy options may be considered.

Rationalization of the national data management system for food security assessment

The data management system to assess food security will need to be rationalized in a manner that it allows for the interlinked analyses of:

- resource environments in relation to farm productivity;
- livelihood portfolio in relation to the resource environments and household characteristics, and their respective challenges, constraints, opportunities, growth areas by livelihood type;
- food adequacy in terms of nutritional status and health in relation with livelihood strategies, the resource environments, household and health-related variables.

The current Family Income and Expenditure Survey (FIES) conducted by the National Statistics and Coordination Board (NSCB), and the National Nutrition Survey (NNS) by the Food and Nutrition Research Institute (FNRI) already include the variables (applied in this thesis) needed for the comprehensive analyses of food security, including the linkage relationships from production to consumption and nutrient intake. But under the current set-up, the sampling designs and periods of administration of the two surveys differ, and thus, could not be appropriately used for such type of holistic analyses. To do so will need the rationalization and coordination of the two surveys. A review of the current design, implementing rules and guidelines in the conduct of these surveys, including some modification of the rural/farming sector (e.g. the inclusion of a variable that allows for agro-ecology stratification, land quality specification) may be in order. Coordinating with the DA is another possibility, especially in relation to agro-ecology and land-use characterization. A well-coordinated survey with a clear framework can well improve the efficiency and usefulness of national data management for various national and local developmental concerns, especially when dealing with the complexities of poverty and food security problems. This will minimize the costs arising from the conduct of location-specific primary data collection in many projects, and focus instead on the collection of good and reliable qualitative data to enrich and give meaning to the nationally-generated

FIES and NNS data. This rationalized data management system can address the long-standing demand for reliable data for policy making and development planning.

Review of the agrarian reform programme

A serious review of the agrarian reform program has been a long delayed policy action. It has been suggested that agrarian reform based on the ideology of "land to the tiller" or land redistribution need serious re-thinking, for the obvious reason that despite some reasonably good performance in land distribution, the performance in terms of agricultural productivity has been disappointing. Philippine farms are the least productive among countries in Southeast Asia on average (Adriano, 1999), and dismally low in the LFAs. Agrarian reform needs to be understood not simply as land distribution but as improved land use according to a balancing out of the principles of comparative advantage, social justice, economy and equity. An agrarian reform could be more responsive if it is tailored and sensitive to agro-ecology and land use, matched with market opportunities, economies of scale, community resource management capability, and household resources, incentives and strategies. This could result in various area- or land-use-specific agrarian reform models appropriate to certain types of communities.

This thesis found that land ownership per se is not necessarily a critical factor to productivity, and tenancy was not found to be a deterrent to crop productivity. Instead, security of land-use rights, commonly family land-use rights and handed-down family-based tenancies, were found motivating enough for productivity. In addition, other experiences show that respect for indigenous systems of property rights was found to be more facilitative of productivity or rural development programmes than the introduction of another legal order. The health and vigor of farming communities and their constituent households depend on the alienability of land, the right to convey or transfer property freely (Netting, 1993). Established and respected use rights of land, not necessarily ownership, can perform such function.

The agrarian reform programmme needs the rightsizing of ministries for cost-effectiveness, better coordination, and better integration with related components such as land suitability and farm systems, utilization and markets. Ministry rightsizing improves logistics at a time of serious fiscal deficits, by allocating a portion of the funds to rural infrastructure and basic social services in education and health, or environmental protection.

Implementation of the AFMA

The Republic Act No. 8435, or the Agriculture Fisheries and Modernization Act (AFMA) needs a strong political will to implement it according to the spirit of the law. This legislation has defined clearly the concept of food security that embodies a multi-dimensional concept as articulated in this thesis (a departure from the long history of food self-sufficiency focus). The goals and strategies have been identified in order to achieve the modernization of the fisheries and agriculture sectors to reduce poverty and improve the quality

of life. This definitely has implications for research, development and extension (RDE) budget allocation, in which the stress on food self-sufficiency produced a budget biased in favour of rice. This should be reflected in a budgetary allocation for the RDE of commodities based on the principle of comparative advantage, and not the politics-orientation of the food self-sufficiency thrust.

An important issue relevant to farming in fragile areas is that of cash and food crops (e.g. abaca or coconut with rootcrops, banana), and this may well be expressed in the RDE budget prioritization. As this thesis showed, cash and food crops are not necessarily competitive of themselves or with other farming household activities. The two types of crops are technically complementary in a farming system. For example, rootcrop such as *takudo* or banana is intercropped or mixed with abaca so as to maximize labour use, and the return to land. In RDE programming and budget prioritization, the purely cash crop argument to generate incomes may not be realistic with farming households in less-favoured areas who also must partly or fully produce for their own food in addition to other income generating activities. This implies that RDE agriculture development programs will need to adopt at least a systems perspective that recognizes interdependence and complementarity. Improvements in markets and marketing infrastructure, as well as related micro/macro industry-development and provision of support systems are important components of the RDE programme.

Critical importance of improved social services

The social services programme needs more teeth through substantial improvement in budget and coordination. These are needed in order to effectively implement the social services on education, population management, health and nutrition education by the Department of Health, Food and Nutrition Research Institute, National Nutrition Council, Department of Social Welfare and Development, Department of Agriculture, Department of Education, Culture and Sports, as well as the local government units. The fragmented and uncoordinated implementation of these programmes in many rural areas can only be costly and ineffective. The effects of the interaction of household size, dependency ratio and working children will need to be positively harnessed for rural development through a rationalized and pro-active population management programme which integrates skills development, women livelihoods, and reproductive health. This is critical, particularly in the Philippines now in the fertility transition phase with a population growth rate of 1.8 percent. Fertility decline affects the achievement of the Millennium Development Goals (MDG)[7] via its effect on

[7] The Millennium Development Goals (MDGs) of the Philippines consist of the achievement of targets by 2015 for 17 indicators. These indicators include poverty incidence, subsistence incidence, prevalence of underweight children 0-6 years, net enrolment ratio, cohort survival rate, basic literacy rate, elementary enrolment ratio of girls to boys, secondary enrolment ratio of girls to boys, ratio of literate females, proportion of seats held by women in local politics, under-five mortality rate, proportion of 1-year old children immunized against measles, maternal mortality rate, births

the age-structure in relation to the needed public investments in social services, and the direct links with maternal and child health. The resulting age-structure and its impact on health will either limit or expand the opportunities to achieve the MDGs (Gultiano, 2006).

There is also the need to utilize the role of public media and collaborate with non-government organizations (NGOs) for extensive and intensive health and nutrition education in rural areas, reproductive health, social marketing for indigenous nutrient-rich foods, intensification of home gardening initiatives, agro-industry skills development, market promotion, and primary health care. All these initiatives directly impact on the highly significant variables that were identified in this study as affecting nutritional status and health. Improvements in the pubic health programmes are critical. These require a committed national social services policy with a strengthened capacity building for local governments to develop better mechanisms for generating resources for an effective local health delivery system. The current collaborative initiatives of the DOH and GTZ on assessing the socio-economic status, reproductive health and health insurance among households in Region VIII (Southern Leyte, Eastern Samar) should be expanded and the results used for appropriate policy action, particularly the local health delivery system. Social marketing towards better health among children, women and mothers needs beefing up in order to stimulate both public and private investments in local health services.

The potentials of tapping the government's overseas foreign workers (OFW) fund will need to be explored as additional means of investment for rural development. This fund can be ploughed back to priority poverty stricken areas to be used in social services particularly for women and out-of-school youth skills training, certain deficiencies in existing health services particularly in primary health care, disease prevention, quality drinking water and sanitation. These are critical factors which affect finally the health situation of farming households, especially the children.

Crucial role of non-farm livelihood components

This research has shown the growing crucial importance of non-farm livelihoods in the overall livelihood system of farming households. Non-farm income remittances were used as capital (e.g. seed, animal power, fishing boat, labour wage), as insurance for risk, for human capital investment (e.g. education of siblings), and household maintenance (i.e. medical expenses, food sustenance). They have been key sources for livelihood diversification by the rural poor and the income growth in many developing countries. These were usually through the exploitation of indigenous resources and capacities, and market niches; appropriate technology and innovations; and support systems such as market promotion and expansion, financial sources, standards and regulations, capacity for organizations strengthening, entrepreneurship

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attended by skilled health personnel., proportion of households with sustainable access to improved water source, access to improved sanitation, and access to secure tenure (NSCB, 2006)

development, leadership and management of the non-farm livelihoods (Reardon, 2001; Haggblade *et al.,* 2002; Ruben and Pender, 2004).

Interventions for the rural non-farm sector should be responsive to identified constraints in both or either the demand (e.g. absence or limited markets, low incomes, unattractive price), and/or the supply (e.g. unstable raw materials, product quality, technology, lack of capital) sides. Demand side policies could include pro-agriculture policies, government purchase, trade policies, linkages, and marketing assistance. Supply side policies include macro-economic policies that affect input cost and output prices, standards and regulation, zoning, rural infrastructure, credit supply and availability, technology, and entrepreneurship and management assistance, extension, raw materials, and skills training. These interventions will need to be tailored to the specific circumstances of different settings because their prospects, opportunities and constraints differ, as evidence from the two research villages shows. Evaluating these prior to any interventions scheme is critical, and the choice of appropriate analytical tools and development approach are likewise important. Literature suggests that developing the non-farm sector should not assume it the be-all of addressing poor rural incomes, but should recognize the linkage between the farm and non-farm sectors (Reardon *et al.,* 2001; Haggblade *et al.,* 2002). A rural development strategy that stresses the growth of farm, off-farm and non-farm components within a village or clusters of villages, and considering the diverse influence of the bio-physical and socioeconomic factors, is crucial. The complexity of conditions of the poor farming households in less favoured areas may render this a formidable task. Models and approaches which worked in other areas with more or less similar circumstances could be tried, noting the principle of comparative advantage, systems-orientation, the role of institutions and relevant support systems, leadership and management capacities among stakeholders, and sensitivity to the perspective of various actors.

Rationalization of the poverty and rural development programs

Presently, a number of poverty and rural development programmes are being undertaken by various agencies such as the National Anti-Poverty Commission (NAPC), DAR, DA Department of Finance (DOF), the LGUs, research institutes and universities, and the BIDANI, among others. The government and non-government structures that address these programmes are so huge and diverse, and are impractical to be coordinated by a single entity. Rationalization and streamlining of these programs will, at least, need a commonly understood framework of the interface of concerns in rural development, poverty reduction and food security. The targets in the MDG document provide enough focal points to address. Points of convergence (by area, by sector, by target group) will need to be determined and assessed to improve the cost-effectiveness of implementation, and improve the efficient complementation among agencies and beneficiaries at the ground level. In addition, the concerned agencies should be conscious of coordination as much as possible in their areas of responsibilities.

Rural development and poverty programs could very well consider innovative approaches which are process and systems-oriented, user sensitive, engages and empowers the communities and the people concerned. This process approach assesses the causes of vulnerability, assets, livelihoods and strategies, to livelihood generation, increased income and well-being, food security, and sustainable use of natural resource base. This people-centered and holistic approach focuses on assets and vulnerabilities in achieving sustainable livelihoods, through greater empowerment and participation (Carney, 1998) and helps to link up important aspects of livelihoods, poverty and food security so that they could be seen as parts of a holistic approach to poverty reduction, thus improving the likelihood of lasting improvements in food security (Thomson, 2001).

This process approach can be integrated with the "food systems" perspective, which tackles not only the present malnutrition problems, but also the long term impact on the productivity and well-being of the population. The key is to understand the causes of malnutrition, and explore strategic linkages, such as food systems, between agriculture and human nutrition (Combs *et al.,* 1996, 1997). The food systems approach may be understood and implemented in three components. First, assessing the factors affecting nutritional inadequacies, which could use the protocol provided in this study. Second, to put in place a research and development agenda within relevant research institutes for the analysis of the nutrient content of various plant species, which can be grown in home gardens and farms, or those from the wild foods. In line with this approach is the need to strengthen current efforts by national and local agencies in improving the diversity of own food nutrient sources. This may be the most feasible solution for the poor farming households in the short and medium terms. Third, intensive social marketing to promote the diversity of own-production of food-nutrient sources by the relevant research institutes, the local government unit and community-based organizations or civic society groups. In the medium to long runs, the relevant international research community will need to collaborate with the national research systems in developing and implementing the RDE for improving the diversity of food nutrient sources in home gardens and wild foods, bio-fortification of staples, and health-oriented products appropriate for the rural poor. Various collaborative programmes of the international agricultural research centres (IARCs), such as IFPRI, IRRI, CIP and IPGRI, which are geared towards improving the links between biodiversity, agriculture, human nutrition and health, are significant steps towards addressing food insecurity among the poor households (Bouis *et al.,* 2000; Welch and Graham, 2000; Frison *et al.,* 2006) in the medium to long runs.

Appropriate approach and focus

Many times the importance of an appropriate perspective and methodology is made explicit, but the various actors concerned are not properly oriented or capacitated to implement poverty and food security programmes. There are a

number of approaches and tools to improve participation, accountability, responsibility, and engagement.

Maxwell (2001) distinguishes different strategies and argues that a "food security-first policy strategy" stresses improving the poor people's ability to acquire and access food in various ways (production, purchase, exchange, donation), and not food production per se. The focus is more on the integration of agricultural and rural development for poverty reduction giving priority to low potential or less favoured areas. Resources are invested to reduce poor people's vulnerabilities such as measures to increase income in cash or food crops, own-food production, or for emergency relief. This may be costly in terms of growth in the short and medium-term but is aimed at alleviating poverty and food insecurity in the medium and long term. This differs from the "food-first policy" which stresses food self-sufficiency in production, particularly the cereal staple, even though some areas do not have comparative advantage. This focus usually benefits the high potential areas and, thus, contributes less to poverty reduction.

Huddleston (1990) claims that a food security approach to development is practically useful for at least the following reasons. First, food security indicators such as food consumption and nutrient adequacy are more meaningful measures of poverty than average per capita income estimates because they provide better account of intra-household differences in food access. These indicators identify the poor and vulnerable groups, and can be used as impact indicators of policy or programme. Second, with such concrete indicators, the likelihood of a better directed analysis and programming is higher than the income-based poverty approach.

However, with the existing sector or commodity-based nature of most planning and implementing structures in the country, a food security policy strategy should be seen as a framework to preserve the holistic perspective and provide the linkages between the sectoral approaches. For example, global commitments such as those of the World Food Summit of 1996, reiterated in 2002, will have to be assessed as to the extent to which these are reflected in country sector strategies. Thomson (2001) stressed the importance of increasing the level of participation of the poor and food insecure in the policy process, especially because of the diversity of livelihood strategies they adopt. Further refining the decentralization process as provided by the Local Autonomy Act, together with good governance, could improve the creation of an enabling environment for the poor themselves to participate in policy making and programme implementation. Such allows for greater awareness and responsiveness to local conditions and accountability to the local populace. The role of the LGUs is critical. A progressive local leadership, which is sensitive to the food security challenges and opportunities, encourages collaboration among various sectors, and exercises political will through a pro-active rural development programme, is basic need in local initiatives.

10.3 Policies, time and institutional perspectives

There is a mixed coverage of food security issues in real practice. This needs improvement and all those involved in the development process, both government and non-government agencies, need to intensify capacity building in the treatment or integration of food security programmes at various levels. An overarching concern is the capacity building of development workers and all those engaged in food security initiatives in various types of work whether in the assessment, planning, implementation, monitoring or evaluation. Given the bloated government bureaucracy, the rationalization of the institutional set up will need to be seriously addressed, no matter how painstaking the process. This is indeed a formidable challenge since various agencies are currently doing fragments or components of the whole endeavour on poverty reduction and food security. Programmes addressing both will need to be rationalized since food security is an integral part of poverty reduction efforts. The policy options discussed in Sections 10.2.1 and 10.2.2 will need to be organized into a workable institutional infrastructure from the national down to the local levels to streamline efforts. These institutional challenges need strong policy commitments and their implementations require good governance.

The time perspective is another concern. Policy options will need to be clearly viewed in terms of workable options in the short, medium and long runs. The works in order to assess, design, plan, organize, commit resources and implement the food security agenda are multi-faceted and complex. Implementing the existing food security programmes by different ministries and agencies in various areas while building on experience demands that options be placed in their proper time horizon. The short-run will have to deal with the existing resources, initiatives, institutional set-up, constraints and opportunities. Optimizing the givens is the dictum for the short-run strategy. The medium-term policy options consider those that are doable from the feasible changes in resources, initiatives and institutional set-up such as improving coordination and modifying the approach together with the needed resources. The long-term options include those that require substantial change in the institutional set-up together with big investments for implementation, and require a relatively long time to produce results. Nevertheless, the options relative to the different time perspectives should have a clearly defined framework so as to have cumulative results of a unified direction, that is, food security.

Hopefully, the results and insights from this thesis and the protocol tested here will further serious interest and commitment to the food insecurity challenge, especially among the poor farming households on fragile lands.

References

ACC/SCN (2000)
4th Report on the world nutrition situation. Geneva, Switzerland, United Nations Administrative Committee on Coordination, Sub-Committee on Nutrition.

Agarwal, B. (1997)
"Bargaining" and gender relations: within and beyond the household. *Feminist Economics* 3(1): 1-51.

Ahmed, A. (2005)
Livelihood and food security in rural Bangladesh. The role of social capital. PhD Thesis Wageningen University.

Alburo, F. (1979)
Comparative agricultural modernization and non-farm economic activities. Quezon City, School of Economics.

Aldaba, F. & P. Tuaño (1997)
The effects of economic policies and reforms on poverty-oriented economic policy. A country study for the Philippines. Eschborn, Germany, Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ).

Anderson, M., F. Bechhofer & J. Gershuny (1994)
Individual and household strategies. In: *The social and political economy of the household*, M. Anderson, F. Bechhofer & J. Gershuny (eds). New York, Oxford University Press, pp. 19-68.

Asian Development Bank (2001)
Republic of the Philippines – Asian Development Bank Poverty Partnership Agreement, TA 3422-PHI. Joint ADB, UNDP and World Bank Poverty Consultations. Manila, ADB, UNDP and World Bank.

Azurin, P. & E. LLanto (2003)
Past, present and future: an analysis of the Philippine economy. International Development and Econometrics Association.

Balatibat, E.M. (2004)
The linkages between food and nutrition security in lowland and coastal villages in the Philippines. PhD Thesis Wageningen University.

Balisacan, A.M. (1991)
Agricultural growth, landlessness, off-farm employment, and rural poverty in the Philippines. Quezon City, School of Economics, University of the Philippines Diliman.

Balisacan, A.M. (1996)
Rural growth, food security, and poverty alleviation in developing Asian countries. Quezon City, School of Economics, University of the Philippines Diliman.

Balisacan, A.M. & S. Fujisaki (eds) (1999)
What do we really know - or don't know - about economic inequality and poverty in the Philippines? Causes of poverty: myths, facts and policies. A Philippine study. Quezon City, University of the Philippines Press.

Barbier, E.B. (1997)
The economic determinants of land degradation in developing countries. *Philosophical Transactions* 352: 891-899.

Barbier, E.B. (2000)
The economic linkages between rural poverty and land degradation: some evidence from Africa. *Agriculture, Ecosystems and Environment* 82: 355-370.

Bardhan, P. & C. Udry (1999)
Household Economics. In*: Development Microeconomics*. Oxford, Oxford University Press. pp. 7-19.

Baybay, Municipality of (2000)
Comprehensive Land Use Plan. Municipal Planning and Development Office, Baybay, Philippines.

Bebbington, A. (1999)
Capitals and capabilities: A framework for analyzing peasant viability, rural livelihoods and poverty. *World Development* **27**(12): 2021-2043.

Becker, G.S. (1981)
A treatise on the Family. Cambridge, Massachusetts and London, Harvard University Press.

Behrman, J.R. (1988)
Intrahousehold allocation of nutrients in rural India: are boys favored? Do parents exhibit inequality aversion? *Oxford Economic Papers* 40: 32-54.

Behrman, J.R. (1988)
Nutrition, health, birth order and seasonality. *Journal of Development Economics* 28: 43-62.

Behrman, J.R. (1992)
Intra-household allocation of nutrients and gender effects: a survey of structural and reduced-form estimates. In: *Nutrition and Poverty*. S.R. Osmani (ed.). Oxford, Clarendon Press, pp. 287-323.

Behrman, J.R. & A.B. Deolalikar (1988)
Health and nutrition. In: *Handbook of Development Economics Vol. 1*. H. Chenery & T.N. Srinivasan (eds). Amsterdam, New York, Oxford, Tokyo, Elsiever Science Publishers B.V., pp. 632-711.

Bell, D.E., W.C. Clark & V.W. Ruttan (1994)
Global research systems for sustainable development: agriculture, health, and environment. In: *Agriculture, environment, and health: Sustainable development in the 21st century*. V.W. Ruttan (ed.). Minneapolis, London, University of Minnesota Press, p. 401.

Berg, A. (1981)
Malnourished people: a policy view. Washington D.C., World Bank.
Bergeron, G. (1999)
Rapid assessment methods for the assessment, design, and evaluation of food security programs. *Technical Guide*. Washington, D.C., International Food Policy Research Institute.
Berman, P. , C. Kendall & K.Bhattacharya (1994)
The household production of health: integrating social science perspectives on micro-level health determinants. *Social Science Medicine* 38(2): 205-215.
Bindraban, P.S. & A.J.V. Verhagen (1999)
A land quality indicator for sustainable land management: the yield gap. The case of Sub-Saharan Africa. Wageningen, Wageningen University & Research Centre.
Blaikie, P. & H. Brookfield (1987)
Land Degradation and Society. London, Methuen.
Blijham, N., L. de Kan & A. Niehof (2006)
Determinants and adequacy of food consumption of children in La Trinidad, the Philippines. *International Journal of Consumer Studies*: doi: 10.1111/j.1470-6431.2006.00501.x.
Boardman, J., J. Poesen & R. Evans (2003)
Socio-economic factors in soil erosion and conservation. *Environmental Sciences and Policy* 6: 1-6.
Bos, E., L. Adolfse & N. Heerink (1993)
Undernutrition: a constant threat. Towards an integrated analysis of the socio-economic determinants of nutritional status. *Wageningen Economic Papers*.
Boserup, E. (1990)
Economic and Demographic Relationships in Development. Baltimore and London, The Johns Hopkins University Press.
Bouis, H.E. (1994)
The effect of income on demand for food in poor countries: Are our food consumption databases giving us reliable estimates? *Journal of Development Economics* 44: 199-226.
Bouis, H.E. & C.L. Peña (1997)
Inequality in the intrafamily distribution of food: the dilemma of defining an individual's "fair share". In: *Intrahousehold resource allocation in developing countries: models, methods, and policy*. L. Haddad, J. Hoddinott & H. Alderman (eds). Baltimore and London, The Johns Hopkins University Press, pp. 179-212.
Bouis, H.E. & R.D. Graham, et al. (2000)
The Consultative Group on International Agricultural Research (CGIAR) micronutrients project: justification and objectives. *Food and Nutrition Bulletin* 21(4): 374-381.
Brons, J., T. Dietz, K. Witsenburg & A. Niehof (2006)
Dimensions of vulnerability of livelihoods in less-favoured areas:

interplay between the individual and the collective. CABI Books [in press].

Bryceson, D.F. (1996)
Deagrarianization and rural employment in Sub-Saharan Africa: A sectoral perspective. *World Development* 24(1): 97-111.

Bryceson, D.F. (1999)
Sub-Saharan Africa betwixt and between: rural livelihood practices and policies. ASC Working Paper 43. Afrika Studiecentrum, Leiden.

Bryceson, D.F.(2000)
Peasant theories and smallholder policies: past and present. In: *Disappearing peasantries? Rural labour in Africa, Asia and Latin America.* D.F. Bryceson. London, Intermediate Technology Publications, pp. 1-36.

Brydon, L.A. (1993)
Women in the Third World. New Brunswick, New Jersey, Rutgers University Press.

Cabanilla, L.S. & M.M. Paunlagui (1999)
Food security in the Philippines. Los Baños, Laguna, Institute of Strategic Planning and Policy Studies, UPLB and UP Center for Integrative and Development Studies.

Cabrillo, F. (1999)
The Economics of the Family and Family Policy. London, Edward Elgar, MPG Books, Ltd.

Caldwell, J.C. (1982)
Theory of Fertility Decline. New York, Academic Press.

Calhoun, C. (2002)
Dictionary of the Social Sciences. Oxford, Oxford University Press.

Camacho, J.I.N. (2003)
Philippines' resilience under challenging conditions. Recent economic developments. Manila, the Government of the Republic of the Philippines.

Carney, D. (1998)
Implementing the sustainable rural livelihoods approach. In: *Sustainable rural livelihoods. What contribution can we make?* Carney, D. (ed). London, Department for International Development, pp. 3-26.

Castillo, G. (1993)
Where food and population meet: the Filipino household among other households. University of the Philippines Center for Integrative and Development Studies.

CGIAR (1997)
New frontiers in participatory research and gender analysis. Cali, Colombia, Centro Internacional de la Agricultura Tropical.

Chambers, R. (1989)
Editorial Introduction: Vulnerability, Coping and Policy. *IDS Bulletin* 20: 1-7.

Chambers, R. & G.R. Conway (1992).
Sustainable rural livelihoods: practical concepts for the 21st century. *IDS Discussion Paper 296*.

Chen, H. (1996)
The role of gender in farming household decision-making in Yaan, Southwestern China. PhD Thesis Wageningen University.

Chen, R.S. & R.W. Kates (1994)
World food security: prospects and trends. *Food Policy* 2: 192-208.

Constable, N. (2003)
Dolls, T-birds, and ideal workers: the negotiation of Filipino identity in Hong Kong. In: *Home and Hegemony: Domestic Service and Identity Politics in South and Southeast Asia*. K.M. Adams & S. Dickey (eds). Ann Arbor, The University of Michigan Press, pp. 221-249.

Corcolon, R.G. & M.R. Nguyen (2002)
Food and nutrition: a comparative study in two Laguna villages. In: *Meeting food security: a study of Laguna households in transition*. Los Baños, Institute of Strategic Planning and Policy Studies, College of Public Affairs, University of the Philippines College Laguna, pp. 23-51.

Coxhead, I. (2000)
Consequences of a food security strategy for economic welfare, income distribution and land degradation: the Philippine case. *World Development* 28(1): 111-128.

Coxhead, I., G. E. Shively & X. Shuai (2001)
Agricultural development policies and land expansion in a Southern Philippine watershed. In: *Agricultural Technologies and Tropical Deforestation*. A. Angelsen & D. Kaimowitz (eds). New York, CABI Publishing, pp. 347-363.

Cramb, R.A., J.N.M. Garcia, R.V. Gerritz & G.C. Saguiguit (2000)
Conservation farming projects in the Philippine uplands: rhetoric and reality. *World Development* 28(5): 911-927.

Dargantes, B.B., W. Koch, V. Hoffmann & R. Jahn (1998)
Socio-economic influences on agro-ecosystem modification: case examples from Leyte, Philippines. *PLITS* 16(2): 247-257.

Dabin, B. (1980)
Phosphorus deficiency in tropical soils as a constraint on agricultural output. In: *Soil-related Constraints to Food Production in the Tropics*. Los Baños, Laguna, Philippines, International Rice Research Institute, New York State College of Agriculture and Life Sciences, Cornell University and University Consortium of Soils for the Tropics Institute, pp. 217-232.

Dasgupta, P., C. Folke & K. Mäler (1994)
The environmental resource base and human welfare. In: *Population, Economic Development and the Environment*. K. Lindahl-Kiessling

& H. Landberg (eds). New York, Oxford University Press, pp. 25-51.

Davies, S. (1993)
Are coping strategies a cop out. *IDS Bulletin* 24(4): 60-72.

Davies, S. & N. Hossain (1997)
Livelihood adaptation, public action and civil socieity: A review of the literature. *IDS Working Paper* 57.

De Tray, D. (1980)
On the microeconomics of family behaviour in developing societies. In: *Rural household studies in Asia*. H. P. Binswanger, R. E. Evenson, C.A. Florencio & B.N.F. White (eds). Singapore, Singapore University Press, pp. 69-97.

Den Hartog, A.P., W.A. van Staveren & I. Brouwer (1995)
Manual for social surveys on food habits and consumption in developing countries. Weikersheim, Margraf Verlag.

Dent, F.J. (1980)
Major production systems and soil-related constraints in Southeast Asia. In: *Soil-related constraints to food production in the tropics*. Los Baños, Laguna, Philippines, International Rice Research Institute, New York College of Agriculture and Life Sciences, Cornell University and University Consortium of Soils for the Tropics, pp. 78-106.

Department of Agriculture (1998)
Implementing Rules and Regulations (Amended) pursuant to Republic Act 8435: The Agriculture and Fisheries Modernization Act of 1997. *DA Administrative Order*. Quezon City, Philippines.

Devereux, S. & S. Maxwell (2001)
Food security in Sub-Saharan Africa. London, ITDG Publishing.

Dolan, R.E. (1991)
Philippines. A country study. *US Library of Congress country study*.

Dove, M.R., (1984)
The Chayanov slope in a swidden society: household demography and extensive agriculture in Western Kalimantan. In: *Chayanov, Peasants, and Economic Anthropology*. P.E. Durrenberger (ed.). Orlando, Florida, Academic Press Inc., pp. 97-130.

Dulag, Municipality of (1998)
Comprehensive Land Use Plan. Dulag, Philippines, Municipal Planning and Development Office.

Dumont, J.P. (2003)
Always home, never home: Visayan "helpers" and identities. In: *Home and Hegemony: Domestic Service and Identity Politics in South and Southeast Asia*. K.M. Adams &. S. Dickey (eds). Ann Arbor, The University of Michigan Press, pp. 119-135.

Durrenberger, P.E. (1984)
Introduction: Chayanov and agricultural policy. In: *Chayanov,*

Peasants, and EconomicAanthropology. P. E. Durrenberger (ed.). Orlando, Florida, Academic Press Inc., pp. 1-22.

El-Swaify, S.A. (1997)
Factors affecting soil erosion hazards and conservation needs for tropical steeplands. *Soil Technology* 11: 3-16.

Ellis, F. (2000)
Peasant Economics: Farm Households and Agrarian Development. Cambridge, Cambridge University Press.

Ellis, F. (2000)
Rural Livelihoods and Diversity in Developing Countries. Oxford, Oxford University Press.

Ellis, F. & H.A. Freeman (2004)
Rural livelihoods and poverty reduction strategies in four African countries. *The Journal of Development Studies* **40**(4): 1-30.

Elson, D. (1990)
Some issues regarding women's role in the management of family resources for the achievement of household food security and nutrition. Nutrition Consultant's Report. Rome, Food and Agriculture Organization, United Nations.

Estudillo, J. P. (1997)
Income inequality in the Philippines, 1961-91. *The Developing Economies* XXXV(1): 68-95.

Ethel, N. (1965)
Life in a Leyte Village. Seattle, University of Washington Press.

Evans, A. (1991).
Gender issues in rural household economics. *IDS Bulletin* 22(1): 51-59.

Evanylo, G. & R. McGuinn (2000)
Agricultural management practices and soil quality: measuring, assessing, and comparing laboratory and field test kit indicators of soil quality attributes. *Virginia Cooperative Extension*, 13 DOI: http://www.ext.vt.edu/pubs/compost/452-400/452-400.html

Evenson, R.E., B.M. Popkin & E.K. Quizon (1980)
Nutrition, work, and demographic behaviour in rural Philippine households: a synopsis of several Laguna household studies. In: *Rural household studies in Asia*. H. P. Binswanger, R. E. Evenson, C.A. Florencio & B.N.F. White (eds). Singapore, Singapore University Press, pp. 289-364.

Fafchamps, M. & A.R. Quisumbing (1997)
Human capital, productivity, and labor allocation in rural Pakistan. *The Journal of Human Resources* XXXIV(2): 367-406.

Florencio, C.A. (1980)
Household behaviour: the nutritionists' perspective. In: *Rural household studies in Asia*. H.P. Binswanger, R.E. Evenson, C.A. Florencio & B.N.F. White (eds). Singapore, Singapore University Press, pp. 26-41.

Florencio, C.A. (2003)
Food and nutritional status of Filipinos and nutrition integration. Quezon, Philippines, University of the Philippines Diliman.
Folbre, N. (1984)
Household production in the Philippines: a neo-classical approach. *Economic Development and Cultural Change* 32: 303-330.
Folbre, N. (1984)
Market opportunities, genetic endowments, and intrafamily resource distribution: comment. *The American Economic Review* 74(3): 518-520.
Food and Agriculture Organization Nutrition Profile: Philippines. Rome, ESN-NUTRITION, FAO.
Food and Agriculture Organization (1996)
Rome Declaration on World Food Security and World Food Summit Plan of Action.
http://www.fao.org/docrep/003/w3613e/w3613e00/HTM
Food and Nutrition Research Institute (1997)
The Philippine food composition tables. Metro Manila, Philippines, FNRI-DOST Foundation.
Food and Nutrition Research Institute (2001)
Philippine nutrition: facts and figures. Metro Manila, Food and Nutrition Research Institute.
Food and Nutrition Research Institute (2002)
2001 Updating of nutritional status of Filipino children at the regional level. Metro Manila, Food and Nutrition Research Institute, Department of Science and Technology.
Food and Nutrition Research Institute (2002)
Philippine Nutritional Facts and Figures Supplement 1: 2001 Update of the Nutritional Status of 0-10 Year-old Filipino Children. Manila, FNRI.
Food and Nutrition Research Institute (2002)
Recommended energy and nutrient intakes. Manila, Philippines, FNRI-DOST Foundation.
Food and Nutrition Research Institute (2004)
FNRI through the years. *Manila Bulletin*. Manila.
Food and Nutrition Research Institute (2006)
Wide use of fortified foods with Sangkap Pinoy seal among Filipino households noted. DOI:
http://www.fnri.dost.gov.ph/wp/sangkappinoy.htm
Frankenberger, T.R. (1985)
Adding a food consumption perspective to farming systems research. Nutrition Economics Group, Technical Assistance Division, Office of International Cooperation and Development United States Department of Agriculture, 65 pp.
Frankenberger, T. R. (1992)

Indicators and data collection methods for assessing household food security. Review paper on household food security, IFAD and UNICEF.

Frankenberger, T.R. & M.K. McCaston (2001)
The household livelihood security concept. *Food, nutrition and agriculture 22 X0051t05*. USA.

Frison, E.A., I.F. Smith, T. Johns, J. Cherfas & P. Eyzaguirre (2006)
Agricultural biodiversity, nutrition, and health: Making a difference to hunger and nutrition in the developing world. *Food and Nutrition Bulletin* 27(2): 167-179.

Fuwa, N. (1999)
An analysis of social mobility in a village community: The case of a Philippine village. *Journal of Policy Modelling* 21(1): 101-138.

Garcia, M. (1990)
Resource allocation and household welfare: A study of the impact of personal sources of income on food consumption and health in the Philippines. PhD Thesis Institute of Social Studies, The Hague.

Gari, J.A. (2004)
Plant, diversity, sustainable rural livelihoods and the HIV/AIDS crisis. Bangkok, United Nations Development Programme.

Gayao, B.T., H.L. Quindara, J.M. Sim, D.T. Mendoza, E.T. Bogan, C.C. Shagol & E.J.D. Shagalla (2004).
Contribution of sweetpotato to household income, food and nutrient intake of farmers and processors. *NPRCRTC Working Paper Series*. La Trinidad, Benguet, Northern Philippines Root Crops Research and Training Center.

GCRIO (2005)
Soil quality. http://www.gcrio.org/geo/quality.html. Retrieved 8-3-2005.

Geertz, C. (1968)
Agricultural Involution. The Processes of Ecological Change in Indonesia. Berkeley and Los Angeles, University of California Press.

Gibson, R.S. (1990)
Principles of Nutritional Assessment. New York, Oxford, Oxford University Press.

Gittelsohn, J. (1992)
Applying anthropological methods to intrahousehold resource allocation. In: *Understanding how resources are allocated within households*. Washington D.C., International Food Policy Research Institute, pp. 7-8.

Gono, C. (1997)
The state of CARP implementation in 1997. Manila, Philippines, Institute of Church and Social Issues.

Gronau, R. (1980)
Leisure, home production, and work. In: *Rural Household Studies in*

Asia. H.P. Binswanger, R.E. Evenson, C.A. Florencio & B.N.F. White (eds). Singapore, Singapore University Press, pp. 42-68.

Gultiano, S.A. (2006)
Fertility and age-structural transitions and the Millenium Development Goals: perspective from the Philippines. *FAD Library* DOI:http://www/teenfad.ph/news/current/fad_library_fertility_and_agestructural_transition.htm.

Haaga, J.G. & J.B. Mason (1987)
Food distribution within the family: evidence and implications for research and programmes. *Food Policy* 12(2): 146-160.

Haddad, L. (1991)
Gender and poverty in Ghana: a descriptive analysis of selected outcomes and processes. *Institute of Development Studies Bulletin* **22**(1): 5-21.

Haddad, L., H. Alderman, S. Appleton, L. Song, & Y. Yohannes (2003)
Reducing child malnutrition: how far does income growth take us? *The World Bank Economic Review* 17(1): 107-133.

Haddad, L., J. Hoddinott, & H. Alderman (1997)
Introduction: the scope of intrahousehold resource allocation issues. In: *Intrahousehold Resource Allocation in Developing Countries: Methods, Models, and Policy*. L. Haddad, J. Hoddinott & H. Alderman (eds). Baltimore and London, The Johns Hopkins University Press, pp. 1-16.

Haddad, L. & R. Kanbur (1990)
How serious is the neglect of intra-household inequality? *The Economic Journal* **100**: 866-881.

Haddad, L., C. L. Peña, C. Nishida, A. Quisumbing & A. Slack (1996)
Food Security and Nutrition Implications of Intrahousehold Bias: A Review of Literature. Washington D.C., International Food Policy Research Institute Food Consumption and Nutrition Division.

Hankin, J.H. (1979)
Proceedings Methodologies for Human Population Studies in Nutrition related to Health. Bethesda, Maryland, US Department of Health and Human Services, Public Health Service, National Institute of Health.

Hardon-Baars, A.J. (1996)
User/use-oriented approaches to technology assessment and innovation. In: *Into action research: partnerships in Asian rootcrop research and development*. Los Baños, Laguna, Philippines, UPWARD, pp. 203-217.

Harriss-White, B. (1997)
Gender bias in intrahousehold nutrition in South India: unpacking Households and the policy process. In: *Intrahousehold Resource Allocation in Developing Countries: Models, Methods, and Policy*. L. Haddad, J. Hoddinott & H. Alderman (eds). Baltimore and London, The Johns Hopkins University Press, pp.194-212.

Hart, G. (1980)
Patterns of household labour allocation in a Javanese village. In: *Rural Household Studies in Asia*. H.P. Binswanger, R.E. Evenson, C.A. Florencio & B.N.F. White (eds). Singapore, Singapore University Press, pp. 188-217.

Hart, G. (1995)
Gender and household dynamics: Recent theories and their implications. In: *Critical issues in Asian development theories, experiences, and policies*. M.G. Quibria (ed.). Oxford and New York, Oxford University Press.

Hayami, Y. (2001)
Ecology, history, and development: A perspective from rural Southeast Asia. *The World Bank Economic Observer* 16(2):169-198.

Herrin, A. & R. Racelis (1995)
Monitoring the coverage of public program on low-income families: Philippines, 1992. Pasig City, MetroManila, Integrated Population and Development Planning Project, National Economic Development Authority.

Ho, T.J. (1976)
Time budgets of married women in rural households: Laguna. Quezon City, Institute of Economic Development and Research.

Hoddinott, J. (1992)
Household economics and the economics of households. *Understanding how resources are allocated within households*. Washington D.C., International Food Policy Research Institute. pp. 9-12.

Hoddinott, J, (1999)
Operationalizing household food security in development projects: an introduction. Washington D.C., International Food Policy Research Institute.

Holden, S.T. & H.P. Binswanger
Small-farmer decisionmaking, market imperfections, and natural resource management in developing countries. In: *Agriculture and the environment.* Lutz, E. (ed). Washington, D.C. The World Bank, pp. 50-67.

Horrell, S. (1994)
Household time allocation and women's labour force participation. In: *The social and political economy of the household*. M. Anderson, F. Bechhofer & J. Gershuny (eds). New York, Oxford University Press, pp. 198-225.

Hospes, O. (1995)
Women's differential use of ROSCAs in Indonesia. In: *Money-Go-Rounds. The Importance of Rotating Savings and Credit Associations for Women*. S. Ardener & S. Burman (eds). Oxford, Washington D.C., Berg Publishers, pp. 127-148.

Hossain, M. (1980)
Transformation of Asian rural economy. *Asian rural economy and multifunctionality of agriculture*. pp. 1-21.
http://www.nscb.gov.ph/poverty/2000/, N. (2000)
2000 Poverty estimates - annual per capita poverty thresholds: 2002 and 1997. *Statistical indicators*. Manila, National Statistics Coordination Board.
http://www.nscb.gov.ph/poverty/2003/, N. (2003)
Gross regional domestic product (GRDP), National Statistics Coordination Board.
http://www.nscb.gov.ph/secstat/d_agri.asp. (2004)
Agriculture and fishery statistics. *Statistics*. Retrieved 9-02-2005.
http://www.nscb.gov.ph/secstat/d_income.asp. (2003, 24 January 2005)
Family income. Statistics. Retrieved 9-02-2005.
http://www.nscb.gov.ph/secstat/d_labor.asp. (2004, 15 December 2004)
Labor and employment statistics. *Statistics.* Retrieved 9-02-2005.
http://www.nscb.gov.ph/secstat/d_vital.asp. (2003).
Vital, health and nutrition. *Statistics*. Retrieved 9-02-2005.
http://www.nscb.gov.ph/sna/2004/4qtr-2004/2004gnpi4.asp. (2004, 4th quarter 2004) Gross national product and gross domestic product. *Statistics.* Retrieved 9-02-2005.
http://www.nscb.gov.ph/stats/statdev/, N. (2004)
Statistical indicators on Philippine development 2004. *Statistical Development Philippines 2004*. Manila, National Statistics Coordination Board.
Huddleston, B. (1990)
FAO's overall approach and methodology for formulating national food security programmes in developing countries. *IDS Bulletin* 21(3): 82-83.
International Fund for Agricultural Development (2001)
Rural Poverty Report 2001: The Challenge of Ending Rural Poverty. Rome, Italy, International Fund for Agricultural Development.
International Labor Organization (1974)
Sharing in development: a programme of employment, equity and growth in the Philippines. Geneva, ILO.
James, W.P.T. & E.C. Schofield (1990)
Human Energy Requirements: A Manual for Planners and Nutrition-ists. New York, Oxford University Press.
Jenkins, J.C. & S.J. Scanlan (2001).
Food security in less developed countries, 1970 to 1990. *American Sociological Review* 66(5): 718-744.
Joekes, S. & N. Kabeer (1991)
Researching the household: methodology and empirical issues. *IDS Bulletin* 22(1): pp. 1-3.
Jorion, P. (1984)
Chayanov should be right: testing Chayanov's rule in French fishing

community. In: *Chayanov, Peasants, and Economic Anthropology*. P.E. Durrenberger (ed.). Orlando, Florida, Academic Press, pp. 71-95.

Justimbaste, E.B. (2004)
Historical junctions from pre-Hispanic times to the World War II Leyte landings. Retrieved 23-02, 2005, from http://www-geocities.com/ebjustimbaste/ph11.html?200523.

Kabeer, N. (1991)
Gender, Production and Well-being: Rethinking the Household Economy. Discussion Paper 288 Institute of Development Studies.

Kabeer, N. (1994)
Benevolent dictators, maternal altruists and patriarchal contracts: gender and household economics. *Reversed Realities: Gender Hierarchies in Development Thought*. London, Verso, pp. 95-135.

Kabeer, N. (1994)
Reversed Realities: Gender Hierarchies in Development Thought. London, New York, Verso.

Kabeer, N. (1996)
Agency, well-being and inequality: Reflections on the gender dimensions of poverty. *IDS Bulletin* 27(1): 11-21.

Katz, E. (2000)
Does gender matter for the nutritional consequences of agricultural commercialization? Intrahousehold transfers, food acquisition, and export cropping in Guatemala. In: *Women Farmers and Commercial Ventures*. A. Spring (ed.). Boulder, Colorado, Lynne Rienner Publishers, pp. 209-231.

Keenan, D.P., C. Olson, J.C. Hersey & S.M. Parmer (2001)
Measures of food insecurity/security. *Journal of Nutrition Education* 33: S49-S58.

Kemmler, G. (1980)
Potassium deficiency in soils of the tropics as a constraint to food production. In: *Soil-related Constraints to Food Production in the Tropics*. Los Baños, Laguna, Philippines, International Rice Research Institute, New York College of Agriculture and Life Sciences, Cornell University and University Consortium of Soils for in the Tropics, pp. 253-276.

Kennedy, E. & H.E. Bouis (1993)
Linkages between Agriculture and Nutrition: Implications for Policy and Research. Washington D.C., International Food Policy Research Institute**:** 28.

Kennedy, E. & B. Cogill (1988)
The commercialization of agriculture and household-level food security: the case of southwesters Kenya. *World Development* 16(9): 1075-1081.

Kevane, M. (2000)
Extrahousehold norms and intrahousehold bargaining. In: *Women*

Farmers and Commercial Ventures. A. Spring (ed.). London, Lynne Rienner Publishers, pp. 89-112.

Knol, L.L., B. Haughton & E.C. Fitzhugh (2004)
Food insufficiency is not related to the overall variety of foods consumed by young children in low-income families. *Journal of the American Dietetic Association* 104(4): 640-644.

Koopman, J. (1991)
Neoclassical household models and modes of household production: problems in the analysis of African agricultural households. *Review of Radical Political Economics* 23(3 & 4): 148-173.

Lachica, A.A. & M.L. Prodigalidad (2000)
A Country Paper on the Republic of the Philippines. Gent, Belgium, University of Gent, Faculty of Agriculture and Applied Biological Sciences.

Lacy, V.B. & L.R. Lacy (2003)
Global food security, environmental sustainability and poverty alleviation: complementary or contradictory goals? In: *Food Security and Environmental Quality in the Developing World*. R. Lal, D. Hansen, N. Uphoff & S. Slack (eds). New York, Washington D.C., Lewis Publishers.

Lal, R. (2001)
Managing world soils for food security and environmental quality. *Advances in Agronomy* 74: 155-192.

Lal, R. (2003)
Soil degradation and global food security: a soil science perspective. In: *Land Quality, Agricultural Productivity, and Food Security*. K. Wiebe (ed.). Cheltenham, Edward Elgar, pp. 16-35.

Lal, R. & D. Hansen (2003)
Food security and environmental quality in the developing world. Boca Raton, Florida, Lewis Publishers.

Lapar, M.L.A. & S. Pandey (1999)
Adoption of soil conservation: the case of the Philippine uplands. *Agricultural Economics* 21: 241-256.

LCSD (2000)
Daguitan watershed profile and management plan. First draft. Tacloban, Leyte Council for Sustainable Development: 62 pp.

Ledesma, A.J. (1978)
Rice farmers and landless rural workers: perspectives from the household level. *IRRI Saturday seminar*. Los Baños, Laguna, Philippines.

Leones, J.P. & S. Feldman (1998)
Nonfarm activity and rural household income: evidence from Philippine microdata. *Economic Development and Cultural Change* 46(4): 789-806.

Levin, C. & K. Ralston, et al. (1993)
Intrahousehold-related policy research: implications for data

collection. In: *Data Needs for Food Policy in Developing Countries: New Directions for Household Surveys*. J. von Braun (ed.). Washington D.C., International Food Policy Research Institute.

Lindenberg, M. (2002)
Measuring household livelihood security at the family and community level in the developing world. *World Development* 30(2): 301-318.

Lindert, P. (2001).
Soil change and agriculture in two developing countries. In: *Agricultural Science and Policy: Changing Global Agendas.* J. M. Alston, P.G. Pardey & M.J. Taylor (eds). Baltimore and London, John Hopkins University Press, pp. 122-158.

Longhurst, R. (1986)
Household food strategies in response to seasonality and famine. *IDS Bulletin* 17(3): 27-35.

Longhurst, R. (1988)
Cash crops and food security: cash crops, household food security and nutrition. *IDS Bulletin* 19(2): 28-36.

Lorenzana, P.A. & C. Mercado (2002)
Measuring household food security in poor Venezuelan households. *Public Health and Nutrition* 5(6A): 851-857.

Martorell, R., J.P. Habicht & R.E. Klein (1979)
Anthropometric indicators of changes in nutritional status in malnourished populations. In: *Methodologies for Human Population Studies in Nutrition related to Health*, Bethesda, Maryland, National Institute of Health.

Maxwell, D. & K. Wiebe (1999)
Land tenure and food security: exploring dynamic linkages. *Development and Change* 30(1999): 825-849.

Maxwell, D.G. (1996)
Measuring food insecurity: the frequency and severity of 'coping strategies'. *Food Policy* 21(3): 291-303.

Maxwell, D.S. Devereux. (2001)
Introduction. In: *Food security in Sub-Saharan Africa*. S.M. Devereux & D.S. Maxwell (eds). London, ITDG Publishing, pp.1-12.

Maxwell, S. (1990)
Food security in developing countries: issues and options for developing countries. *IDS Bulletin* 21(3): 2-13.

Maxwell, S. (2001)
The evolution of thinking about food security. In: *Food security in Sub-Saharan Africa*. S.M. Devereux & D.S. Maxwell (eds). London, ITDG Publishing, pp. 13-31.

Maxwell, S. & R. Slater (2003)
Food policy old and new. *Development Policy Review* 21(5-6): 531-553.

Maxwell, S. & M. Smith (1992)
Household Food Security: A Conceptual Overview. UNICEF, Geneva.
McDonald, P. (2000)
Gender equity in theories of fertility transition. In: *Population and Development Review* 26(3): 427-439.
Meinzen-Dick, R.S., L.R. Brown, H.S. Feldstein & A.R. Quisumbing (1997)
Gender, property rights, and natural resources. *World Development* 25(8): 1303-1315.
Mellor, J.W. (1986)
Agriculture on the road to industrialization. In: *Development strategies reconsidered*. V. Kallab (ed.). Washington D.C., Overseas Development Council.
Miles, M.B. & A.M. Huberman (1984)
Qualitative Data Analysis. Beverly Hills, California, London UK, Sage Publications.
Miller, D.C. (1991)
Handbook of Research Design and Social Measurement. London UK, Sage Publications.
Moerbeek, H. (2001)
Friends and Foes in the Occupational Career: The Influence of Sweet and Sour Social Capital on the Labour Market. PhD Thesis Katholieke Universiteit Nijmegen.
Monsod, S.C. & T.C. Monsod (1999)
International and intranational comparisons of Philippine poverty. In: *Causes of Poverty: Myths, Facts and Policies. A Philippine Study*. A. M. Balisacan & S. Fujisaki (eds). Quezon City, University of the Philippines Press, pp. 51-96.
Morris, S.S. (1999)
Measuring nutritional dimensions of household food security. Washington, D.C., International Food Policy Research Institute.
Moorman, F.R. & D.J. Greenland (1980)
Major production systems related to soil properties in human tropical Africa. In: *Soil-related Constraints to Food Production in the Tropics*. Los Baños, Laguna, Philippines, International Rice Research Institute, New York College of Agriculture and Life Sciences, Cornell University and University Consortium of Soils in the Tropics, pp. 55-78.
Mula, R.P. (1999)
Coping with Mother Nature: Households' Livelihood Security and Coping Strategies in a Situation of a Continuing Disaster in Tarlac, Philippines. PhD Thesis Wageningen University.
Mundlak, Y. (2000)
Issues, evidence, and attributes. In: *Agriculture and Economic Growth. Theory and measurement*. London, Harvard University Press.

Nagel, B. (2000)
Anthropology of food: The social dynamics of food security. *American Anthropologist* 102(2): 403-404.

Narciso, Z.V. (2001)
The nutritional guidelines for Filipinos (NGF) and their contribution to nutritional security. 8th Convention of the League of Nutrition Action Officers of Region I, Fort Ilocandia, Laoag City, Philippines.

Narwal, R.P. & B.R. Singh (2003)
Soil degradation as a threat to food security. In: *Food security and environmental quality in the developing world*. R. Lal, D. Hansen, N. Uphoff & S. Slack (eds). London, New York, Washington D.C., Lewis Publishers, pp. 89-105.

National Nutrition Council (1994)
Philippine Plan of Action for Nutrition 1993-1998. Makati, Philippines, National Nutrition Council.

National Nutrition Council (1995)
NNC, policy statement and strategies. Makati, Philippines, National Nutrition Council.

National Statistics Coordination Board Region VIII (2000)
Eastern Visayas in figures. Tacloban, National Statistics Coordination Board.

NEDA (2005).
Regional development: issues and strategies on Nutrition. *Philippine Development Planning Studies Series, 5*. Manila, Republic of the Philippines, National Economic Development Authority.

Negash, A. & A. Niehof (2004)
The significance of enset culture and biodiversity for rural household food and livelihood security in southwestern Ethiopia. *Agriculture and Human Values* 21: 61-71.

Neuman, L.W. (1991)
Social Research Methods: Qualitative and Quantitative Approaches. Needham Heights, Massachusetts, Allyn and Bacon.

Niehof, A. (1999)
Household, Family, and Nutrition Research: Writing a Proposal. Wageningen, H & C Publication Series 1, Wageningen University.

Niehof, A. (2004)
A micro-ecological approach to home care for AIDS patients. *Medische Antropologie* 16(2): 245-265.

Niehof, A. (2004)
The significance of diversification for rural livelihood systems. *Food Policy* 29(4): 321-338.

Niehof, A. & F. Lubis (2003)
Family planning in practice. Cases from the field. In: *Two is enough. Family planning in Indonesia under the New Order 1968-1998*. A. Niehof & F. Lubis (eds). Leiden, KITLV Press, pp. 119-150.

Niehof, A. & L.L. Price (2001)
Rural livelihood systems: a conceptual framework. Wageningen, Wageningen-UPWARD Series on Rural Livelihoods No.1.
Nurge, E. (1965)
Life in a Leyte village. Seattle, University of Washington Press.
Nyariki, D.M., S.L. Wiggins & J.K. Imungi (2002)
Levels and causes of household food and nutrition insecurity in dryland Kenya. *Ecology of Food and Nutrition* 41: 155-176.
Omosa, M. (1998)
Re-conceptualising Food Security. Interlocking Strategies, Unfolding Choices and Rural Livelihoods in Kisii District, Kenya. PhD Thesis Wageningen University.
Osmani, S.R. (1992)
Introduction. In: *Nutrition and Poverty*. Oxford, Clarendon Press, pp. 1-15.
Osmani, S.R. (1992)
Nutrition and Poverty. Oxford, Clarendon Press.
Pacey, A., P. Payne & M. Lipton (1985)
Agricultural Development and Nutrition. London, Hutchison and Co., with Food and Agriculture Organization and UNICEF.
Paqueo, V. & E. Angeles (1979)
An analysis of wife's labor participation in the Philippines and the threshold hypothesis. Quezon City, Institute of Economic Development and Research.
Paris, T.R. (2002)
Crop-animal systems in Asia: socio-economic benefits and impacts on rural livelihoods. *Agricultural Systems* 71: 147-168.
Paris, T.R. & L.J. Unnevehr (1987)
Human nutrition in relation to agricultural production: an example in the Philippines. In: *Policy Issues on Nutrition and Welfare*. Los Baños, Laguna, Center for Policy and Development Studies, University of the Philippines at Los Baños, College Laguna, pp. 183-237.
Payne, P.R. (1990)
Measuring malnutrition. *IDS Bulletin* **21**(3): 14-30.
Payne, P.R. (1992)
Assessing undernutrition: the need for a reconceptualization. In: *Nutrition and poverty*. S.R. Osmani (ed.). Oxford, Clarendon Press pp. 49-95.
Payne, P.R. & M. Lipton (1994)
How Third World Rural Households Adapt to Dietary Energy Stress: The Evidence and the Issues. Washington D.C., International Food Policy Research Institute.
Pelto, G.H. (1989)
Introduction: methodological directions in nutritional anthropology. *Research Methods in Nutritional Anthropology*. G. H. Pelto, P. J.

Pelto & E. Messer (eds). Tokyo, Japan, United Nations University Press, pp. 1-8.

Pelto, G.H. (2004)
Care, power and macro-level/micro-level analysis. *Medische Antropologie* 16(2): 267-268.

Pender, J. (1999)
Rural population growth, agricultural change and natural resource management in developing countries: a review of hypotheses and some evidence from Honduras. *EPTD Discussion Paper*. Washington D.C., IFPRI.

Pender, J. (2004)
Development pathways for hillsides and highlands: Some lessons from Central America and East Africa. *Food Policy* 29(4): 339-369.

Pender, J., B. Gebremedhin, S. Benin & S. Ehui (2001)
Strategies for sustainable agricultural development in the Ethiopian highlands. *EPTD Discussion Paper*. Washington D.C., IFPRI.

Pender, J., S.J. Scherr & G. Duron. (2001)
Pathways of development in the hillside areas of Honduras: causes and implications for agricultural production, poverty and sustainable resource use. In: *Trade-offs or Synergies?* D.R. Lee & C.D. Barrett (eds) Amsterdam, CABI International.

Pennartz, P. & A. Niehof (1999)
The domestic domain: chances, choices and strategies of family households. Aldershot, Burlington USA, Singapore, Sydney, Ashgate.

Pinstrup-Andersen, P. & R. Pandya-Lorch (1999)
World food prospects: critical issues for the early twenty-first century. Washington, D.C., International Food Policy Research Institute.

Pinstrup-Andersen, P. (2000)
Food policy research for developing countries: emerging issues and unfinished business. *Food Policy* 25(1): 125-141.

Pitt, M.M., Mark R. Rosenzweig, & Md. N. Hassan (1990)
Productivity, health, and inequality in the intrahousehold distribution of food in low-income countries. *The American Economic Review* 80(5): 1139-1156.

Popkin, B.M. & G.P. Hart (1975)
A note on the interdependence between economic and welfare factors in the rural Filipino households. Quezon City, Institute of Economic Development and Research, 26 pp.

Pretty, J.N., J.I.L. Morison & R.E. Hine (2003)
Reducing poverty by increasing agricultural sustainability in developing countries. *Agriculture, Ecosystems and Environment* 95: 217-234.

Price, L.L. (2000)
The fields are full of gold: women's marketing of wild foods from

rice fields in Southeast Asia and the impacts of pesticides and integrated pest management. In: *Women Farmers and Commercial Ventures*. A. Spring (ed.). Boulder, Colorado, Lynne Rienner Publishers, pp. 191-207.

Price, L.L. (2006).
Wild food plants in farming environments with special reference to Northeast Thailand, food as functional and medicinal, and the social roles of women. *Eating and Healing. Traditional Food as Medicine*. A. Pieroni & L. L. Price (eds.). New York, London, Food Products Press, pp. 65-99.

Quisumbing, A. R. (1987)
Nutrition and welfare issues in the Philippines: Some perspectives for research. In: *Policy Issues on Nutrition and Welfare*. Los Baños, Laguna, Center for Policy and Development Studies, University of the Philippines at Los Baños, College Laguna, pp. 1-10.

Quisumbing, A.R. (1987)
The Philippine food and nutrition situation: trends and policy issues. In: *Policy Issues on Nutrition and Welfare*. Los Baños, Laguna, Center for Policy and Development Studies, University of the Philippines at Los Baños, College Laguna, pp. 11-51.

Quisumbing, A. (1994)
Intergenerational transfers in Philippine rice villages. *Journal of Development Economics* 43: 167-195.

Quisumbing, A. (2000)
Intrahousehold Allocation and Gender Relations: New Empirical Evidence from four Developing Countries. Washington D.C., IFPRI.

Quisumbing, A. (2000)
Women's Assets and Intrahousehold Allocation in rural Bangladesh. Washington D.C., IFPRI.

Rakodi, C. (1999)
A capital assets framework for analysing household livelihood strategies: implications for policy. *Development Policy Review* 17: 315-342.

Rao, N.P. (1980)
Determinants of nutritional status in India. In: *Rural Household Studies in Asia*. H.P. Binswanger & R.E. Evenson (eds). Singapore, Singapore University Press, pp. 145-187.

Reardon, T. (1997)
Using evidence of household income diversification to inform study of the rural nonfarm labor market in Africa. *World Development* 25(5): 735-748.

Reardon, T., J. Berdegue & G. Escobar (2001)
Rural non-farm employment and incomes in Latin America: overview and policy implications. *World Development* 29(3): 395-409.

Reardon, T., J.E. Taylor, K. Stamoulis, P. Lanjouw & A. Balisacan (2000)
Effects of non-farm employment on rural income inequality in

developing countries: An investment perspective. *Journal of Agricultural Economics* 51(2): 266-288.

Reardon, T. & S. A. Vosti (1995)
Links between poverty and the environment in developing countries: asset categories and investment poverty. *World Development* 23(9): 1495-1506.

Resurreccion, B.P. (1999)
Transforming Nature, Redefining Ourselves. Gender and Ethnic Relations, Resource Use, and Environmental Change in the Philippines Uplands. Maastricht, Shaker Publishing.

Resurreccion, B.P. (2000)
From erosion control to food crisis: changing gender divisions of labor in a Philippine upland village. *CLARA Working Paper*. Amsterdam, HAS/HSG.

Rola, A.C., M.M. Paunlagui & D.D. Elazegui (2002)
Household food security: concept and evidence from Laguna, Philippines villages. In: *Meeting food security: a study of Laguna households in transition*. Los Baños, Institute of Strategic Planning and Policy Studies, College of Public Affairs, University of the Philippines, College Laguna, pp. 1-22.

Rosenzweig, M. R. (1986)
Program interventions, intrahousehold distribution and the welfare of individuals: modelling household behavior. *World Development* 14(2): 233-243.

Ruben, R. & J. Pender (2004)
Rural diversity and heterogeneity in less-favoured areas: The quest for policy targeting. *Food Policy* 29(4): 303-321.

Rudie, I. (1995)
The significance of 'eating': cooperation, support, and reputation in Kelantan Malay households. In: *'Male' and 'Female' in Developing Southeast Asia*. W.J. Karim (ed.). Washington D.C., Berg Publishers.

Ruttan, V.W. (1994)
Agriculture, environment, and health: Sustainable development in the 21st century. Minneapolis, London, University of Minnesota Press.

Ryder, N.B. (1965)
The cohort as a concept in the study of social change. *American Sociological Review* 30: 843-861.

Saint Girons, O. (2003)
Soil and Water Management Strategies of Farmers Situated in Fragile Environments, Leyte, Philippines. Wageningen University Master's Thesis.

Scherr, S.J. (2000)
A downward spiral? Research evidence on the relationship between

poverty and natural resource degradation. *Food Policy* 25(4): 479-498.

Scherr, S.J. (2003a)
The economic impacts of agricultural soil degradation in Asia. In: *Food Security and Environmental Quality in the Developing World*. R. Lal, D. Hansen, N. Uphoff & S. Slack (eds). London, New York, Washington D.C., Lewis Publishers, pp. 69-87.

Scherr, S.J. (2003b)
Productivity-related economic impacts of soil degradation in developing countries: an evaluation of regional experience. In: *Land Quality, Agricultural Productivity, and Food Security*. K. Wiebe (ed.). Cheltenham, Edward Elgar, pp. 223-261.

Scherr, S. & P. Hazell. (1994)
Sustainable agricultural development strategies in fragile lands. *EPTD Discussion Paper*. Washington D.C., IFPRI.

Scholz, U. (1986).
Regional overview of environmental and socio-economic aspects of tropical deforestation in the Asian and Pacific region. Environmental and socio-economic aspects of tropical deforestation in Asia and the Pacific. Bangkok, Thailand, Economic and Social Commission for Asia and the Pacific.

Schwarz, G. & R. Schwarz-Morgado (2002)
Philippines through the centuries. http://www/iaswww.com/ODP/Regional/Asia/Philippines/Society_and_Culture/History. Retrieved 24-2-2005.

Scoones, I. (1998)
Sustainable rural livelihoods: a framework for analysis. *IDS Working Paper*.

Scrimshaw, S.C.M. (1990)
Combining quantitative and qualitative methods in the study of intra-household resource allocation. In: *Intra-household Resource Allocation: Issues and Methods for Development Policy and Planning*. B.L. Rogers and N.P. Schlossman (eds). Tokyo, United Nations University Press, pp. 86-98.

Sen, A. (1981)
Poverty and Famines: An Essay on Entitlement and Deprivation. Oxford, Clarendon Press.

Sen, A. (1990)
Gender and cooperative conflicts. In: *Persistent Inequalities: Women and World Development*. I. Tinker (ed.). New York, Oxford University Press, pp. 123-149.

Sen, A. (1994)
Population and reasoned agency: food, fertility, and economic development. In: *Population, Economic Development, and the Environment*. K. Lindahl-Kiessling & H. Landberg (eds). Oxford, New York, Oxford University Press, pp.51-78.

Senauer, B. (1990).
The impact of the value of women's time on food and nutrition. *Persistent Inequalities: Women and World Development*. In: I. Tinker (ed.). New York, Oxford University Press, pp. 150-161.

Senauer, B., M. Garcia & E. Jacinto (1988)
Determinants of the Intrahousehold allocation of food in the rural Philippines. *American Journal of Agricultural Economics* 70(1): 70-180.

Senauer, B.& M. Sur. (2001)
Ending global hunger in the 21st century: projections of the number of food insecure people. *Review of Agricultural Economics* 23(1): 68-81.

Shields, M.D., C. Butler Flora, B. Thomas-Slayter & G. Buenavista (1996).
Developing and dismantling social capital: gender and resource management in the Philippines. In: *Feminist Political Ecology: Global Issues and Local Perspectives*. R. Diane, B. Thomas-Slayter & E. Wangari (eds). London, Routledge, pp. 154-179.

Shively, G. & E. Martinez (2001)
Deforestation, irrigation, employment and cautious optimism in Southern Palawan, the Philippines. In: *Agricultural Technologies and Tropical Deforestation*. A. Angelsen & E. Kaimowitz (eds.). New York, CABI, pp. 335-346.

Shively, G.E. (2000)
Soil conservation and consumption risk in a model of low-income agriculture. *Environmental Monitoring and Assessment* 62: 55-69.

Singh, I., L Squire & J. Strauss (1986)
Agricultural Household Models. Baltimore, John Hopkins University Press.

Smith, D.R., A. Gordon, K. Meadows & K. Zwick (2001)
Livelihood diversification in Uganda: Patterns and determinants of change across two rural districts. *Food Policy* 26(4): 421-435.

Smith, L.C., E.O. Amani & H.H. Jensen (2000)
The geography and causes of food insecurity in developing countries. *Agricultural Economics* 22: 199-215.

Solon, F.S. & L.E. Sanchez-Fermin & L.S. Wambangco (2000)
Strengths and weaknesses of the food fortification program for the elimination of vitamin A deficiency. *Food and Nutrition Bulletin* 21(2): 239-246.

Srinivasan, T.N. (1992)
Undernutrition: concepts, measurements, and policy implications. *Nutrition and Poverty*. S.R. Osmani (ed.). Oxford, Clarendon Press, pp. 97-120.

Strauss, J. & P.J. Gertler, et al. (2000)
Gender and life-cycle differentials in the patterns and determinants of adult health. *Journal of Human Resources* XXVIII(4): 791-837.

Svedberg, P. (2000).
Poverty and Undernutrition: Theory, Measurement and Policy. New York, Oxford University Press.
Swaminathan, M.S. (2001)
Food security and sustainable development. *Current Science* 81(8): 948-954.
Swift, J. (1989)
Why are rural people vulnerable to famine? *IDS Bulletin* **20**(2): 8-15.
Tan, E. A. &. G.R. Tecson (1974)
The Level and Determinants of Nutrition. Quezon City, Institute of Economics and Development Research, School of Economics, University of the Philippines.
Tannenbaum, N. (1984)
Chayanov and Economic Anthropology. In: *Chayanov, Peasants, and Economic Anthropology*. P.E. Durrenberger (ed.). Orlando, Florida, Academic Press, pp. 27-50.
Thomas, D. (1996)
Intra-household resource allocation: an inferential approach. In: *The Economics of the Family*. N. Folbre (ed.). Cheltenham UK, Brookfield USA.
Thomson, A.M. (2001)
Food security and sustainable livelihoods: the policy challenge. *Development* 44(4): 24-28.
Thorner, D., B. Kerblay & R.E.F. Smith (1966)
A.V. Chanayanov on the Theory of Peasant Economy. Homewood, Illinois, Richard D. Irwin, The American Economic Association.
Thrupp, L.A. (1993)
Political ecology of sustainable rural development: dynamics of social and natural resource degradation. In: *Food for the Future: Conditions and Contradictions of Sustainability*. P. Allen (ed.). New York, John Wiley and Sons, pp. 47-73.
Tiffen, M., M. Mortimore & F. Gichuki (1994)
More People – Less Erosion: Environmental Recovery in Kenya. London, Wylie and Sons.
Tinker, I. (1990)
Persistent Inequalities: Women and World Development. New York and Oxford, Oxford University Press.
Toledo, A. & B. Burlingame (2006)
Biodiversity and nutrition: A common path toward global food security and sustainable development. *Journal of Food Composition and Analysis* 19(6-7): 477-483.
Turner, B.L. II &. P.A. Benjamin (1994)
Fragile lands: identification and use for agriculture. In: *Agriculture, Environment, and Health: Sustainable Development in the 21st Century*. V.W. Ruttan (ed.). Minneapolis and London, University of Minnesota Press, pp. 104-145.

U.S. Library of Congress, http://www.countrystudies/us/ph/1htm., 22-10-2004 (1991)
Philippines: a country study. *Country studies series*. U.S. Library of Congress.

Udry, C. (1996)
Gender, agricultural production, and the theory of the household. *Journal of Political Economy* 104(5): 1010-1045.

Ulluwishewa, R. (1995)
Development, environmental degradation and rural women: a case study in Kirindi Oya Irrigation and Settlement Project in Sri Lanka. Wageningen, Wageningen Agricultural University.

UNFPA (2005)
State of the World Population. New York, United Nations Population Fund.

United Nations (1986)
How to weigh and measure children. Assessing the nutritional status of young children in household surveys. Annex I. Summary procedures. In: *National Household Survey Capability Programme.* New York, United Nations Department of Technical Co-operation for Development: 26 pp.

UNU (2000)
Special Issue on Improving Human Nutrition through Agriculture. Tokyo, Japan, United Nations University Press.

Uphoff, N. (2003)
Reconciling food security with environmental quality in the 21st century. In: *Food Security and Environmental Quality in the Developing World*. R. Lal, D. Hansen, N. Uphoff & S. Slack (eds). London, New York, Washington D.C., Lewis Publishers, pp. 443-448.

UPLB (1985)
Policy Issues on Nutrition and Welfare. Nutrition and Welfare Workshop, UP Los Baños, Laguna, Philippines, Center for Policy and Development Studies, UPLB, College Laguna.

UPLB and Ministry of Agriculture, Forestry and Fisheries, Japan (1989)
Soil description and soil sampling. Los Baños, Laguna, Department of Soil Science, College of Agriculture, UPLB, College Laguna, Philippines.

USDA 2001
http://www.nap.edu/napcgi/skimit.cgi?isbn. Retrieved 8-3-2005.

Van der Haar, F.A.D.K. (1978)
Food Intake, Nutritional Anthropometry and Blood Chemical Parameters in 3 selected Dutch Schoolchildren Populations. PhD Thesis Wageningen University.

Villavieja, G.M., E.F. Palafox, C.M. Cerdeña & R.D. Laña (1995)
Part A. Food Consumption Survey. *Fourth National Nutrition Survey Philippines, 1993 Report No. 5*. Metro Manila, Food and

Nutrition Research Institute, Department of Science and Technology.

Virtucio, F. (1994)
A survey of the lowest income households. In: *Understanding Poverty and Inequity in the Philippines*. P.Intal & C. Bantilan (eds). Makati, MetroManila, National Economic Development Authority and the United Nations Development Program.

Von Braun, J. (1991)
The links between agricultural growth, environmental degradation, and nutrition and health: implications for policy and research. Agricultural sustainability, growth, and poverty alleviation: issues and policies, Feldafing, Germany, Deutsche Stiftung für Internationale Entwicklung (DSE).

Von Braun, J., H.E. Bouis, S. Kumar & R. Pandya-Lorch (1992)
Improving Food Security of the Poor: Concept, Policy, and Programs. Washington D.C., IFPRI.

Welch, R.M. &. R.D. Graham (2000)
A new paradigm for world agriculture: Productive, sustainable, nutritious, healthful food systems. *Food and Nutrition Bulletin* 21(4): 361-366.

White, B.N.F. (1980)
Rural household studies in anthropological perspective. In: *Rural Household Studies in Asia*. H.P. Binswanger, R.E. Evenson, C.A. Florencio & B.N.F. White (eds). Singapore, Singapore University Press, pp. 3-25.

White, B. (1984)
Measuring time allocation, decision-making and agrarian changes affecting rural women: examples from recent research in Indonesia. *IDS Bulletin* 15(1): 18-32.

Wiebe, K. (2003)
Land quality, agricultural productivity, and food security. In: *Land quality, agricultural productivity,and food security*. K. Wiebe (ed.). Cheltenham, Edward Elgar, pp. 3-15.

Wikipedia (2006)
Human Development Index. DOI:
http://en.wikipedia.org/wiki/Human_Development_Index

Wilson, G. (1991)
Thoughts on the cooperative conflict model of the household in relation to economic method. *IDS Bulletin* 22(1): 31-36.

Witcover, J. & M. W. Rosegrant (1995)
Conference on agricultural sustainability, growth, and poverty alleviation in East and Southeast Asia. *EPTD workshop summary papers*. Washington D.C., International Food Policy Research Institute.

Wolfe, W.S. &. A. Edward (2004)
Building household food security measurement tools from the ground up. *Food and Nutrition Bulletin* 22(10): 5-12.

Wood, S., K. Sebastian, F. Nachtergaele, D. Nielsen & A. Dai (1999)
Spatial aspects of the design and targeting of agricultural development strategies. *EPTD Discussion Paper*. Washington D.C., IFPRI.

World Bank (1996)
A strategy to fight poverty. Washington D.C., ESCAP Region Operations Division, World Bank.

Glossary

Aeta or Negrito	ethnic mountain tribe, also known as pygmies; aborigi-nals in the Philippines
Alcojeres	bunchy top disease of abaca
Amihan	northeast wind
Amor propio	self-esteem
Bagakay	a small type of bamboo
Baha	flood
Balikbayan	a returning Filipino immigrant or worker
Banca	a small row boat
Banlas	a condition where the farm is no longer productive due to the removal of topsoil because of water erosion
Banika	upland rice
Barangay	smallest political unit; village or barrio
Bayanihan	spirit of cooperation, now applied to any group activity, but originally referring to the cooperative practice of transfering a whole *nipa* house to another place
Bugtok	bunchy top disease of banana or plantain
Datu	the village chief during pre-Hispanic times
Encomienda	the system of granting vast tracts of land to the privileged class during the Spanish times
Gabhok	rainfed area (farms) interior of the village
Gintong Ani	Golden Harvest, programme of the Department of Agriculture for the development of the staple and high-value crops
Habagat	southwest wind
Hacienda	vast tract of farm land, from about a hundred or few thousands of hectares, privately owned, originating from the *encomienda* system during Spanish period
Halom	a servant who lived under harsher condition than that of the *mamalay* and disposed at the master's will, and even killed with the master as tradition dictated
Hiya	self-shame
Ilustrado	the highly educated local elite who come from the wealthy class during the Spanish times
Indio	the native Filipino during the Spanish times, a derogatory reference
Inosa, laylay, libutanay, linawaan	abaca cultivars
Kaingin	slash and burn agriculture
Kasapad	local sweetpotato variety
Lahar	sediment deposits after river flooding

Laka	heavily eroded part of the hill or mountain with no soil left
Lanajon	old name of Alegre, literally meaning oily.
Lilas	dried long strips of romblon leaves used in native crafts
Mamalay	in pre-Hispanic times, an unpaid hired help who worked part time who lived and obliged to work in the master's home
Mangangayam	a wild animal hunter and tree-cutter
Mestizo	a native Filipino hybrid
Mombon	sandy river bank area
Municipio	municipality or town
Nipa	a kind of palm used for thatched roofing or walls
Operation Timbang	Department of Health project for the weighing of children in the villages. "Timbang" means to weigh.
Pakyaw	wholesale deal
Principalia	the upper class who had wealth and prestige; privileged as appointment to local offices and tax exemption
Purok or sitio	a sub-section of the village
Rajah	the chieftain of an area equivalent to a province or region during pre-Hispanic times
Sabungan	a place for cockfighting
Sari-sari	small retail store selling a very limited number of items
Sensoro	drift-net fishing
Suki	a kind of patron-client relationship between the trader/financier and the buyer or seller/supplier (as in farmer, customer) which usually establishes long lasting mutually beneficial relation
Tanod	a village appointed official in-charge of peace-keeping
Timawa	a freeman who was either born to it, or acquired it from slavery through hard work or rendering commendable service to the datu
Tuba	popular local toddy made by fermenting coconut sap
Umbak	stripped and dried abaca bark used to make furniture and other native crafts
Utang na loob	debt of gratitude

Acronyms

AFMA	Agriculture and Fisheries Modernization Act
BIDANI	Barangay Integrated Development Approach for Nutrition Improvement
BCBP	Brotherhood of Christian Businessmen and Professionals
BSWM	Bureau of Soils and Water Management
BTD	Bunchy top disease
CARP	Comprehensive Agrarian Reform Program
CGIAR	Consultative Group on International Agricultural Research
DA	Department of Agriculture
DECS	Department of Education, Culture and Sports
DOST	Department of Science and Technology
DSWD	Department of Social Welfare and Development
EDSA	Epifanio de los Santos Avenue
FAO	Food and Agriculture Organization
FBS	Food balance sheet
FCT	Food Composition Table
FIES	Family Income and Expenditure Survey
FNRI	Food and Nutrition Research Institute
GLASOD	Global Assessment on Soil Degradation
GRDP	Gross Regional Domestic Product
HDES	Household dietary evaluation system
HDI	Human Development Index
HHPH	Household Production of Health
IARC	International Agricultural Research Centre
ICN	International Conference on Nutrition
IDA	Iron deficiency anemia
IDD	Iodine deficiency disorder
IFAD	Institute for Food and Agriculture Development
IFPRI	International Food Policy Research Institute
ILO	International Labor Organization
INREF	Interdisciplinary Research Fund
IPM	Integrated Pest Management
KPA	Key Production Area
LGU	Local government unit
LSU	Leyte State University
MDG	Millennium Development Goal
MIDAS	Marketing Information and Direct Assistance Service
MTPDP	Medium-Term Philippine Development Plan
MTPFNP	Medium-Term Philippine Food and Nutrition Plan
NDCB	National Disaster Coordinating Board
NDHS	National Demographic and Health Survey
NEDA	National Economic Development Authority
NHF	Neys-van Hoogstraten Foundation
NIN	National Information Network

NIST	National Institute of Science and Technology
NNC	National Nutritional Council
NNS	National Nutrition Survey
NSCB	National Statistics Coordination Board
NSDB	National Science Development Board
NSTA	National Science and Technology Authority
OFW	Overseas Filipino Workers
PAL	Physical activity level
PNP	Philippine Nutrition Plan
PPAN	Philippine Plan for Agriculture and Nutrition
PPP	Purchasing power parity
RDA	Recommended Daily Allowance
RDE	Research, development and extension
RESPONSE	Regional Food Security Policies for Natural Resources Management and Sustainable Economies
SAFDZ	Strategic Agriculture and Fisheries Development Zone
SEARCA	Southeast Asian Regional Center for Graduate Studies in Agriculture
SPSS	Statistical Package for Social Sciences
SRA	Social Reform Agenda
SUC	State universities and colleges
TSK	Tulay sa Kaunlaran
UNFPA	United Nations Fund for Population Activities
UNICEF	United Nations International Children's Emergency Fund
UNU	United Nations University
UPWARD	United Plaridel Women's Association for Rural Development
UPWARD	User's Perspective with Agricultural Research and Development
VAD	Vitamin A deficiency
WCED	World Commission on Environment and Development
WUR	Wageningen University and Research Centre

Appendix I
Guide for the orientation and concept validation workshops

Participants: 20-30 participants, both females and males, of about equal proportion in number.

1. Introduction

The facilitator explains the objectives, the nature of the research, the activities, the time frame, the role of the local people who will be involved and the role of the local officials. She elicits the participants' reaction on these matters and asks for possibilities of who can participate and the conditions of different types of participation (e.g. FGDs, case study, formal surveys).

An ice-breaker after the discussion: the facilitator asks if any of the participant can lead this.

2. Concept validation session (about 1 hour)

The facilitator divides the participants into 3-4 groups of 7-10 per group, depending on the actual number of participants. Each group should have proportional number of females and males. Two trained assistants help in monitoring the group dynamics and take notes.

The visualization exercise is used to elicit the local perceptions of HOUSEHOLD and FAMILY. Each group is given colour pentel pens and a manila paper to visualize and draw what to them is a household and a family. The participants are required to discuss and contribute in the visualization process. After the drawing, the participants give differences and similarities of their concepts of household and family.

Sharing/feedback and synthesis. Each group presents briefly their outputs and followed by group discussion.

3. Livelihood activities of households (about 1 hour)

The facilitator gives instruction on the use of meta-cards to identify livelihood activities, constraints and problems. She explains the procedure of the causal tree analysis for organizing the constraints of each livelihood.

Same groupings. The participants identify and discuss the different livelihood activities of the village. By using meta-cards, participants write down their ideas and organize them on the manila paper. For each livelihood, the group members identify different constraints or problems for each livelihood activity and present them in a causal tree.

Each group presents its outputs. The facilitator proceeds with the pairwise ranking of the identified problems and constraints for each group. The output will give the priority concerns of the village, with each group's output being discussed and validated by the participants.

Synthesis and wrap-up.

Appendix II
Guide for the focused group discussions on agro-ecology and land use changes

Participants: 15-20 participants composed of farmers or ex-farmers, male and female, 60 years old and above, to include the oldest man or woman in the village.

1. Introduction

Facilitator explains the importance of noting changes in the agro-ecological environment, land use and practices in an area. She gives a summary of the results of the previous land use, soil and management practices FGD (done by the master student), and tries to validate these with the participants. This is done also to stimulate discussion.

2. Exercise 1

Land use, practices and changes from the earliest period recalled by the participants, starting from the oldest person's recall, up to the present.
Facilator takes note of the different time periods that the participants can identify and recall. The oldest participant is given the first chance to recall the period and associate land use, farm practices and product use or markets. Then the rest of the participants are given the chance to give their contributions and make their own assessment of why the changes. A land use timeline (in cross-sectional transect format) is in effect drawn where later the types of soil and changes in soil, water conditions are drawn. Problems and constraints are also noted over time per agro-ecology.

3. Exercise 2

Other livelihood systems, market opportunities. With contributed information mapped out on manila paper, the researcher further facilitates to discuss the changes in livelihoods, in addition to farming in response to market or resource opportunities, and the associated problems and constraints over time, per livelihood activity identified. Facilitator tries to elicit land marks or events associated with the changes.

4. Gender roles and changes

The group discusses the changes in gender roles in household livelihood activities and domestic work over time. Why the changes in gender roles, if any, should be noted.

5. Wrap-up

NOTE: As this is done with the older people, be sensitive to their needs and constraints. Keep the discussion alive. This is an opportunity to get a lot of information, deeper perceptions, and folk wisdom.

Appendix III
Guide for the focused group discussions on food security

1. Introduction

Facilitator provides a summary of the results of the concept validation workshop, particularly (CVW) on livelihood systems. A schematic diagram is shown and explained since these FGD participants may not have attended the CVW. The main livelihood sources explained and related to food sources.

2. Food security concept

2a. threats and constraints to food security are discussed per group, presented/ shared. (about 30 minutes).
2b. the explanation in No. 1 should flow to the introduction of the concepts of food security: differentiating degrees of food insecurity.

Activity (about 1 hour): divide the participants into two (2) groups (may use a numbers game). Facilitator explains group activity: which is a description/ discussion of their understanding of food security or, food insecurity and perceptions of differences. Participants write the results of their discussion on a manila paper. Each group selects a presenter. The presentation per group should elicit discussion and resolution of the concept of food security.

Food security rating: self and community. After presentation, each participant is requested to rate own household as to the situations discussed. Then rate the *purok* where she/he belongs.

3. Food inventory

- Each group is requested to list down all food households consume per staple and non-staple categories and according to whether own produced/ gathered or bought.
- Participants then rank which in the food groups are most commonly consumed.
- Participants also discuss which of the foods are nutritious; which nutrient can be taken from which food.

4. Food security timeline (about 1.5 hours)

- This activity will show patterns of peak harvests, and thus peak incomes and cash flows, labour use and food supply conditions.
- Facilitator prepares a seasonal/ timeline chart which reflects these conditions; and explains to the participants how they can identify and discuss the different crops, incomes (men and women), food and cash conditions, and to rate on a monthly basis.

- The group works on the chart. Facilitator should see to it that participants actively shares in the work. Group sharing follows in order to validate the groups' work.

5. Wrap-up session

Cards are distributed to the participants. Each is requested to write down their learning for the session's activity.

Appendix IV
Guide questions for the case study households

1. Case household profiling:
- 1.1 socio-demographic characteristics
- 1.2 sources of incomes, their assets, resources, liabilities
- 1.3 farming, land use, history, problems and perceptions.

2. Decision-making process (livelihood, household and farm expenses, budgeting, and resource use): by sex, position in the household, contribution to income.

3. Life history of the household.

4. Perceptions of opportunities, problems and constraints.

5. Factors affecting perceived success or failures in livelihood(s).

6. Perception of food security situation of the household and members; food preferences, biases.

Appendix V
livelihood strategies and food security study household socio-economic status and production questionnaire

1. Identification

Municipality
Barangay
Household control number:
Name of household head _____
Sex of household head
Name of respondent _____
Sex of respondent
Relation to household head _____
Household life-cycle code
Household livelihood type

Interviewer _____
Date of interview _____

DIGIT	ITEM	CODE
First	Municipality	1 - Baybay 2 - Dulag
Second	Village	1 - Plaridel "Pais" 2 - Alegre "Amigo"
Third, fourth and fifth	Household control number	Based on the master list of sample households
Sixth	Sex of household head	1 - male 2 – female
Seventh	Sex of respondent/ SR, if single response	1 - male/ SR 2 - female/ SR 3 - joint
Eighth	Household life-cycle	1 - wife less than 35 years old 2 - wife 35 to less than 50 years old 3 - wife 50 years old and above
Ninth	Household livelihood type (this will be identified after estimating income distribution during editing, before computer data entry)	1 - farm, non-farm, off-farm incomes about the same proportion 2 - income from farm > 50% 3 - income from off-farm > 50% 4 - income from non-farm > 50%
Tenth	Interviewer code	1 - Lelita Mazo 4. Jerevil 2 - Kristine Posas Sumayod 3 - Belen Lumaken

Hh Control No. _____

a. Socio-economic and demographic characteristics

Member ID	Name	Sex	Rel. to HHH	Age (actual)		Civil status	Hh size equivalnt/ member	Years schooling	Contribute to hh inc. ✔	Occupation (check ✔ appropriately for year round, state months for seasonal; as applicable)					
				Yrs.	Mos.					Primary	Year Rnd. (check)	Seasonal (mos.)	Secondary	Year Rnd. (check)	Seasonal (mos)

Total household size _____ Total working members _____ Consumer/worker ratio _____

How do you arrange the incomes of hh members for expenses? Household expenses _____ Farm expenses _____

CODES: 1 – pool income, decided by hh head
2 – pool income, shared decision
3 – non-pool, individual contribution, share expense item agreed
4 – non-pool, voluntary contribution by members
5 – others, specify _____

Number of years of farming experience : _____ years

Hh Control No. _____

(TAKE NOTE OF THE REFERENCE PERIOD for survey responses: May, 2001 – June, 2002)

B. Farm plot characteristics

Plot ID	Plot description	Terrain/ slope	Soil type	Irrigation	Tenure/ operation status	If owned, who owns	How acquired	Year when acquired	Payment if you rented this plot	Payment if you rented out this plot	Sharing, if tenancy (Tenant:Lndlrd ratio)	Market value when acquired, if owned	Distance from road for transport	Distance from home-stead
1														
2														
3														
4														
5														
6														

C. Plot/ farm size and use

Plot ID	Estimate area (ha)	Plot use pattern	Crop/ livestock	Cropping/ rearing intensity	Variety/ breed	Planting/ start of breed or fattening	Harvesting	Estimated yield	Percentage sold	Problem related to plot Rank first three.		
										1	2	3

Hh Control No. _____

C. Plot/ farm size and use (continuation)

Plot ID	Estimate area (ha)	Plot use pattern	Crop/ livestock	Cropping/ rearing intensity !!!	Variety/ breed	Planting/ start of breed or fattening	Harvesting	Growing season	Estimated yield per hectare (in kgs.)	Problem related to plot Rank first three		
										1	2	3

Hh Control. No. __

D. Production steps, labor and other input use (Cost of farm production of actual area reported for all cropping seasons)

Plot ID	Crop/ live-stock	Production step	Who makes decision	Family labor			Hired labor				Non labor input	Quantity	Price/ qty.	Total non-labor cash exp.	Total cash expenses	Total cost
				member	mandays	Value of family L	type	Man days	Paymnt mode/rate	Value of payment						

(additional sheets, if necessary)

Hh Control No. _____

E. Post-production steps, labor and other input use (Cost of post-production activities of actual area reported for all cropping seasons)

Plot ID	Crop/ livestock	Post Production step	Who makes decision	Family labor			Hired labor				Non labor input	Quantity	Price	Total non-labor cash expenses	Total cash expenses	Total cost
				Member	Man days	Value of family L	Type	Man days	Paymnt mode/rate	Value of payment						

(additional steps for this)

Hh Control No. _____

F. Disposition of harvest (Farm Income for each product for the whole year. Take note of the cropping/ rearing intensity of each crop or livestock)

C/L code (see code C)	Product code	Growing season (see C)	Total harvest for the year (for each crop/live-stock)	Total product sold			Sold to whom	Point of sale	Unsold			By-product			Sold to whom	TOTAL VALUE	Who makes decision on use
				Qty.	Selling price	Value			Qty.	Use	Value	Qty.	Use	Value			
			total cash income														

Hh Control No. _____

G. Non-farm, off-farm activities, labor and other input use and other incomes(Incomes and expenses of non-farm and off farm activities. For wage employment and other forms of incomes, inputs/expenses would be only non-labor expenses such as transport, etc., the rest should be NA. This should account for all members (contributing to the hh income) non-farm and off-farm activities).

Non-F/ Off Farm Activity/ INCOME code	Gross income/ wages per year	EXPENSES											Total expenses	Net income
		Family labor			Hired labor				Non-labor (other) inputs					
		Family L code	Man-days	Value	Hired L code	Man-days	Payment mode/ rate	Total labor value	Type of other inputs	Quantity	Price of input per unit	Total nonLabor expenses		
TOTAL														

(additional sheets for this, if necessary

Hh Control No. ____

H. Other material assets and resources

Assets/ resources	Who owns (see B)	When acquired	Value when acquired	How acquired (see B)	Who makes decisions to use them

CODES:

Assets/resources

1 – own irrigation
2 – community irrigation prenda)
3 – cattle, carabao (working animal)
4 – moldboard plow
5 – disc plow
6 – threshing machine
7 – tractor, hand
8 – tractor, heavy duty
9 – jewelries
10 - savings
11 – business capital
12 – durables (for
13 - rare seed/cultivar

I. Non-material assets and resources

What do you consider as non-material/non physical assets/resources which can earn an income or help you in making a living? Enumerate. How has each asset mentioned been applied?

List of non-material assets and resources	Rank by importance	Degree/extent of application

CODES:

1 – family connections
2 - political connections
3 – social connection (being a member of a group, asso.)
4 – culture (member of ethnic group or region)
5 – gender-related (being man or woman; advantage)
6 – age advantage
7 – skills (informal training, etc.)
8 – good health
9 – education
10 – others, specify

Degree of application

1 – full application
2 – partial

Rank:

1 - first
2 - second
3 – third, etc.

Appendix V

Hh Control No. ____

J. Uses of incomes

Expense item	Amount per			Mainly from which income source (*estimate percentage from each income source, as applicable)*				Own-produced	Gifts or donations	Who decides
	day	month	year	farm	off-farm	nonfarm	Total			
Food / staple										
Food/ others										
Clothing										
House, rent										
House, maintenance/ repair										
Education										
Health, medical										
Personal care										
Durables, jewelries										
Socials, festivities										
Leisure										
Miscellaneous										
Savings										
Total										

Hh Control No. _____

K. Time allocation (peak work season)

Member ID	Household age classification	Time	Farm work	Non-farmwork	Household work	Leisure (recreation)	Meals	School
		4:00 –						
		5:00 –						
		6:00 –						
		7:00 –						
		8:00 –						
		10:00						
		12:00						
		1:00 –						
		2:00 –						
		3:00 –						
		4:00 –						
		6:00 –						
		7:00 –						
		8:00 –						
		9:00 –						
		10:00						
		11:00						

Time allocation (slack work season)

Member ID	Use family labor code in D	Time	Farm work	Non-farm work	Household work	Leisure (recreation)	Meals	School
		4:00 –						
		5:00 –						
		6:00 –						
		7:00 –						
		8:00 –						
		10:00						
		12:00						
		1:00 –						
		2:00 –						
		3:00 –						
		4:00 –						
		6:00 –						
		7:00 –						
		8:00 –						
		9:00 –						
		10:00						
		11:00						

A. Socio-economic and demographic characteristics

A. CODES				
Sex: 1 = Male 2 = Female Civil status: 1 = unmarried 2 = married 3 = widow/widower 4 = separated (no legalities) 5 = divorced, annulled Years of schooling 1 = no schooling 2 = primary, unfinished 3 = primary, completed 4 = elementary, unfinished 5 = elementary, completed	6 = secondary, unfinished 7 = secondary, completed 8 = college, unfinished 9 = college, completed Relationship to HHH: 1 = household head 2 = spouse 3 = son/daughter 4 = father/mother 5 = brother/sister 6 = son/daughter-in-law 7 = brother/sister-in-law 8 = grand son/daughter 9 = niece/nephew 10 = auntie/uncle 11 = other relatives	12 = adopted son/daughter 13 = household help/permanent labor Occupation: 1 = agriculture (crop) 2 = agriculture (fish) 3 = agriculture (livestock) 4 = agriculture (mainly mixed) 5 = tuba gatherer/producer 6 = peddling (fish, food) 7 = peddling (wares) 8 = unpaid domestic service (housewife) 9 = paid domestic service (servant, etc.) 10 = retail store business 11 = buy and sell/trading 12 = food processing 13 = handicraft/weaving wage labor 14 = own trade handicraft/weaving	15 = driver, potpot, other non-motorized 16 = driver, motor vehicle 17 = mechanic 18 = dressmaker 19 = tailor 20 =plumber/cobbler/blacksmith 21 = carpenter/mason 22 = contract contruction worker 23 = barber 24 = mani-pedicure/hair cutter 25 = agriculture wage labor 26 = small trade agent, commisionaire 27 = professional, self-employed 28 = agriculture technician 29 = health/nutrition worker 30 = teacher	31 =local official 32 = other local gov't service 33 = NGO worker 34 = group/association/coop worker 35 = religious service 36 = retired pension earner 37 = other paid employment 38 = other self-employment 39 = student 40 = unemployed 41 = invalid 42 = child (< 12 years old) Months code 1= January to 12= december

B. **Farm plot characteristics**

B. CODES				
Plot description 1 = homestead 2 = cultivated land 3 = non-cultivated land (at least 10 years) 4 = fallowed land (at time of survey) Terrain 1 = plain (0-3%) 2 = undulating (3-18%) 3 = sloping (18-30%) 4 = hilly (>30%)	Soil type 1 = clay 2 = loam 3 = sandy 4 = clay-loam 5 = sandy –loam Irrigation/ domestic water 01 = homestead, water far 02 = homestead, water near 03 = homestead, pipe water 1 = rainfed 2 = shallow/ hand tubewell 3 = pond irrigation	4 = community irrigation Tenure/operation status 1 = fallow 2 = owned, operated 3 = rented out/cash 4 = rented out/share 5 = rented in/cash 6 = rented in/share 7 = leasehold 8 = mortagage 9 = share tenancy 10 = farm worker/laborer 11= other, specify	Who legally owns 1 = husband 2 = wife 3 = joint/conjugal 4 = husband family, undivided 5 = wife's family, undivided How acquired 1 = bought 2 = inherit (wife's family) 3 = inherit (husband's family) 4 = temporary user right (husband's family)	5 = temporary user right (wife's family) 6 = rented in 7 = constructed/made/built Payment, sharing and value are actual. Distance from homestead: Homestead and adjacent to homestead is 0; otherwise actual in kilometer estimate. Distance from road: actual in kilometer estimate

C. Plot/ farm size and use

C. CODES					
	3 = rotation	12 = corn, yellow	Variety or breed:	9 = September	8 = landlord-related
Include homestead plot; backyard gardening and livestock raising are recorded in this row.	4 = sequential 5 = mixed	13 = squash 14 = stringbeans 15 = eggplant	1 = local or native 2 = hybrid, introduced	10 = October 11 = November 12 = December	9 = lack of labor 10 = farm capital 11 = technical assistance
	Crop:	16 = pechay/cabbage			
	1 = irrigated rice	17 = pepper/spices		Problems	12 = no better variety/cultivar
Estimated area, yield, percentage are actual data reported.	2 = rainfed rice 3 = coconut 4 = abaca	18 = tomato 19 = other vegetables	Planting/start of fattening - harvesting month	0 = no problem 1 = low yield 2 = poor soil	natural calamities 13 = no irrigation water
	5 = sweetpotato	Livestock		3 = pests/disease	
Plot use pattern:	6 = cassava	20 = pig	1 = January	4 = astray animals	14 = slow irrig. water flow
01 = pure homestead	7 = taro (gabi)	21= chicken	2 = February	5 = market/no or less demand	15= unsafe water, home use
02 = homestead with backyard gardening or raising	8 = takudo/estaring 9 = other rootcrop	22 = goat 23 = duck	3 = March 4 = April	6 = cannot sell myself/no trader	16 = no/lack water, home use
1 = monocrop with fallow	10 = banana	24 = turkey	5 = May	7 = price/fluctuating, low	
2 = monocrop without fallow	11 = corn, white	25 = cow, cattle	6 = June 7 = July 8 = August		Growing season: 1 = dry 2 = wet 3 = not cultivated

D. Production steps, labor and other input use (Cost of farm production)

D. CODES Production step: 0 = fallow 1 = land clearing/levelling 2 = land prep/plowing 3 = harrowing 4 = ridging 5 = seed preparation 6 = seed broadcasting 7 = pulling of seedling 8 = transplanting/ planting 9 = re-planting 10 = fertilizer application 11= weeding 12 = cultivation 13 = irrigation 14 = pesticide application 15 = underbrushing/ ringweeding 16 = offbarring/hilling-up	17 = digging of holes/ planting 18 = planting shade trees 19 = stakes/sticks preparation 20 = harvesting 21 = leaves/stem/vines cutting 22 = feeding 23 = washing/bathing/care 24 = cleaning pens/maintenance 25 = monitoring/field visits <u>Man-days labor:</u> estimated based on 8-hour day work (i.e. man-hours / 8 hours) – actual. **Family and hired labor type** 1 = adult male (>20 yrs) 2 = adult female (>20 yrs) 3 = young male (12-20 yrs) 4 = young female (12-20 yrs) 5 = boy (<12 yrs) 6 = girl (<12 yrs)	**Who makes decision** 1 = household head mainly 2 = spouse 3 = joint 1 and 2 4 = joint with other hh member contribution **Mode of payment** 1 = cash (daily) 2 = cash (contract) 3 = cash + meals (daily) 4 = cash + meals (contract) 5 = share of harvest 6 = in kind + meals 7 = exchange labor 8 = without pay 9 = other payment mode	**Inputs** 1 = seed (maize, corn, veg.) 2 = planting materials/ cuttings (coconut, abaca, rootcrops) 3 = fertilizer, urea 4 = fertilizer, NPK 5 = fertilizer, organic 6 = pesticide 7 = other chemical 8 = sprayer 9 = tractor, hand 10 = tractor, heavy duty 11 =draught animal (carabao) 12= hand hoe 13 = bolo 14 = power tiller 15 = moldboard plow 16 = disc plow 17 = sickle	18 = thresher 19 = spade 20 = stakes (for yam) 21 = sticks (stringbeans, etc.) 22 = sacks 23 = cart (carabao-drawn) 24 = stripper (abaca) 25 = pigpen 26 = commercial feeds 27 = home-based feeds 28 = irrigation water 29 = wire and nails 30 = salt 31 = pail 32 = other packing materials 33 = immunization 34 = medicines 35 = others, specify <u>Values and expenses</u>: actual and estimated.

E. Post-production steps, labor and other input use (Cost of post-production activities)

E. CODES (see D codes for crop/ livestock, labor, payment) **Post-production steps** 1 = threshing 2 = winnowing 3 = crushing 4 = husking 5 = par-boiling 6 = pounding 7 = shelling 8 = milling 9 = sorting	10 - grading 11 = drying 12 = sacking/packaging 13 = storage activities 14 = stripping 15 = dehusking/splitting (coconut) 16 = separate meat from shell (coconut) 17 = preparing drying set-up (for abaca, coconut kiln) 18 = handling from dryer to storage 19 = handling/transport from field to homestead 20 = handling/transport to market	21 = selling, wholesale town/city market 22 = selling, retail at local market 23 = selling, retail at home/attached store Non-labor inputs 1 = carabao 2 = thresher 3 = basket/winnower 4 = mat 5 = bolo	6 = cart 7 = firewood 8 = stripping machine 9 = tapahan dryer 10 = drying machine 11 = sheller 12 = bamboo 13 = de-husker 14 = tool to separate coco meat from shell

F. Disposition of harvest (Farm Income)

F. CODES **Product** 1 = palay, unmilled 2 = milled rice 3 = corn, dehusked 4 = whole corn 5 = copra 6 = coconut, whole 7 = roots, tubers 8 = corms, rhizomes 9 = vegetables 10 = abaca fiber	11 = tuba 12 = fruits 13= pig, whole 14= goat, whole 15 = ducks, whole 16 = cow, whole 17 = pig, meat 18 = goat, meat 19 = duck, meat 20 = cow, meat Selling price and quantity are actual data report.	**By-product** 1 = rice straw 2 = rice bran 3 = coconut husk 4 = abaca strips 5 = umbak 6 = corn straw 7 = vegetable seed 8 = charcoal 9 = coconut shell	**Point of sale** 1 = at farm 2 = local market 3 = at homestead **Sold to whom** 1 = trader, wholesaler 2 = mill 3 = direct to consumer 4 = retail store 5 = government agency	**Use of unsold and by-products** 1 = sold 2 = own use, feeds 3 = own use, food 4 = own use, fuel 5 = own use, planting material 6 = wasted

G. Non-farm and off-farm activities, labor and other input use (Cost of non-farm and off farm Production)

G. CODES Non-farm/ Off-farm Activity and other incomes code: 1 = farm wage worker 2 = exchange labor 3 = fishing 4 = tuba gatherer/producer 5 = peddling (fish, food) 6 = peddling (wares) 7 = unpaid domestic service (housewife) 8 = paid domestic service (servant, etc.) 9 = retail store 10 = buy and sell/trading 11 = food processing 12 = handicraft/weaving wage labor	13 = own trade handicraft/weaving 14 = driver, potpot, other non-motorized 15 = driver, motor vehicle 16 = mechanic 17 = dressmaker 18 = tailor 19 = plumber/cobbler/blacksmith 20 = carpenter/mason 21 = contract contruction worker 22 = barber 23 = mani-pedicure/hair cutter 24 = small trade agent, commisionaire 25 = professional, self-employed 26 = agriculture technician 27 = health/nutrition worker 28 = teacher 29 =local official	30 = NGO worker 31 = group/association/coop worker 32 = religious service 33 = retired pension earner 34 = other paid employment 35 = other self-employment 36 = remittances 37 = gifts/ donations Family and hired labor 1 = adult male 2 = adult female 3 = young male (13-18 yrs) 4 = young female (13-18 yrs) 5 = boy (12 & < yrs) 6 = girl (12 & < yrs)	Non-labor expenses 1 = romblon/pandan 2 = dye 3 = tungog 4 = transport/handling 5 = abaca fiber 6 = umbak 7 = wooden frame 8 = miscellaneous/others <u>Quantity, values and income:</u> actual/ reported estimates	Mode of payment 1 = cash (daily) 2 = cash (contract) 3 = cash + meals (daily) 4 = cash + meals (contract) 5 = share of harvest 6 = in kind + meals 7 = exchange labor 8 = without pay 9 = other payment mode

J. CODES Household member age classification 1 = parent, male 2 = parent, female 3 = non-p adult, male (>20 yrs) 4 = non-p adult, female (>20 yrs.)	5 = teenager, male (>12-20 yrs) 6 = teenage, female (>12-20 yrs) 7 = child, male (6 – 12 yrs) 8 = child, female (6 – 12 yrs) 9 = child, male (2 – 5 yrs) 10 = child, female (2 – 5 yrs) 12 = child, male (<2 yrs) 13 = child, female (<2yrs)

Appendix VI
livelihood strategies and food security study
food consumption, nutrition and health questionnaire

Identification

Municipality Hh No. Code _____

Barangay
Household control number:
Name of household head _____
Sex of household head
Name of respondent _____
Sex of respondent
Relation to household head _____
Household life-cycle code
Household livelihood type

Interviewer _____
Date of interview _____

DIGIT	ITEM	CODE
First	Municipality	1 - Baybay 2 - Dulag
Second	Village	1 - Plaridel "Pais" 2 - Alegre "Amigo"
Third, fourth and fifth	Household control number	Based on the master list of sample households
Sixth	Sex of household head	1 - male 2 – female
Seventh	Sex of respondent/ SR, if single response	1 - male/ SR 2 - female/ SR 3 - joint

Eighth	Household life-cycle	1 - wife less than 35 years old 2 - wife 35 to less than 50 years old 3 - wife 50 years old and above
Ninth	Household livelihood type (this will be identified after estimating income distribution during editing, before computer data entry)	1 - farm, non-farm, off-farm incomes about the same proportion 2 - income from farm > 50% 3 - income from off-farm > 50% 4 - income from non-farm > 50%
Tenth	Interviewer code	1 - Elvie 4 - Ayen 2 - Flor 3 - Gigi

Hh number code _____

A. SOCIO-ECONOMIC AND DEMOGRAPHIC CHARACTERISTICS

Member ID	Name	Sex	Rel. to HHH	Age (actual)		Civil status	Educational attainment	Contribute to hh inc. ✔	Occupation (check ✔ appropriately for year round or seasonal, as it applies)					
				Yrs.	Mos.				Primary	Year Rnd.	Seasonal (mos.)	Secondary	Year Rnd.	Seasonal (mos)

Hh number code _____

B. SANITATION

Source of water for drinking/cooking: what is the source of drinking and cooking water? Record code. Answer may be multiple.
CODES: 1 = piped water system 4 = artesian well/jetmatic
2 = spring water 5 = other, specify_____
3 = deep well

Source of water for washing/cleaning: what is the source of washing and cleaning water? Answer may be multiple.
CODES: 1 = piped water system 4 = artesian well/jetmatic
2 = spring water 5 = river
3 = deep well 6 = other, specify _____

Garbage disposal: how do you dispose of the household garbage? Answer may be multiple.
CODES: 1 = burn 4 = through garbage collector
2 = throw in open pit 5 = bury (in the ground)
3 = throw anywhere 6 = other, specify _____

Type of toilet: what type of toilet do you have?
CODES: 1 = water sealed/flush 4 = open pit
2 = antipolo 5 = none, anywhere

Sanitation index _____

C. HOUSING

Type of house. Record the type of house by observation
CODES: 1 = bamboo and nipa/coconut/cogon thatches
2 = wood/plywood and nipa/coconut/cogon thatches
3 = wood/plywood/bamboo and galvanized iron
4 = semi-concrete (concrete w/ wood/bamboo) and nipa/coconut/cogon thatches
5 = semi-concrete and galvanized iron
6 = concrete with nipa thatches
7 = concrete with galvanized iron
8 = others, specify

Hh number code _____

D. OWN AND GATHERED FOOD (including GIVEN and DONATED Food; for 1 year period; May, 2001 – June 2002
(To be filled up ONLY if household produce or collect / fish some food. Include food which are given or donated. If not applicable, put NA)

Food item	Food item code	Source code	In charge of production or collecting	Quantity/ per use	Price, if bought	Frequency of home use	Value per year

Hh number code _____

E. 24-HOUR RECALL OF HOUSEHOLD FOOD INTAKE

Day code	Line number	Meal code	Menu/ recipe	Food item (ingredients)	Food item code	Description of food or drink. Give brand name if applicable	Source code	Raw cooked code (RCC)	Cooking method code (CMC)	Household measure	Converted weight (in grams)	Value

Hh number code _____

Day code	Line number	Meal code	Menu /recipe	Food item (ingredients)	Food item code	Description of ingredients. Give brand name if applicable	Source code	Raw/ cooked code (RCC)	Cooking method code (CMC)	Household measure	Converted weight (in grams)	Value

Additional questions:	
Was intake unusual in any way? Yes (1) No (2) If yes, in what way? Do you take vitamin or mineral supplements? Yes (1) No (2) If yes, how many per day? ---------- per week? ---------- If yes, what kind? (give brand if possible) Multivitamin iron ascorbic acid Other (list)	Who decides what to eat? _____ CODES: Who buys the food? _____ 1 = mother Who prepares/cooks the food? _____ 2 = father 3 = any adult, female 4 = any adult, male 5 = female (13-20 yrs) 6 = male (13-20 yrs)

Modified from IFPRI survey and from Weiner and Lourie (1960).

Hh number code ____

Hh number code _____

F. Intra-household food distribution

Member ID/ guest/ food given to other/ left over for next day (code)	Meal /snack code as in E	Menu / recipe	Food item	Food item code	Raw/ cooked code (RCC) as in E	Cooking method code (CMC) as in E	Household measure	Converted weight (in grams)	Where meal was taken	If meal not taken, why

Hh number code _____

G. Food expenditure

Code	Food item	Quantity bought of food consumed	Quantity consumed	*Non-purchased food: quantity consumed*					Recall period: last one month			
				Own production	From in-kind wages	Collected / gathered	Gifts	Borrow-ed	How many times bought	Quantity bought	Price	Total cost/value
Recall period: last three days												
Cereals												
1	rice											
2	corn											
Recall period: last one week												
Roots, tubers and pulses												
21	sweetpotato											
22	cassava											
23	taro											
24	yam											
25	estaring											
26	takudo											
27	mungbean											
28	other beans											
29	banana table,fresh											
30	banana (cooked)											

Hh number code _____

Code	Food item	Quantity bought of food consumed	Quantity consumed	*Non-purchased food: quantity consumed*					Recall period: last one month			
				Own production	From in-kind wages	Collected / gathered	Gifts	Borrow-ed	How many times bought	Quantity bought	Price	Total cost/value
Recall period: last three days												
Fish and seafoods												
31	fish, small											
32	Fish, M- L											
32	Dried fish											
33	Salted fish											
34	Uyap											
35	Seashells											
36	Shrimp											
37	Crabs											

Recall period: last one week												
Vegetables and spices												
41	Malunggay											
42	Eggplant											
43	Squash											
44	Stringbeans											
45	Cabbage											
46	Pechay											
47	Ampalaya											
48	Kangkong											
49	Okra											
50	Tomato											
51	Cucumber											
52	Onions											
53	Pepper											
54	Lemon grass											
55	Camote tips											
56	Winged beans											
57	Ferns											
58	Chayote											
59	Upo											
60	Gabi leaves											

Hh number code _____

Code	Food item	Quantity bought of food consumed	Quantity consumed	*Non-purchased food: quantity consumed*					Recall period: last one month			
				Own production	From in-kind wages	Collected / gathered	Gifts	Borrowed	How many times bought	Quantity bought	Price	Total cost/ value
Recall period: last one week (continuation)												
61	Carrots											
62	Potatoes											
63	Other spices											
64												
65												
66												
Beverages Recall period: last one week												
70	Milk, pwdr											
71	Milk, evap											
72	Milk, cond.											
73	Coffee											
74	Chocolate											
75	Juice, fresh											
76	Juice, pckd											
77	Softdrinks											
78	Tuba											

Code	Food item	Quantity bought of food consumed	Quantity consumed	*Non-purchased food: quantity consumed*					Recall period: last one month			
				Own production	From in-kind wages	Collected/ gathered	Gifts	Borrowed	How many times bought	Quantity bought	Price	Total cost/ value
Meat and other foods Recall period: last one week (continuation)												
80	Pork meat											
81	Beef											
82	Chicken											
83	Carabeef											
84	Other meat											
85	Egg											
86	Sugar, W											
87	Sugar, B											
88	Cooking oil											
89	Soy sauce											
90	ketchup											
91	Vinegar											
92	Salt											
93	Vetsin											
94	Coconut oil											
95												
96												
97												

Hh number code _____

H. Hunger questions for the household.

In the last seven days (or 1 week):

Item no.	
1	Has the household consumed less preferred foods? 1 = never 2 = rarely (once) 3 = from time to time (2-3 times) 4 = often (4 or more times)
2	Have you reduced the quantity of food served to men in this household? 1 = never 2 = rarely (once) 3 = from time to time (2-3 times) 4 = often (4 or more times)
3	Have you reduced your own(female) consumption of food? 1 2 3 4
4	Have you reduced the quantity of food served to male children in this household? 1 2 3 4
5	Have you reduced the quantity of food served to female children in this household? 1 2 3 4
6	Have members of this household skipped meals in the last 7 days? 1 2 3 4
7	If so, who?
8	Have members of this household skipped meals for a whole day? 1 2 3 4
9	If so, who?
10	When there is not enough food for all, who gets the priority of food? 1- Father 4- teenage, boy 7- child bet. 6-12 yrs, girl 2- Mother 5- teenage, girl 3- child below 5 yrs 6- child, between 6-12 yrs. Boy
11	SCORE/RATING

Hh number code _____

I. MORBIDITY (Short and chronic)

1. Short-term morbidity (recall period: last 2 weeks)

Did any of hh member suffer from any sickness during the last 2 weeks? 1 = Yes, 2 = No (circle).

If yes, fill the table.

If no, probe whether any of them had any headache, cough, abdominal pain in the last 2 weeks. And if there was any symptom of illness, then fill the table.

Note: Fill each sickness in separate rows.

Member ID	Sickness code	Duration of sickness code (actual days/	When cured (days ago) If still sick put 99	Sickness prevent regular acrtivity?	Severity code (may have	Whom consulted code	Distance to place of consultation (actual in m or	Number of times visited (actual)	Amount paid for consultation (actual)	Did you have any treatment?	If no, why code	If yes, type of treatment cod	Amount spent for treatment (actual)	If hospitalized		If did not consult, why code
														Distance to hospital	Cost of hospitalization	

Note: If the respondent cannot say separately the doctor's fee and cost for medicines/tests, write total expenditure in the doctors fee column and put * in the column of money spent for medicine/test.

Hh number code _____

2. Chronic morbidity (recall period: last one year)
Definition: suffered the sickness or disease for more than one month.

Did any hh member suffer from any sickness for one month or more during the last one year? 1 = Yes, 2 = No (circle).

If yes, fill the table.
If no, skip table; put not applicable, NA.
Note: Fill each chronic sickness in separate rows.

Member ID	Sickness code	Duration of sickness code (actual days/ weeks)	When cured (days ago) If still sick put 99	Sickness prevent regular acrtivity? 1= Y	Severity code (may have multiple	Whom consulted code	Distance to place of consultation (actual in m or	Number of times visited (actual)	Amount paid for consultation (actual)	Did you have any treatment?	If no, why code	If yes, type of treatment code	Amount spent for treatment (actual)	If hospitalized		If did not consult, why code
														Distance to hospital	Cost of hospitalization	

Note: If the respondent cannot say separately the doctor's fee and cost for medicines/tests, write total expenditure in the doctors fee column and put * in the column of money spent for medicine/test.

Hh number code _____

J. CARE OF CHILD

(Ask only for children five years old and less)

Child ID	Where child defec-ate	Responsible for bathing child	If absent, Who bathes? (code 2)	How often child is bathed in a day? (code 3)	Source of bathing water (code 4)	Who is responsible in feed-ing child? (code 2)	If absent, who feeds? (code 2)	How often is child fed? (code 3)	Has child been breast fed? Y/N	When was child weaned? (actual age in years)	Is child given supplementary vitamins? 1- no 2- daily	Who cares for the child when sick? (code 2)	If absent, who takes care?

Code 1: 1= latrine used by elder, 2= left where child defecate, 3= anywhere in and around home, 4= in a ditch, 5= others, specify _____

Code 2: 1= mother, 2= father, 3= elder sister, 4= any elder, 5= helper, 6= child him/her self, 7= other, specify _____

Code 3: 1 = once, 2= twice, 3= three times, 4= as often as when child calls for it, or needs it

Code 4: 1= pipe water in house, 2= comunity pipe water, 3= artesian well, 4= river, 5= other, specify _____

Hh number code _____

K. nutritional knowledge of mother

Mother ID		Mark/ score	
1	Which of these foods is rich source of energy? 1= green leafy vegetables 2= meat 3= rice 4= don't know		
2	Which of these food is a protective food? 1= colocasia leaves 2= fish 3= oil 4= don't know		
3	Which of these foods is rich in protein? 1= pulses 2= wheat 3= fruits 4= don't know		
4	Who among the members of the household has highest need of body-building food? 1= children under 5 yrs 3= adult female 5= don't know 2= adolescents 4= adult male		
5	At what age do you think breast milk is not enough to feed the child and therefore, he/she should have other food regularly? 1= 4 –6 months 3= 8 – 12 months 2= 6 – 8 months 4= don't know		
6	What should be given to the newborn immediately after birth? 1= honey water 2= sugar water 3= colostrum 4= don't know		
7	What is the best food for a baby? 1= powder milk 2= cow/goat mild 3= breast milk 4= don't know		
8	What results when vitamin A is deficient? 1= night blindness 2= goiter 3= tiredness 4= don't know		
9	What is the problem when iodine is deficient? 1= fever 2= goiter 3= diarrhoea 4= don't know		
10	What should be done for diarrhoea of infants? 1= stop breastfeeding 3= stop giving all food 2= give ORS 4= don't know		

11	What problem results when iron is deficient? 1= fever 2= diarrhea 3= tiredness 4= don't know		
12	Who is most likely to be iron deficient? 1= adult male 3= pregnant woman 2= school age children 4= don't know		
13	If the child is sick with diarrhea, do you feed him/her? 1 – yes 2 - no		
14	If yes, what do you feed him/her with?		
15	If the child has fever, do you feed him/her?		
16	If yes, what do you feed him/her with?		
17	SCORE/RATING		

Hh number code _____

L. HYGIENE SPOT CHECK

1. Is there garbage around the house or compound?	1 = yes 2 = no
2. Does the compound need to be swept?	1 = yes 2 = no
3. Does the inside of the house need to be swept?	1 = yes 2 = no
4, Were human feces observed in the compound?	1 = yes 2 = no
5. Were poultry feces observed in the compound?	1 = yes 2 = no
6. Were animal feces observed in the compound?	1 = yes 2 = no
7. Was stagnant water observed in the compound?	1 = yes 2 = no
8. Are there unwashed cooking/ eating utentils in the house?	1 = yes 2 = no
9. Are flies present in/ around the house?	1 = yes 2 = no
10. What is the general appearance of the primary caregiver? (hands, clothes, fingernails)	1 = clean 2 = dirty
11. What is the general appearance of the youngest child? (hands, clothes, fingernails)	1 = clean 2 = dirty
12. Did the compound smell of animal urine?	1 = yes 2 = no
13. Is the floor of the house clean?	1 = yes 2 = no
14. Are the walls of the house clean?	1 = yes 2 = no

Hh number code _____

M. DIARY OF ACTIVITIES (for all household members)

Household Member Code _____

Time	Activity	Category of activity	Total hours (A)	Calorie per kg.B. wt. (B)	Total calories per kg. (A x B)

D. Own and gathered FOOD

	12 = eggplant 13 = ampalaya 14 = alugbati 15 = upo 16 = okra 17 = malunggay 18 = kangkong 19 = ferns/ pako **20 = onion leaves** 21 = tanglad/lemon grass 22 = atsal/chilli 23 = tomato 24 = luya	25 = chicken 26 = duck 27 = pig 28 = coconut 29 = tuba 30 = fruits, various 31 = seashells 32 = other seafoods **Source** 1 = backyard garden 2 = own farm/field 3 = open sea	4 = neighboring farm/field **5 = given/donated** **In-charge of production** 1 = adult male (>20) 2 = adult female (>20) 3 = young male (13-20) 4 = young female (13-20) 5 = child male (12 & less) 6 = child female(12, less)

E. 24-HOUR RECALL OF HOUSEHOLD FOOD INTAKE

E. CODES **Day** 1 = Monday 2 = Tuesday 3 = Wednesday 4 = Thursday 5 = Friday 6 = Saturday 7 = Sunday	**Meal/snacks code** 1 = breakfast 2 = am snack 3 = lunch 4 = pm snack 5 = supper 6 = evening snack Source code 1 = left over 2 = cooked food from others	3 = purchased 4 = own farm 5 = collected/wild Raw/cooked code (RCC) 1= RAP(raw as purchased) 2= REP(raw edible portion) 3= CAP(cooked as purchased) 4= CEP(cooked edible portion)	5= Cl/Dr fresh(cleaned & drawn) Cooking method code (CMC): 1 = boiled (incl. steamed) 2 = fried 3 = sauteed (guisado) 4 = broiled, sinugba 5 = scrambled 6 = raw, not applicable

F. INTRA-HOUSEHOLD FOOD DISTRIBUTION

F. CODES Note: write member ID for each household member. Begin guest code from 101. Food given to animal code from 201. Food given to others code from 301. Food left over code from 401	**Sex code** 1 = male 2 = female **Meal code** 1 = breakfast 2 = am snack 3 = lunch 4 = pm snack	5 = supper 6 = evening snack Where meal was taken: 1 = at home 2 = employer's house 3 = other invitation 4 = in market/hotel 5 = absent 6 = meal not taken	Reason for not taking meal: 1 = fasting 2 = sickness 3 = did not like to eat/ unwillingness to take food 4 = too busy, skipped meal, food 5 = others, specify _____

I. Morbidity section codes

Sickness code 1 = diarrhoea 2 = dysentery 3 = influenza 4 = ear problem 5 = dental problem 6 = skin problem 7 = rheumatoid arthritis 8 = gout 9 = fever 10 = cold 11= headache 12= malaria	13 = stomach ache 14 = anemia 15= cough 16 = typhoid 17 = measles 18 = tetanus 19 = cholera 20 = chicken pox 21 = mumps 22 = hypertension 23 = ulcer 24 = kidney problem 25 = dizziness 26 = heart disease	27 = hyperacidity 28 = jaundice 29 = eye problem 30 = asthma 31 = goiter 32 = diabetes 33 = consulvion 34 = other pain **Severity code** 1 = lain in bed 2 = can't stand 3 = can't sit 4 = can't walk 5 = can't carry heavy object	6 = can't run 7 = can't do any work 8 = not applicale 9 = other **Consultant code** 1 = none 2 = allopath registerd 3 = allopath quack 4 = homeopath 5 = spiritual 6 = paramedic 7 = self/non-medical person 8 = medical doctor	9 = physical therapist 10 ="hilot" 11 = acupuncturist 12 = reflexologist **Medical treatment code** 1 = allopathic 2 = homeopathic 3 = apiritual 4 = drug prescribed by doctor 5 = physical therapy 6 = acupuncture 7 = reflexology 8 = water treatment

APPENDIX VII
Local, English and scientific names of crops and trees in the villages

Local name	English name	Scientific name
Abaca	Abaca, Manila hemp	Musa textiles Née
Abokado	Avocado	Persea spp.
Ahos	Garlic	Allium sativum
Alugbati	Malabar night shade	Basilia rubra L.
Ampalaya, paliya	Bitter gourd	Mormodica charantia (ampalaya)
Atsal	Bell pepper	Capsicum annuum
Balanghoy, kalibre	Cassava	Manihot esculenta Crantz
Batong	Common bean, stringbean	Phaseolus vulgaris, Phaseolus lunatus
Bayabas	Guava	Psidium guajava L.
Bugang	Wild cane	Saccharum spontaneum
Bugas humay	Rice (Asian)	Oryza sativa L.
Cogon	Cogon	Imperata cylindrica
Gabi	Taro	Colocosia esculenta (L.) Schott et Endl.
Guyabano, guabana	Sour sop	Annona muricata L.
Kahil, dalandan	Naranja, “orange”	Citrus sinensis (L.) Osbeck
Kaimito	Star apple	Chrysophyllum cainito
Kalabasa	Squash	Cucurbita maxima Duch.
Kamatis	Tomato	Lycopersicum esculentum (L.) Karsten
Kamote, camote	Sweetpotato	Ipomoea batatas (L.) Poir.
Kangkong, tangkong	Water spinach, swamp cabbage	Ipomoea aquatica
Kapayas, papaya	Papaya	Carica papaya L.
Kolo	Breadfruit	Artocarpus altilis
Lagutmon	Aroids	Colocasia spp.; Xanthosom spp.
Limon	Lemon	Citrus limon (L.) Burm. f.
Limonsito	Citrus	Citrus aurantium L.
Lubi	Coconut	Cocos nucifera L.
Luy-a	Ginger	Zingiber oficinale Rosc.
Madre de cacao	Mexican lilac, gliricia	Gliricidia sepium
Mais	Corn	Zea mays L.
Malunggay	Horse radish	Moringa oleifera
Mangga	Mango	Mengifera indica L.
Nangka	Jackfruit	Artocarpus heterophyllus Lam.
Okra	Okra	Abelmoschus esculentus
Pako	Fiddlehead fern	Athyrium esculentum
Pakudo or estaring	Yautia	Xanthosoma sagittifolium (L.) Schott
Patola	Luffa	Luffa acutangula
Pinya	Pineapple	Ananas comosus (L.) Merr.
Pipino	Cucumber	Cucurbita spp.

Rambutan	Rambutan	Nephelium lappaceum
Romblon	Romblon	Pandanus odoratissimus
Saging sab-a	Plantain	Musa paradisiaca L.
Saluyot	Jute mallow	Corchurus olitorious
Sayote	Chayote	Sechium edule (Jaca.) Sw.
Sili	Hot pepper	Capsicum ssp.
Talong	Eggplant	Solanum spp.
Tamarindo	Tamarind	Tamarindus indica L.
Tanglad, tangad	Lemon grass	Cymbopogon citratus (DC) Stapf.
Tisa	Egg fruit	Poteria campechiana
Upo	Bottle gourd	Lagenaria siceraria

Appendix VIII
Abbreviations and symbols

AP	As purchased
Ca	calcium
ca	circa or about
cec	cation exchange capacity
EP	Edible portion
gm	gram
ha	hectare
K	potassium
kg	kilogram
km	kilometer
m	meter
masl	meters above sea level
Mg	magnesium
N	nitrogen
P	phosphorus
Php	Philippine peso
ppm	parts per million
>	greater than
<	lesser than
%	percent
USD	US dollar

Summary

Food insecurity results from a web of problems involving human and non-human processes within certain environments. This thesis is both a methodological and a policy-oriented study. It explores the linkages in order to understand the food security situation in less favored areas (LFAs) in the Philippines.

In the Philippines, food insecurity can be argued as most seriously felt in the LFAs which constitute about 65 percent of total agricultural land and where about 70 percent of the rural poor live. About 40 percent remain poor and food insecure in the rural areas. The two research villages (i.e. Alegre and Plaridel) in Leyte are representative of different types of LFAs: the flood-prone lowlands and the high risk eroded uplands and mountainous region in varied socio-economic settings.

Methodological issues: fit, relevance and applicability

Since food security is multi-faceted, the three dimensions of food availability, access and adequacy are addressed using a combination of formal surveys and qualitative tools (e.g. focussed group discussions, case studies, key informant interviews), which were so designed that they mutually enrich the investigation. The formal surveys (i.e. household production and socio-economic survey; food consumption, nutrition and health survey) are parallels to the existing national surveys regularly conducted (FIES, NNS), and were so selected to build on them in order to gain insights at improving their usefulness, particularly for the comprehensive assessment of food security. The various non-formal survey methods and tools were designed to give contextual information on the results of the statistical analyses (multi-variate analyses), and to qualify and enrich the interpretation of the significant variables that were identified in the regressions.

This thesis attempts to treat the food insecurity issue among households in LFAs using the livelihood approach within the framework of the interrelationships between their biophysical and socio-economic environments. The variables used in the analyses also consisted of biophysical, socio-demographic and economic variables. The households in the LFAs are engaged in farming to a greater or lesser degree. Iit is therefore logical that the biophysical environment is the starting point of analysis. This was done in the agro-ecology and land-use ethno-histories, the case studies, the community surveys and in the elaboration of Hypothesis 1. The latter deals with productivity determinants of the major food and cash crops. It was hypothesized that the niggardliness of the biophysical resource, and other biophysical-related and socio-economic factors contributed to low farm productivity, and thus, pushed households to seek for other sources of income.

Hypothesis 2 deals with the factors that most likely affect the households' decision in composing their livelihood portfolio. Livelihoods are grouped into four types: same percentage distribution of income sources (LIVETYP1); farm

income>50% (LIVETYP2); off-farm income>50% (LIVETYP3); non-farm income>50% (LIVETYP4), based on the income percentage criteria of the total full income of households obtained from these various income sources. This was found to be a useful classification because of the divergent trends found in LFAs, despite the similarities in cultivated crop (coconut, rice, rootcrops) and livelihood activities (farming, backyard piggery, domestic services, seasonal off-farm work, carpentry/construction). With this classification, it was found that one village counts more of the farming type of households (Alegre), and the other more the non-farm type of households (Plaridel). The regressions on Hypotheses 1 and 2 combined with the community surveys and case studies explained and qualified the differences in livelihood portfolios. Also, it was found that livelihood types do impact significantly on the choice and productivity of crop systems and the nutritional status of children. This thesis argues for the usefulness of the livelihood approach in exploring the linkages in food security analysis.

In addition, the data and regression results built around hypotheses 1 and 2 provided insights in food availability and food access. Finally, food adequacy is dealt with in Hypothesis 3 which investigated the determinants of nutrient intake and nutritional status of children, the latter as proxy for health. Nutritional status was regressed on the livelihood types together with economic, socio-demographic and health-related variables. Coming full circle, the factors affecting nutritional status of children as well as their health conditions were identified.

In methodological terms, the study attempts to provide a workable protocol for an integrative analysis of food security which can be applicable in development work (e.g. RDE programs and projects) or for policy purposes at local or national levels. This protocol is relevant and fitting particularly to the Philippine setting because of the recent moves to improve the local database of minimum basic data needs for food security assessments. The procedure and results of this study can be instructive and be tested, and further improved, in the current food security assessment initiatives by local government units with the assistance of the SUCs and research institutes.

Research results

In this section, I will summarize the results and relevant policy concerns. But first, I will present a brief on the food security situation in the LFAs as gathered from the results of the ethno-histories, FGDs, case studies, community surveys and informal interviews in the research villages.

The LFAs, livelihoods and the food security situation

Nature and man both played a role in the deterioration of the villages' landscapes over time. Flood-prone Alegre is located along the typhoon path. The unregulated quarrying operations of the politics-backed businessmen and the deforestation of the bigger watershed of which the village is part, greatly contributed to the high risk of floods which can be triggered just by heavy rains. This means high risk of flooding for the rice farms, vegetable and

rootcrop gardens, which contribute significantly to food and cash. This results in the erosion of capital which is usually sourced from the often usurious credit. With respect to farming, mainly upland Plaridel is no better, except for the fact that it has an additional cash crop, abaca, which provides added opportunities for off-farm wage work. Plaridel is also along the typhoon path, its hilly and mountainous farms exposed to wind and rain that cause erosions. Illegal logging by the influential and wealthy local businessmen has also contributed to the deterioration, and, in addition, has caused damage to the fish habitat leading to the disappearance of local fishing as an important livelihood. In both villages, farmers do not have the incentive for conservation farming. Farming income in general is not enough to feed and attend to the other basic needs of households.

Both villages differ in many respects from each other and this led to differences in livelihood strategies and the food security situation. Plaridel is a bigger village in terms of non-farm (native craft industry, construction, trade) and off-farm opportunities (coconut and abaca) and is part of a more economically vigorous local economy, whereas Alegre has fewer non-farm (domestic service, local transport) and off-farm (smaller coconut and rice) activities. About 47 percent of households in Plaridel are depending mostly on non-farm incomes, and about 42 percent in Alegre mostly on farm incomes. The per capita income of Plaridel is about 0.90 USD and of Alegre 0.64 USD, both still below the WB poverty threshold of a dollar a day. In terms of income, households in these villages are poor. This below poverty threshold income presents serious limitations in terms of food access. Enough nutrient sources of food are available in the nearby town and village markets yet the households reported being food deficit two to three months a year during the off-harvest season when cash is also very low. Food access is the more limiting factor.

Food habits are part of culture. Partly because of cultural factors and partly because of the village terrain and proximity of fields, Alegre households tend to have vegetable gardens more than in Plaridel, though quite limited in diversity. The use of the nutritious taro and sweetpotato leaves and petioles, and the preparation of many dishes with fresh coconut milk are very much a part of the Waray-waray food culture. Despite the relatively lower per capita income than Plaridel, Alegre household members turned out to have better nutrient adequacy for all nutrients tested and for all age groups. This could also be because Alegre mothers had more time for home and child care (associated with farm and off-farm type households) than Plaridel mothers (non-farm type households). The statistical regressions showed the high significance and importance of off-farm type households as positively affecting the nutritional status of children via the associated intensity of time allocation for home and child care. Though still below national averages, Alegre households are better off in nutrient adequacy for all nutrients than the better-income households in Plaridel. This allows for the conclusion that a higher income level per se is not an assurance of nutrient adequacy. Further, the home garden argument implies that improving the availability of nutrient

sources from the home gardens provides opportunity for food and nutrient adequacy improvements especially among the poor households whose income levels will really take time, if at all, to adequately improve.

The village government of Plaridel was able to adequately provide for quality drinking water from three spring water sources in the mountains, while potable drinking water in Alegre was accessed outside the village due to poor quality of its groundwater. Plaridel has better school and health facilities than Alegre, where households are served by one school only and have some access to health services. There were more sources of credit in Plaridel, including the Church-organized cooperative for home industry and consumption uses, while Alegre households had to contend with the usurious local moneylenders, except for one or two farmers who accessed credit from the Rural Bank in town. Plaridel has relatively more traders who are also financiers of farm capital, i.e. seed, fertilizers or wage payment. Comparatively, Plaridel has more in terms of economic opportunities and support services, while Alegre has more of economic constraints. The economic gains however have not been translated in terms of nutritional status.

All these basic data provide strongly for the argument that the significant and important factors that contribute to food security are not only economic in nature. Economic factors such as income and food budget are necessary but not sufficient conditions for food security.

Among poor households, labour is the most important resource. Labour as a variable, is a special case, and I will treat it as quasi-economic and quasi-social because it has both an economic and a social value. The latter simply means that the consideration for labour use decision is not only for monetary aims but also for non-monetary rewards or benefits. This is especially true with regard to a mother's or a wife's use of labour time. In households where women play a dual role as both producer and consumer, valuation of labour is subjective because there is no 'real market' for own use of time partly because of social norms. This has an important bearing particularly in labour substitution between wage and domestic work.

The hard evidence: in reply to the queries

The main research question that this thesis deals with is: "How do the livelihoods of farming households impact on their food security in a context of ecologically fragile environments?" The explanations of the variables or factors from the interrelationship between hypotheses 1 and 2, and between hypotheses 2 and 3 clarify the answer to this question.

It is clear at the outset that farming households in the LFAs are on average poor and engaged in diverse activities to make ends meet. In this study, the households are classified based on the percentage contribution of income from three groups of activities (farm, off-farm, non-farm). The 'livelihood typology' is used as a proxy for resource-use strategies. Households face difficult choices in allocating their two most important resources, labour and time, with very meagre contribution of other inputs, because of constraints and limited opportunities.

The livelihoods of farming households in less favoured areas are affected by the interplay of biophysical and socio-economic factors. These factors have differential impact on the different livelihood types because of the availability and competing use of labour of adult working members, the household size, the size of cultivated farm, value of farm produce, and the existence of idle lands. From direct observation and interviews it bacame apparent that idle land is the catch-all variable for poor quality land and/or the lack of capital to make use of technology and other inputs.

It will be noted that the final indicator of food security is that of nutrition adequacy, the latter of which is indicated by nutrient adequacy of the individual household members and nutritional status of children. In the final analysis, the nutritional status of children, especially those under five, is highly significantly and positively affected when households income is obtained more from off-farm activities (LIVETYP3), and positively when more income comes from non-farm activities (LIVETYP4), and negatively when income is more from farming activities (LIVETYP2). The evidence for the latter two, however, is not conclusive.

Hypothesis 1: low farm productivity and multi-livelihoods

How does the situation in ecologically less favoured areas affect the choice and generation of livelihoods?

The first hypothesis has addressed this query by investigating the effect of the biophysical and socio-economic environments on farm productivity. Households have stopped depending only on their farms for sustenance because of low farm productivity and low farm incomes. They maintain a dual or multi-activity livelihood portfolio because farming alone cannot provide adequately, even for their most basic needs. Households usually combine farming with other sources of income: in farm wage work (coconut, rice, and abaca) and/or non-farm employment (native craft, peddling, domestic service).

The biophysical and related factors found to have highly significant effects on crop productivity include the season, fertilizer use, irrigation water and soil type for rice, terrain and variety for sweetpotato, cropping pattern for abaca; and idle land, indirectly, via livelihood choice (LIVETYP4) for coconut and rice. The higher the incidence of idle lands, the greater the tendency for households to engage in non-farm employment, and the more non-productive the farms are due to labour shifts away from them. Poor land quality with less or no capital and technology inputs to start with, results in low farm productivity.

The socio-economic variables that have significant impact on farm productivity are: non-farm income, share tenancy, remittances, and dependency ratio for abaca, wage rate, production cost, farming experience for rice and coconut, age of farmer for sweetpotato, and livelihood type for coconut, abaca and rice. It is important to note that the cash crops abaca, coconut and rice are more sensitive to livelihood types especially the non-farm (LIVETYP4) and off-farm (LIVETYP3) livelihood types. The negative relation implies a labour substitution effect (coconut, abaca) and the positive

relation implies the capital plough-back effect (rice). Higher wage rate will have a greater likelihood of reducing rice yield due to labour shifts into more lucrative non-farm work, but not with coconut and abaca because these are the main cash crops. Similarly, the effects of the off-farm income and non-farm income variables depend on relative labour shifts away from coconut farms, and the capital plough-back in abaca farms, respectively.

The higher the dependency ratio the more likely farmers intensify the use of resources for abaca farming because it is the more cash-earning crop, with a stable market and better prices. The more remittances a household has the more negative the impact on abaca production due to distance-induced inertia because the abaca fields are located three kilometres or more to the mountains.

Share tenancy is significant but not a negative issue, especially with abaca and rice because what is more relevant is the use-right of the land without the burden of tax (which goes with ownership). Working on the land for generations has generated family loyalty sealed with mutual benefits. Share tenancy, however, tends to negatively impact on coconut productivity because of labour shifts, which are likely due to the more diffused labour use among coconut farmers who are engaged more in off-farm and non-farm activities.

These differential effects on the various crops show that crops respond differently to various factors, and this factor-specificity has important policy implications for targeting intervention options for productivity improvement.

Hypothesis 2: the livelihood portfolio – choices and dimensions

From Hypothesis 1, it is concluded that farming households have a diversified livelihood portfolio because low productivity and low incomes from farming cannot sustain their lives. In summary, livelihood type has high significant correlations with the variables farm wage worker (+), age of household head (+), size of cultivated area (-), actual household size (-), value of farm produce (+), number of working children (+/-). The evidence on the life cycle variable is not conclusive. Generally, the behaviour of the relationships shows labour shifts from one type of activity to another mainly because of household size, labour supply within household, the area and productivity of the farm.

The inclusion of the dimensions on assets and resources, sex, age, and life course was based on their assumed importance in the process of decision-making for the livelihood portfolio. In Hypothesis 2, these are included as independent variables in the multivariate regressions for the livelihood types, and sought to address the basic question of what determines the households' livelihood portfolio. Livelihood type one (LIVETYP1), the control, refers to household livelihood strategies which result in more or less equal distribution of income earnings from farm, off-farm and non-farm sources; livelihood type two (LIVETYP2), where the share of farm income is greater than 50 percent; livelihood type three (LIVETYP3), when off-farm income is greater than 50

percent; and livelihood type 4 (LIVETYP4), when non-farm income is greater than 50 percent.

The non-farm livelihood type household tends to be highly significantly and positively related with idle land. There is a significant and negative relation with actual household size. This clearly shows the movement towards more non-farm employment when land becomes less productive, or with the lack of inputs or incentive to till the soil. A smaller household size means that one or two spouses can have more labour time shifted from domestic to non-farm work. This variable is highly significant for off-farm livelihood type. Farm wage worker is highly significantly and positively related with both farm and off-farm based livelihood types. But with more working members, household labour will likely be shifted to off-farm work. Although not conclusive, life cycle tends to have a negative relationship with the off-farm livelihood type, since the earlier in the life cycle with no child, the more labour time available for off-farm work.

The value of farm produce is highly significant and positively related with farm livelihood type, showing that households will greatly rely on farm income if its value is high. This is a variable that captures relatively good land, better yield, and better market. Also the bigger the farm land cultivated, the more likely the negative impact on off-farm livelihood type because this would mean greater labour requirement on farm, and thus, less labour available for off-farm work.

The role of gender is critical in terms of type of labour available and employment opportunity. Male labour is usually employed in off-farm activity of cash crops such as coconut and abaca, and female labour mostly for non-farm employment like native crafts and domestic services. Household size affects labour supply, especially of women since their labour use on domestic chores is high. Hence, a bigger household size tends to negatively impact on their availability for off-farm (in rice) and non-farm work.

Hypothesis 3: nutrient adequacy and nutritional status

Following through the series of relations and results, the final answer to the main question is provided in this section on the food adequacy situation. On the whole, nutrient adequacy and nutritional status of households and individuals in the LFAs, as represented by the research villages, are far below the national averages.

The study found no significant differences in the nutrient adequacy levels between age and sex groups, except a better-off picture of adequacy for all nutrients among children below 5 years of age. Overall, the energy adequacy level is only about 50 percent, which has serious implications for the growth of children and health of adults. Children under 5 and adults tend to have better nutrient adequacy, but children under 5 are critically deficient in Vitamin A, C, riboflavin and calories. The males, the children and adults tend to be more adequate in protein than the teenagers and the females. Also, there were no significant differences in the nutrient fair-share ratio by sex or age

which indicates a fairly equitable distribution of nutrients within the household. However, there was a slight positive bias for all nutrients in favour of children below 5 years old, and women tend to be slightly favoured with calcium, vitamin C and thiamine. This reflects priority given to the very young and mother's nutrient needs.

Despite the lower average per capita income in Alegre, it showed better adequacy levels than Plaridel for all nutrients. Obviously, not because of the income factor but for a mix of reasons: there were more home gardens in Alegre, resulting in a more nutritious diet in the area, and more mother home care time as gleaned from their livelihood patterns.

Nutrient intake is the major determinant for nutritional status. This implies that nutritional status is significantly dependent on variables affecting nutrient intake, such as the food budget, time allocated for home care, mother's or caregiver's education, the availability of non-bought food (own-production, given), household size, age and sex of the individual. There are differential impacts of each of these variables on specific nutrients based on the sensitivity of the nutrient to each of the above variables. Thus, a greater probability that households and individuals in less favoured areas will have higher nutritional status when the food budget is improved, when mothers are better educated to take care of the home and its food needs, when household size is planned to a reasonable minimum, and when food is available from non-bought sources. As the food budget includes both bought and non-bought food, the food budget can be improved not only by improving income but also by intensifying the home production of nutrient-rich food crops.

The separate regressions for nutritional status, using the weight-for-age of children as dependent variable, found as highly significant such variables as drinking water quality, education of mother, total farm full income, livelihood type, and short-term morbidity. Hygiene was significant particularly for children less than 5 years. Nutrient knowledge per se was not found significant in the individual nutrient intake regressions, but was found highly significant and positive with the nutritional status of school age children.

Livelihood types matter in nutritional status via labour and time allocation and food priority effects. The off-farm livelihood type (LIVETYP3) was found highly significant and positively affecting the pre-schoolers' health, most probably because of time allocation effects when the mother has more home care time with the child when the father is away for off-farm work. Though not conclusive, the farming livelihood type (LIVETYP2) variable is negatively related with health of schoolchildren, and the non-farming livelihood type (LIVETYP4) variable is positively related with the pre-schoolers' health via time allocation effects and priority to the very young with additional food from improved food budget, respectively.

Total farm full income includes all produce of the farm that are sold and those consumed in the home. This variable is highly significantly and positively related with health of children under 5, yet significantly and negatively with school children's health. This again highlights the contribution of non-traded or home-grown food and nutrient sources since the income

variable per se has no evidence of significance. More significant is the trade-off between food, care and goods in favour of the pre-schoolers. These further confirm how pressing the food and income constraints are among the poor households that this trade-off is biased against the school children.

With pre-school children, short-term morbidity is highly significant and important as they are more sensitive and prone to contracting illness of whatever kind. Hygiene practices are a significant factor in the health of pre-schoolers, but not with primary schoolchildren. This implies the relative sensitivity of children under 5 to hygienic practices and conditions. There is no conclusive evidence for garbage disposal.

Firming up policy options

Table 11 presents the summary of policy actions necessary to address the significant and important variables identified in this study. The initiation level indicates where policy can originate. National refers to the national agency or relevant research, development and extension institute (RDE), and local refers to provincial, municipal or village governments. The indication of both national and local implies strong coordination with the relevant national agency or research institute and local government unit. Effective implementation presupposes good governance, cost-sharing for cost effectiveness, good human and non-human resources management, and collaboration and partnership with non-government organizations and community-based organizations present in the respective areas.

Given the results of this study, significant policy concerns can be drawn and need to be addressed in order to respond to the persistent food insecurity in LFAs. But there are major over-arching concerns that must be considered in drawing out policy options: the continued deterioration of the biophysical environment (watershed management, resource conservation), the movement away from the farm in livelihood pursuits and the increasing role of non-farm employment, a rationalized RDE in agriculture, and agrarian reform. Land suitability should be an integral part of agriculture RDE, both at the national and local levels. These concerns will need a longer time perspective, a broader scope of policy action, and concerted efforts in order to effectively help poor households, especially in the targeted LFAs. Addressing these concerns will help provide both the necessary and sufficient conditions for the policy actions, herein summarized, to have impact on the significant variables (biophysical factors, land tenure, non-farm livelihood, remittances). There is need for a review and assessment of the planned and implemented programs related to these concerns.

In the medium and long runs, the RDE programs for cash and export crops, like coconut and abaca, need special attention in order to improve their productivity and comparative advantage vis-à-vis the world market. These cash crops are main farm income sources in the LFAs and provide greater opportunities for off-farm work, which tend to impact significantly and positively on the nutritional status of children. These also may yet provide the

only significant livelihood option for those who are left in the farms to earn a living since local non-farm opportunities are quite limited.

It is important to highlight what could be addressed by policy in the short and medium-terms that will most likely improve food security especially of the poor farming households in the LFAs. In particular, I am referring to the need to improve the coordination and implementation of the food-based program on own-food production through home gardens to be integrated with the non-formal education program of women and men. The latter includes components of food-nutrient diversity, home gardening, primary health care, reproductive health, preparation of nutritious local food dishes, micro-enterprise livelihood, home management, and hygiene and sanitary practices. These comprise existing programs of the Department of Health, Department of Social Welfare and Development, Department of Agriculture, the BIDANI, and some local governments, but have not been fully implemented or well coordinated for various reasons. These programs address most of the factors, which were found to be highly significant and important, to improve nutritional status. Such programs can be initiated at the local levels and in collaboration with national initiatives where applicable.

In relation to the food-based nutrient diversity approach, there is also the critical need to develop and integrate an RDE program in existing food crop improvement agenda of relevant research institutes aiming at improving the knowledge base of the nutrient content of food crops. Of the 80,000 species or so of plant sources of nutrients, only a very limited number are grown in own fields and gardens. Promoting the diversity of plant foods that can be produced in farms and gardens through improved food-nutrient information and nutrition campaign program have increasingly received attention in recent years as vehicles to alleviate poverty and food insecurity (Gari, 2004; Frison *et al.,* 2006; Toledo and Burlingame, 2006).

Further, the methodological issue that needs policy action is the coordination of the family income and expenditure survey (FIES) and the national nutrition survey (NNS) so that they can be more useful in a holistic food security assessment. The organizational structures to conduct the surveys are in place but may need modification in order to stratify for LFAs or otherwise, and ensure the consistency of the sampling design, the reference period, and the timing of surveys in order to apply the whole range of analysis in the production-consumption continuum. This can save a substantial amount of time, budget and effort in the development and implementation of food security targeted programs or projects at various levels.

Table 11. Summary table of significant variables and policy options

Policy variables	Policy option type	Initiation level
Biophysical environment and technology		
Idle land	Technology, RDE infrastructure	national, local
Land, soil quality	Technology, land-use suitability assessment, RDE infrastructure	national, local
Cropping pattern, variety	Technology, land-use suitability assessment, RDE infrastructure	national, local
Fertilizer use	Technology, regulatory, RDE	local
Irrigation	Regulatory, RDE infrastructure	local
Socio-economic environment, demographic and health		
Farm livelihoods (LIVETYP2)	Cash crop RDE (coconut, abaca, rootcrops, rice, vegetables) Food-based program (home gardens, own-food production), RDE in nutrient content of own-food produced and wild foods. Support services (capital, market)	national, local local national, local
Off-farm livelihoods (LIVETYP3)	Cash crop RDE (coconut, abaca) Trade and industry, regulatory	national, local national, local
Non-farm livelihoods (LIVETYP4)	Technology, design, RDE Support services (capital, market, quality control)	national, local national, local
Drinking water quality	Utility service/ infrastructure	local
Mother's education	Women non-formal training program (food preparation, food-nutrient information, home gardens, home management)	local
Nutrition knowledge	Women non-formal training Food-nutrient RDE, education and information campaign (social marketing)	national, local
Remittances	Social service (adult education/ training, savings mobilization, capital investment)	national, local
Land tenure	Agrarian reform program review (with assessment of CARP)	national
Household size Number of working children Dependency ratio	Population management (pro-active local implementing infrastructure) Non-formal education for women and men (reproductive health, home management and relations)	national, local
Hygiene	Social/health service Non-formal education	local
Morbidity	Social/health service Non-formal education	local

Samenvatting

Voedselzekerheid is problematisch in grote delen van de Filippijnen, vooral in arme en ecologisch fragiele gebieden. In deze studie werd onderzocht op welke wijze biofysische milieufactoren van invloed zijn op agrarische productiviteit, middelen van bestaan, strategieën van mensen om in hun levensonderhoud te voorzien, en het niveau van voedselzekerheid. Tevens werd gekeken naar de voedingsstatus van kinderen in de huishoudens in de steekproef. Het onderzoek werd uitgevoerd in de dorpen Alegre en Plaridel in Leyte, onder respectievelijk 91 en 109 huishoudens in de periode 2003-2004.

Livelihood theorie vormde de basis voor de formulering van de onderzoeksvragen en de analyse van de resultaten. Het probleem van voedsel(on)zekerheid werd daarmee in een breed kader geplaatst. Voor de beschikbaarheid van en toegang tot voedsel werd gekeken naar de eigen voedselproductie van de agrarische huishoudens en naar de manier waarop de betrokken huishoudens inkomen genereren om voedsel te kopen. Wat dit laatste betreft konden de huishoudens in vier groepen worden verdeeld, al naar gelang het aandeel van het huishoudinkomen uit (a) eigen agrarische productie, (b) andere activiteiten in de agarische sector, (c) activiteiten buiten de agrarische sector. De laatste twee bronnen van inkomen worden in de Engelstalige literatuur aangeduid als respectievelijk *off-farm* en *non-farm* inkomen. Op basis hiervan konden vier soorten huishoudens worden onderscheiden: (1) LIVETYP 1, een gelijk aandeel van de drie soorten van inkomstenbronnen, (2) LIVETYP 2, aandeel inkomen uit eigen agrarische productie meer dan 50%, (3) LIVETYP 3, aandeel off-farm inkomen meer dan 50%, (4) LIVETYP 4, aandeel non-farm inkomen meer dan 50%.

In beide dorpen wordt een mix van voedsel- en handelsgewassen verbouwd. Abaca (voor de vezel) en kokosnoot (copra) zijn belangrijke handelsgewassen, rijst, mais, taro en zoete aardappel belangrijke voedselgewassen. De verdeling van huishoudens over de vier groepen (LIVETYP 1 t/m 4) bleek verschillend voor de twee dorpen. In Alegre domineert LIVETYP 2, in Plaridel LIVETYPE 4, waarbij daar inkomsten uit arbeidsmigratie (*remittances*) een belangrijk deel van het *non-farm* inkomen bleek uit te maken. *Livelihood* type beïnvloedt bestaanszekerheid en voedselzekerheid. Het gemiddeld inkomen in Plaridel bleek hoger dan dat in Alegre. Voor beide dorpen geldt dat ongunstige biofysische omgevingsfactoren leiden tot lage agrarische productiviteit en dat vrijwel alle huishoudens genoodzaakt zijn inkomsten uit andere bronnen te verwerven (Hoofdstukken 6, 7, en 8). De studie laat een heel palet aan activiteiten zien die huishoudens ondernemen om in het dagelijks levensonderhoud en de dagelijkse voedselbehoefte te voorzien en andere noodzakelijke uitgaven (zoals schooluitgaven voor de kinderen en religieuze en andere festiviteiten) te kunnen betalen.

Over de hele linie bleken de onderzochte huishoudens lager te scoren op indicatoren voor voedselzekerheid en voedingsstatus dan de nationale gemiddelden (Hoofdstuk 9). Er zijn wat dit betreft nauwelijks verschillen naar leeftijd en sexe, met uitzondering van kinderen jonger dan 5 jaar die relatief

goed scoren, hoewel ook voor deze groep vitamine-A tekorten werden geconstateerd. (Vitamine-A gebrek is een algemeen probleem in de Filippijnen.) Het onderhouden van een groententuin blijkt het dagelijks menu en daarmee de voedingsstatus positief te beïnvloeden. Overheidsbeleid en overheidsprogramma's zouden daar meer op in moeten spelen. Uit het onderzoek blijkt tevens dat er geen eenduidig verband is tussen huishoudinkomen en voedingsstatus van kinderen. Dit heeft te maken met twee zaken. Ten eerste met de allocatie van het inkomen, ten tweede met de algemene gezondheidstoestand van de kinderen en de zorg en tijd die aan ze wordt besteed, omdat deze variabelen respectievelijk de opname van nutriënten in het lichaam en de inname van voedsel beïnvloeden. Kinderen van moeders die elders (moeten) werken, scoren slechter om – vermoedelijk – deze laatste reden.

Uit de studie blijkt dat gebrek aan voedselzekerheid en goed voeding een complex probleem is, waarbij verschillende soorten factoren in het spel zijn. Het huidige beleid is te veel versnipperd en te weinig gericht op ecologisch fragiele gebieden. Deze laatste gebieden, waarvan de onderzoeksdorpen een voorbeeld zijn, zouden speciale aandacht moeten krijgen. Verder verdient het aanbeveling om het nationale onderzoek naar sociaal-economische status, dat wordt gedaan met de *Family Income and Expenditure Survey* (FIES), en voedselstatus, waarvoor het instrument de *National Nutrition Survey* (NNS) is, te coördineren. Integratie van de instrumenten FIES en NNS, gecombineerd met stratificatie naar gebied, zou tot beter inzicht in de omvang en verspreiding van voedselonzekerheid leiden, met name die in ecologisch fragiele gebieden, en kan resulteren in effectiever beleid.

Curriculum Vitae

Julieta Rodas Roa is currently head-designate of the Extension and Socio-economics Division of the Philippine Rootcrop Research and Training Center based at the Leyte State University. In this capacity, she is in charge of the planning, coordination and implementation of the socio-economic projects and the extension program of this nationally mandated institute for root and tuber crops. She started working here in August 1987 and was involved in various RDE projects in collaboration with local, national and international agencies. As associate professor of the university, she also teaches social science.

This challenging work with science, the rural poor and industry has brought her in contact with the UPWARD (Users' Perspective with Agricultural Research and Development) Network, the social science network of the International Potato Center (CIP) funded by the Netherlands Government. The UPWARD Network was instrumental to a number of mile-stones in her career. The first coordinator recommended her to the International Course for development-oriented Research in Agriculture (ICRA) course in Wageningen, the Netherlands in 1993. Subsequently, she became part of the first ICRA team to do a three-month field study in China (Wu'an County, Hebei province). She got in contact with Dr. Anke Niehof, the chair of the Dutch Support Group of UPWARD, who eventually became her promoter for the PhD study at Wageningen University through the WUR-IFPRI RESPONSE Program.

She had a number of breaks in her early career. Her Bachelor's degree (University of San Carlos, Cebu, Magna cum laude) and master's studies (School of Economics, University of the Philippines, Diliman) in Economics earned for her the position of economist with the Ministry of Trade in Manila (i.e. Trade Assistance Center, MIDAS Project), her first job in 1976. Marriage brought her to central Philippines in Cebu, in 1977, where she worked with the same ministry at the regional office as senior market analyst. In 1979, she got a contract to work for six months on the feasibility of the North Reclamation Area Project in Cebu.

The years 1981 to 1987 brought her into the academic world where she was instructor, tertiary level, in Economics at the University of San Jose-Recoletos, Cebu. Here, she became the SGV Chair holder in Economics in 1982-1985 for the Visayas region. She capped her masters program with the College of Public Affairs, University of the Philippines, Los Baños, Laguna, with the specialization on Strategic Planning and Public Policy in 1999-2000.

She is happily married to Nello P. Roa IV, a businessman, and a fulfilled mother of three children: two grown-ups, professionals in their own right, and one little girl. She saw the dawn of day on 21st of January 1955 in Maasin, Southern Leyte. The family resides in Baybay, Leyte.

Training and supervision plan

Name of the course	Department/ Institute	Estimated costs	Year	Credits
I. General part				
Social Science Research Methods	MGS		2001	1
Techniques for Writing and Presenting a Scientific Paper	MGS		2001	1
(min.2, max. 6 credits)	Subtotal part I			2
II. Mansholt-specific part				
Mansholt Introduction course	MGS		2001	1
Mansholt Multidisciplinary Seminar	MGS		2005	1
Presentations at conferences:				
PhD thesis	MGS		2002	1
Second International NHF Workshop, 1-7 May, Hanoi Vietnam	Neys van-Hoogstraten Foundation, NL		2005	1
(min.4, max. 10 credits)	Subtotal part II			4
III. Discipline-specific part				
Social Theory and the Environment	SENSE		2001	4
Sociology of Households and Livelihoods	SCH (tutorial)		2001	3
Pathways for Agricultural Intensification	MGS		2001	2
Agro-ecological Approach and Rural Development	PE&RC		2001	1
Advanced Farm Household Economics	DEC (D100-220)		2002	4
Bio-Economic Modelling	MGS		2002	2
Food Policy in an Era of Globalization	MGS		2004	3
(min. 9 credits)	Subtotal part III			19
TOTAL (min. 20 credits)				25

Regional Food Security Policies for Natural Resource Management and Sustainable Economies

The research presented in this thesis was carried out within the framework of the RESPONSE (*Regional Food Security Policies for Sustainable Natural Resource Management and Sustainable Economies*) programme, a joint initiative of Mansholt Graduate School for Social Sciences, CT de Wit Graduate School for Production Ecology and Resource Conservation and Wageningen Institute for Animal Sciences (WIAS) at Wageningen University and Research Centre (WUR) in cooperation with the International Food Policy Research Institute (IFPRI) in Washington D.C. The programme aims at supporting policy makers in identifying alternatives for addressing poverty, food security and natural resource degradation in less-favoured areas.

RESPONSE is one of the six multi-annual research programmes of the Interdisciplinary Research and Education Fund (INREF) of Wageningen University, launched in 2000. INREF enables the cooperation of Wageningen University researchers with international and local institutions in the South. The RESPONSE Programme includes 10 sandwich PhD students from East Africa (Ethiopia, Kenya and Uganda) and Southeast Asia (China, Bangladesh and the Philippines). Fieldwork activities have been co-funded by the Dutch Ministry of Foreign Affairs (Directorate General for International Cooperation/DGIS), the European Union and the Neys-van Hoogstraten Foundation.