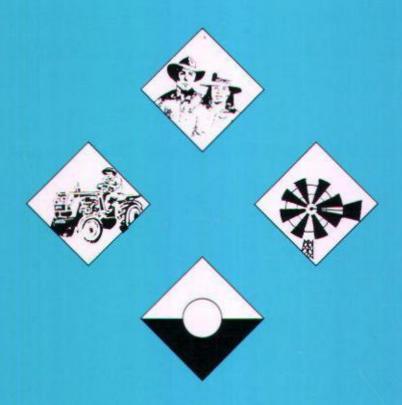
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FRANK VANCLAY



THE SOCIOLOGY

of the

AUSTRALIAN AGRICULTURAL

ENVIRONMENT

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The Sociology of the Australian Agricultural Environment Frank Vanclay

Propositions

- 1. There are major economic, social and environmental consequences for Australia as a result of the processes of economic restructuring in the world political economy (Vanclay and Lawrence, 'Environmental and social consequences of economic restructuring in Australian agriculture', this thesis).
- 2. By locating the least desirable agricultural activities in the less 'regulated' nations of the periphery and semi-periphery, transnational agribusiness is engaging in a form of environmental imperialism which contributes to the peripheralisation of semi-peripheral nations such as Australia (Lawrence and Vanclay, 'Agricultural change and environmental degradation in the semi-periphery', this thesis).
- 3. The three strategies employed by governments and public extension agencies in dealing with the crisis in agriculture and the crisis in extension segmentation, privatisation, and utilisation of group extension and bottom-up approaches will not resolve environmental problems in agriculture and may well worsen them (Vanclay, *Important aspects of traditional extension*', this thesis).
- 4. Farmers' non-adoption of technology and of environmental management practices is rational from their point of view (Vanclay and Lawrence, 'Farmer rationality and the adoption of environmentally sound practices', this thesis).
- 5. Marginal farmers who are being structured out of agriculture are not marginal because of their inability to farm, or by their lack of adoption of agricultural innovations, but are marginal because they were structured to be marginal in the first place (Vanclay, *Important aspects of traditional extension*, this thesis).
- 6. The failure of extension in promoting adoption of new innovations, especially of environmental management practices, is not because of characteristics of those farmers (age, education level, economic status, or cosmopolitanness), but because of the failure of extension agencies to adequately address the needs of farmers (Vanclay, Important aspects of traditional extension', this thesis).
- 7. Farmers do not have environmentally hostile views or attitudes and therefore attempts to change farmers' attitudes or to promote a land ethic amongst farmers will not increase the rate of adoption of environmentally sound management practices (Vanclay, 'The social context of farmers' adoption of environmentally sound farming practices', this thesis).

- 8. Chronic health complaints that impair old age people's ability to live independently are more important to their own perception of their health than many life threatening conditions that do not impair autonomy, even though health care services tend to disregard health matters that are not life threatening (Vanclay, Selby and Hall, 'Health and Autonomy in Old Age', Australian Journal on the Ageing 1984, 3(2): 27-33).
- 9. The predictors of the amount of improvement in functional well being following stroke rehabilitation will be the same as the predictors of the functional outcome when appropriate statistical analysis is undertaken (Vanclay, Functional Outcome Measures in Stroke Rehabilitation', *Stroke* 1991, 22(1): 105-108)
- 10. Long term daily consumption of high quantities of alcohol (above 40 grams of pure ethanol per day) impairs the body and brain and can be detected in community screening tests (Vanclay et al., 'A Community Screening Test for High Alcohol Consumption using Biochemical and Haematological Measures', Alcohol and Alcoholism 1991, 26(3): 337-346).
- 11. Tourists' enjoyment of the Great Barrier Reef is only affected by the Crown of Thorns starfish if they know that the reef has been damaged by the Crown of Thorns starfish tourists can not differentiate coral quality with respect to Crown of Thorns damage (Vanclay, *Tourist Perceptions of the Great Barrier Reef*, Report to the Great Barrier Reef Marine Park Authority, Institute of Applied Environmental Research, Griffith University, Brisbane, 1988).
- 12. If too broad a topic is selected for a PhD, it becomes impossible to adopt a single unified theoretical perspective that satisfactorily covers the topic. This does not satisfy PhD supervisors and examiners. Yet the real world is very broad. This must mean that PhDs are not suitable frameworks under which to study the real world.
- 13. Het is betreurenswaardig, dat studerenden voor het ingenieursdiploma richting akkeren weidebouw, vooral wanneer zij zich tot de Landbouwvoorlichtingdienst voelen aangetrokken, nimmer een bewijs van enige bekwaamheid in de leer der veevoeding behoeven over te leggen (F.K. van der Kley, De Betekenis van Tweezaadlobbige Graslandplanten voor de Minerale Samenstelling van Weidegras, Proefschrift, Landbouwhogeschool te Wageningen, 21 Juni 1957).
- 13. It is deplorable that the subject of animal nutrition is not part of the undergraduate curriculum of crop science and pasture science students who desire to enter the agricultural extension service.

Francis Martin Vanclay
The Sociology of the Australian Agricultural Environment
Wageningen Agricultural University
June, 1994.

The Sociology of the Australian Agricultural Environment

Frank Vanclay

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Promotoren: dr. Norman Long,

hoogleraar in de rurale ontwikkelingssociologie

dr. ir. Niels Röling, voormalig hoogleraar in de voorlichtingskunde

Frank Vanclay

The Sociology of the Australian Agricultural Environment

Proefschrift

ter verkrijging van de graad van doctor in de landbouw- en milieuwetenschappen op gezag van de rector magnificus, dr. C.M. Karssen, in het openbaar te verdedigen op dinsdag 28 juni 1994 des namiddags te vier uur in de Aula van de Landbouwuniversiteit te Wageningen.



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Authors' Abstract

The Sociology of the Australian Agricultural Environment *Frank Vanclay*, 1994.

Australian agriculture is in crisis, the terms of trade for agriculture are falling, many farmers have negative incomes, and there is massive structural adjustment with government policy assisting the exit of marginal farmers out of agriculture. Australian governments are gripped with the philosophy of economic rationalism. This creates a policy environment of reduced commitment to government funding for agriculture, a reduction in agricultural extension services and a government that is opposed, in principle, to regulatory and incentive based approaches to environmental management. Thus there is a period of considerable change in agricultural extension services as they attempt to deal with these changed circumstances. At the same time as these crises in agriculture and in agricultural extension, there is an increased need for effective agricultural extension because of increasing levels of land degradation in Australia. Increasing levels of salinity, acidity, soil structure decline, soil nutrient decline, erosion by wind and water, destruction of native habitat and wildlife, invasion of rangelands by woody weeds, and other environmental problems are of an unprecedented scale. The severity of environmental problems creates an environmental imperative for action for environmental management.

However, the debate about environmental problems in agriculture has been dominated by technical discussion of the physical aspects of the problem, of the physical causes and of the physical solutions. In agricultural extension circles, the debate has been restricted to a discussion of how to get farmers to adopt environmental management practices. At no time has there been any consideration of the social foundation of agriculture, of the social, political and economic processes that have shaped Australian agriculture, or of the social, political and economic basis of environmental problems within agriculture. Agricultural extension agencies, despite the crises in which they currently exist, have tended to maintain a commitment to traditional paradigms relating to farmers' adoption of environmental management practices. None of these ways of thinking are adequate for understanding the real nature of environmental problems within agriculture.

This thesis consists of a series of published papers which address the issue of environmental management within agriculture from a critical sociological perspective. This perspective is applied at three levels of analysis: international, national, and local. The international level applies to the consideration of the position of the Australian agricultural economy in terms of the world political economy and how this affects Australian agriculture and the environment. The national level applies to the responses of extension agencies to the issue of environmental management and how these agencies are responding to the changing policy context within Australia, and the consequences of their responses on environmental management. Finally, the thesis considers the role of individual farmers in the management of the agricultural environment and how they are affected by the international and national processes.

Keywords: agricultural environment, agricultural extension, Australia, environmental sociology, rural sociology, sociology of agriculture, sustainable agriculture.

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The PhD was compiled while I was on an half year study leave from my regular academic post. Thanks must be expressed to Charles Sturt University, Australia, for giving me the opportunity to spend time in Wageningen to learn and experience European aspects about agricultural extension and environmental management. The Centre for Rural Social Research at Charles Sturt University, where I am a 'Key Researcher', provided me with a notebook computer while I was on this sabbatical on which much of this PhD was completed.

The Department of Communication and Innovation Studies at Wageningen Agricultural University hosted me during my sabbatical, provided office facilities and support, and a congenial environment in which to work during my time in The Netherlands. Wageningen Agricultural University provided me with a Visiting Scholar Research Fellowship, for which I am extremely grateful.

Dr Niels Röling in the Department of Communication and Innovation Studies was instrumental in attracting me to Wageningen, and together with Professor Norman Long in the Department of Sociology of Rural Devevelopment, provided oversight of my European intellectual experience. Other people in Wageningen entertained my questions, assisted my research and were generous with their time, including but not exclusively: Alberto Arce, Paul Engel, Cees Leeuwis, Ad Nooij, Jan Douwe van der Ploeg, Jet Proost and Cees van Woerkum.

The PhD is largely based on work undertaken in the Centre for Rural Social Research at Charles Sturt University in Australia. The Centre was then under the directorship of Associate Professor Geoffrey Lawrence (now Professor of sociology at the University of Central Queensland). Geoff Lawrence has been an enormous influence on my work, and has provided considerable support for me and my projects over the years we were together at Charles Sturt University.

My work at Charles Sturt University and especially during my absence in Wageningen has been considerably assisted by the efforts of my PhD students in the Centre for Rural Social Research, especially Stewart Lockie, Scott Glyde and Hugh Campbell. My colleagues, particularly Ian Gray, Perry Share, and Michael Collingridge, deserve to be thanked for looking after my interests while I was away. Ms Helen Swan, the Secretary of the Centre for Rural Social Research, and Mrs Ronda Hull, the Secretary of the School of Humanities and Social Sciences, also undertook activities on my behalf.

At this stage in my career, it is perhaps appropriate to take this opportunity to acknowledge those individuals who have been particularly helpful and/or partly responsible for my development to this stage. My undergraduate development and interest in sociology, particularly rural sociology, were fostered by Associate Professor Roy Rickson in the School of Australian Environmental Studies at Griffith University. Professor John Western at the University of Queensland was also very instrumental in facilitating my development through a Masters degree. Both these people have continued to be very supportive of my development, and their support is gratefully acknowledged. My high school geography teacher, Mr Lindsay Proudlock, kindled an early interest in social geography, environmental issues, political economy, skeptism and critical thinking.

Several people have been very helpful during my visits to The Netherlands. In particular, I wish to thank my relatives, Egbert and Mien van der Kley, and Ties and Sylvia Nauta, and my friends (putative relatives), Theo and Dafke de Boer, for all their hospitality during my stays in The Netherlands.

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Finally, my sabbatical would not have been possible without the sacrifices made and loss experienced by my own family during my absence overseas. My enormous thanks to my partner, Jackie Walsh, and our two children, Alexander and Theo, to whom this PhD is dedicated. I hope that they reap the benefits of my thesis in the future by its contribution to better environmental management, and a less environmentally and socially exploitative agriculture.

My thanks to you all.

Preface

This PhD was compiled and submitted while I was on study leave in the Department of Communication and Innovation Studies, Wageningen Agricultural University, away from my regular academic post as Lecturer in sociology at Charles Sturt University, Australia. In addition to being Lecturer in sociology, I am a 'Key Researcher' in the Centre for Rural Social Research, Charles Sturt University, and a Project Leader in the Cooperative Research Centre for Viticulture (a multi-institution, government funded, research agency). While my teaching commitments tend to be conventional sociology (eg introductory sociology, sociology of health and medicine, sociology of drugs, sociology of police, research methods), my research interests have long been in the area of rural and environmental sociology, and social impact assessment.

Through the Centre of Rural Social Research, I have undertaken many commissioned research projects for government agencies, particularly the NSW Department of Conservation and Land Management (previously the Soil Conservation Service of NSW), and NSW Agriculture. In addition, I have been successful in attracting research funding for a variety of research projects. All of these projects have tended to be on social aspects of agricultural environmental management. My role in the Cooperative Research Centre for Viticulture is to undertake research and supervise postgraduate students engaged in research on aspects of grape-grower management that resists the adoption of allegedly better viticultural management (particularly reduced agrochemical use), and to examine ways to enhance the adoption of a decision support system for viticulture (AusVit). This has proved to be very challenging for a sociologist, because the task is not simply to understand the position of farmers, but to be an active part of changing that position towards promoting more environmentally friendly management practices.

This PhD is the culmination of many years of work and thinking, although much of the work and thinking was not undertaken with a PhD in mind. The thesis is largely a collection of papers that have previously been published, and that were written for largely independent audiences. Consequently there is some duplication between papers. Each paper is presented largely as it was published, although reformatted for this PhD. Because these papers were written over a period of time, there has been a development in my thinking, and the emergence of new ideas in the literature. In a conventional PhD, a student can make modifications to the earlier written chapters of a thesis so as to maintain personal and internal consistency, and to adapt to the latest literature. However,

in this case, this was not possible: the papers were, in most cases, already in print in various journals and edited books.

Each paper was written to address an issue that was of importance and interesting at the time of writing that paper and that was relevant to the policy context in Australia. While the papers generally fall under the same topic and theoretical perspective, they were not designed to complement each other to form a PhD. Consequently, this PhD may appear a little disjointed, and quite possibly internally inconsistent. Some papers would definitely have benefited from exposure to literature that either was not available at the time of writing or submission of that paper, or that was not known to me at that time. The purpose of my sabbatical in Wageningen was to expose me to European literature and thinking on the topic. That certainly has been accomplished and I have become aware of certain deficiencies in some of the papers presented. Nevertheless, I believe that the collection of papers as a whole as presented in this thesis, together with the Introduction, Conclusion and Finale written explicitly for this thesis, exhibits a considerable understanding of, and reflection on, the problem of agricultural environmental management, and is a significant contribution to the (sub)disciplines of rural sociology, environmental sociology, the sociology of agriculture, and agricultural extension, particularly within the Australian context.

While much of the discussion in these papers concerns agricultural extension, this thesis should not necessarily be considered as a thesis in the discipline of agricultural extension, but rather as a thesis in rural sociology. As a rural sociologist working in Australia, I hope to use sociological insights to contribute to environmental management within Australian agriculture. Since extension has played, plays, and will play (at least ought to play) an important role in environmental management in agriculture, it is only appropriate that much of the discussion concerns extension agencies.

Because I came from an Australian sociology background, at the time of writing most of the papers in this PhD, I did not have the insights I have gained while I have been in Wageningen. Some of the European literature had, up to then, escaped me: either because it was in Dutch, in small circulation reports, in relatively unknown journals (at least journals not readily available in Australia), in books published by publishers whose distribution networks do not cover Australia, because they were in journals or books that I would not have considered relevant, or simply that this literature was not known to me. In the language of extension, one could say that the ideas had not filtered down.

European scholars may be surprised by this, but I am equally surprised by the lack of citation of Australian (except issues related to Landcare) and American work in European contributions. Thus any criticism of my lack of exposure of certain segments of the literature would equally apply to much European work. It was my recognition of my limited knowledge of the European literature that made me decide to spend my sabbatical in Wageningen. I have attempted to address the deficiencies of my knowledge while on sabbatical in Wageningen, and I hope this is reflected in the Introduction, Conclusion and Finale to this PhD.

As a well-established academic with a substantial list of publications, and because the papers presented for the PhD were previously published (often with length restrictions), I have resisted the temptation engaged in by many students of gratuitous referencing. By gratuitous referencing, I mean the excessive and unnecessary exhibition of the extent of the student's reading by referencing as many different papers whenever and wherever possible. Instead, I have adopted a mature professional writing style by referencing economically, that is, by only referencing those works directly relevant or necessary to the point being made. Needless to say, it should be obvious that my reading extends well beyond those references actually listed.

The decision on the order the papers ought to appear in this collection was difficult. Many of the papers that were written at a later stage either referred to, or were premised on an understanding of the earlier written papers. In this presentation, I have decided to present them in descending scale. The first two papers deal with the macro-level international context of Australian agriculture from a political economy perspective. Paper 3 deals with a single environmental problem, blue green algae blooms, also from a political economy position at the national level. Papers 4, 5 and 6 deal at the state level with state extension services and to some extent at the level of individual farmer decision making. These three papers are presented in the order that they were written. A conclusion provides a detailed summary of all six papers linking the different levels of analysis. Finally, a 'finale' or 'encore' is provided which was written at the end of my stay in Wageningen and which addresses European rural sociology and extension science theory and links this theory to the Australian situation.

NOTE

This thesis is a compilation of previously published material together with new material in the Introduction, Conclusion and Finale. In cases where readers wish to quote from or refer to previously published sections of the thesis, it is requested that they reference the original source or sources as indicated at the beginning of each paper.

The Sociology of the Australian Agricultural Environment

Frank Vanclay

for Alexander and Theo in the hope that they might live in a better environment in the future.

The Sociology of the Australian Agricultural Environment

The Sociology of the Australian Agricultural Environment Frank Vanclay

INTRODUCTION

Frank Vanclay written for this PhD.

OVERVIEW: STATEMENT OF THE RESEARCH PROBLEM

Australian agriculture is in crisis. Australia has developed as a producer of bulk durable agricultural commodities, particularly grains, sugar, meat and fibre. The value of these commodities has been steadily falling in real terms, while the cost of agricultural inputs has been increasing. Agriculture has been the single most important industry for the Australian economy, yet Australia's production is insignificant in the world scale. Consequently, Australia's agriculture and economy are very vulnerable to world market fluctuations. With an increasing world overproduction of most agricultural commodities, and the development of regional trading blocks, Australia is being increasingly marginalised and peripheralised. Not only at the same time as this crisis in agriculture, but steadily since initial European settlement of Australia, and particularly at present, agriculture has had a significant effect on the natural environment, so much so that the future of agriculture itself is threatened. With the deteriorating position of farmers, and government policies committed to structural adjustment, farmers cannot afford to invest in more environmentally friendly forms of production, nor can they wind back the extent of their production. Changes in government philosophy have meant a reduced commitment to agricultural support, and a reduction of agricultural extension agencies responsible not only for information about production issues but also for conservation issues. At present the future of Australian agriculture looks bleak, and the future of the environment bleaker still. How is this situation to be understood? What has caused this massive degradation of the environment in such a short time? And what can be done to improve the situation? These are crucial questions that this collection of papers attempts to answer.

This thesis examines the social and political processes affecting the structure of agriculture in Australia, and the impacts of those processes on farmers and the agricultural environment. It also examines the responses of Australian governments

(federal and state) and government agricultural extension agencies to those processes, and the effect of those responses on farmers and the environment.

In order to do all this, a multi-faceted approach is taken. First, critical political economy perspectives are used to analyse Australia's position in the world agricultural economy and the Australian governments' responses (Papers 1 and 2). Next, it again uses a political economy perspective to analyse a specific environmental problem, blue green algal blooms (Paper 3). Next it uses critical sociological perspectives to analyse the deficiencies of traditional public agricultural extension agencies and the basis of farmer decision making with respect to environmental management (Papers 4 and 5). Finally, still using critical sociological perspectives, it argues that there are beneficial aspects of traditional extension when consideration is given to environmental issues (Paper 6).

Throughout, a critical sociological perspective, albeit with a personal flavour, is maintained, with analysis at the macro and micro levels. The thesis is directly concerned with the Australian situation, but utilises international literature and experiences. Despite the concern for Australia, it is likely that much of the analysis presented here is directly relevant to other countries and cultures, particularly those of the semi-periphery. Nevertheless, there are some important unique characteristics about the Australian situation.

A BRIEF HISTORY OF THE AUSTRALIAN AGRICULTURAL ENVIRONMENT

Australia's agricultural environment is different to that of other countries, especially in Europe. The geological nature of its soils, particularly the extreme age of the continent, has meant that its land is much more vulnerable to land degradation than European agricultural lands (Watson, 1992).

Despite a very long geological history, and a very long prehistory, Australia's history of European style agriculture (ie cultivation) is very short, at most 200 years, and considerably less in the more remote parts of Australia. In some parts of Australia, the farmers today are the very same individuals who originally cleared the land.

European occupation of Australia was on the legal basis of *terra nulius*, a self-serving colonial concept that implied that if the land was not, in effect, being cultivated, the land did not belong to the indigenous inhabitants of that country. This position was further

justified by the perception that the Aborigines did not wage war on the occupying people. This view was only correct by the 18th century notion of war, which did not accept the guerilla activities of Aborigines against settlers as any form of organised resistance to invasion. The Aboriginal inhabitants of Australia were not believed to be cultivating the land, and were regarded as being sub-human. This has led to a situation where acquisition of Australia was made without any consideration to the local inhabitants. There were no treaties or other negotiations that took place in New Zealand, the USA, and other places of the world.

Some conservationists have persisted with the Roussean ideology that Aborigines did not impact on the environment. However, in academic circles, this is now substantially rejected. There is clear evidence that Aborigines modified the environment in many aspects, particularly by the use of fire (Barr and Cary, 1992; Dovers, 1992; Cary and Barr, 1992). Furthermore, the legal basis of *terra nulius* has recently been successfully challenged in the High Court of Australia in what is known as the Mabo case. The implications of this for Australia are not yet clear, but it could potentially have enormous implications for land tenure, particularly on pastoral leases.

Land degradation, of one form or another, has been a major problem affecting agricultural land in Australia for at least the majority of this century. Land degradation had become so severe by the 1930s, that many Australian states enacted soil conservation legislation at that time. This has meant that, unlike Europe (see Röling, 1993), the promotion of conservation measures as well as production issues amongst farmers has been an important part of the work of agricultural extension agencies in Australia.

THE FORMS OF LAND DEGRADATION

Salinity¹

Salinity is a major problem in most agricultural areas of Australia. Estimates vary widely as to the extent and future extent of the problem, with a typical estimate being 800,000 hectares currently being affected (Watson, 1992).

Adapted from an Appendix written by me in the report by Vanclay and Cary (1989) to the Victorian Department of Conservation, Forests and Lands on farmers' attitudes to dryland salinity.

There are many different types of salinity, however two main categories, irrigation-induced salinity and dryland salinity, can be considered. Soil salting or salinisation can be caused by irrigation (see Barr and Cary, 1984) through rising watertables caused by excessive irrigation or poor water management, but can also occur in non-irrigated areas, when it is called dryland salinity. There are several types of dryland salinity, but the major concern is with a form called saline seepage, since this type of dryland salinity is of a secondary or induced nature, and is caused by land management practices, and can therefore be potentially controlled or minimised. The other major type of dryland salinity, salt scalding, occurs in situations where the subsoil is naturally salty, and is exposed by the erosion of topsoil. While such erosion can be minimised, the greater threat to Australia's agricultural land is by saline seepage.

Seepage salting occurs because historical land-use patterns of land clearing and modern agricultural processes of cropping and grazing have resulted in a situation where less water is used by the ecosystem than was used by the pre-existing natural ecosystems. The excess water not only increases surface runoff, causing erosion problems, but also results in greater accessions to the underground watertable. For a variety of geological reasons, the watertable in many parts of Australia is naturally salty. Rising salt watertables increase the salt in the soil profile. Salt is concentrated in the top metre or so of the soil profile whenever the watertable is less than two metres below the surface by the evaporation of water through the soil, a process known as 'capillary action'. The process is accelerated by the increased evaporation due to the reduced ground cover resulting from increased salinity. Areas that are affected by increased salting are known as discharge areas.

Accessions to the watertable are not uniform over a catchment area. The underlying geology of the terrain can profoundly affect the potential increase in the watertable. Generally, bare hilltops, particularly those formed by movements in the earth's crust which have resulted in hills which have vertical or oblique rock strata (known as preferential pathways), contribute the most to watertable accessions. However, the upper slopes used for pasture and cropping can also contribute to watertable accessions. All areas that contribute to rises in watertable levels are known as recharge areas.

In some locations, recharge and discharge areas can occur in close proximity, with localised salting being caused by water percolation from nearby hills. These areas are known as Province A recharge zones. However, in other situations, known as Province B zones, discharge areas can be far removed from their corresponding recharge areas, with the underground flow of water through aquifers and deep leads. Often the direction

of these aquifers may be independent of surface topography making identification of the recharge areas for the respective discharge areas difficult.

The end result of soil salting is bare land covered with a salt crust. However, there is a considerable lead-up to this situation. The first signs of soil salting are reduced yields in crops, or reduced biomass in pasture species, although this can be due to other factors. The composition of pasture species changes, with the less salt tolerant species such as subterranean clover, giving way to the more salt tolerant species, such as strawberry clover. As the salting worsens, ie the concentration of salt increases, other less palatable salt indicator species such as barley grass, sea barley grass (*Hordeum maritium*) take over. With higher concentrations of salt only very salt tolerant species, such as salt bush, grow.

Because salting is associated with high watertables, seepage of groundwater and resultant waterlogging can occur. A number of rushes such as spiney rush (*Juncus acutus*), and some other species, may indicate the presence of waterlogging by salty seepage. While these species are not restricted to salty environments the 'prolific establishment [of spiney rush] is usually associated with high groundwater salinity' (Jenkin and Morris, 1982). The seepage of groundwater, and increased surface runoff due to reduced ground cover can lead to severe water erosion and gullying particularly in areas with reduced ground cover due to salting.

In discharge areas, the salt affected land should be fenced off to keep stock out and salt tolerant species, such as tall wheat grass (Agropyron elongata), should be sown. Protection against further evaporation should be made by increasing ground cover by hay or other means. Trees could be planted around the perimeter of salt affected areas to provide a windbreak and shelter the newly sown plants, to lower the watertable in the immediate vicinity and to further reduce evaporation. However, control of soil salting should be most directed to preventing further accessions to the watertable by preventing the percolation of water through the soil. This can be achieved by reforesting the recharge areas, particularly on the non productive hilltops with preferential pathways, and by growing deep rooted pasture species such as lucerne and phalaris. Deep rooted pasture species and trees are both high in water use, ie have high evapotranspiration potential, and are able to access water that has entered the soil for longer because of the more extensive root system. Rainfall that falls onto paddocks of deep rooted species has less chance of entering the watertable than rainfall that falls onto other pasture species or crops. However, a range of farm management practices such as stubble retention and minimum tillage would have an effect on reducing watertable accessions.

Rises in the watertable have occurred as a result of the farming practices for the whole period of European settlement. Reduction in future accessions to the watertable will only have minimal short term impact on watertable levels, particularly in Province B situations. The movement of groundwater through the aquifers and particularly the deep leads is extremely slow, and even if all percolation of water was stopped, it is possible for watertables to continue rising for some time.

The effects of salting are widespread. Quite apart from the loss of productivity and consequent reduced profit and reduced land value experienced by individual farmers, every section of a rural community experiences the flow on consequences from widespread salting. Farm and town water supplies are affected, household and farm equipment can be damaged by salt water, the biological integrity of creeks and rivers is threatened, wildlife habitats are threatened, road foundations are undermined causing deteriorating road surfaces, as well as reducing the overall prosperity of the community. Thus, the consequences of salting affect the whole community. However, the community consequences of salting are less tangible than the direct loss in productivity experienced by individual farmers in discharge zones, and these community consequences can often be attributed to other indirect factors. Nevertheless, soil salting is a community issue, not just a farming issue.

As with many land degradation issues, the problem of soil salting is one of externalities. The farmers who experience soil salting, ie those who are in discharge areas, are rarely the farmers who are in the recharge areas. Strategies to reduce watertable levels, or even to prevent further increases in the watertable level, require that farmers in the recharge areas modify their farming practices. Since these are not the farmers who are experiencing the soil salting there is little incentive for them to adopt salting control practices. Salting control techniques, particularly tree planting, can be costly, and the use of deep rooted perennials, even though they may be profitable, limits the farmer's flexibility (Oram, 1987).

Salting is a form of non point pollution. Not just a few individual farmers are responsible; all land holders with land in recharge areas, and the government, having crown land in recharge areas, are responsible. However, the specific identification of recharge areas and therefore the specific identification of those responsible for soil salting is very difficult (because of the inability to identify specific recharge zones). Furthermore, salting is also a form of non temporal pollution. It is not just today's farmers who are responsible, salting has occurred because of land management practices over the duration

of European settlement. Current land management practices are not just the result of farmers' actions, they are the result of the philosophy of land management of European culture which was present not only in farmers' attitudes but also in government policy. Salting, therefore, is the responsibility of the whole community.

Because of the externality problem, a simple solution to soil salting, involving farmers on an individual basis, is not likely to work. It is clear that a community approach to encouraging the adoption of salinity control techniques is required. While local community support and local peer pressure may influence farmers in recharge areas to engage in salinity control, it is likely that this will only encourage adoption in Province A situations. A much more concerted effort will be required to encourage adoption of salinity control techniques on a widespread basis. This may involve the whole Australian community and possibly require some financial support to farmers who participate.

Acidity

Acidity is a major problem where mixed cropping and grazing practices have been undertaken, and is typically associated with the long term use of so-called 'improved pastures' -- pastures sown with clovers, often subterranean clover, and heavily fertilised, especially with superphosphate. Acidity, like salinity, is an insidious process potentially affecting 8 million hectares in the south east corner of Australia (Watson, 1992).

Acidity refers to the chemical processes in the soil which result in the pH of the soil dropping to such a low level that crops can no longer grow. Acidity occurs as the result of having residual nitrogen and phosphorous in the soil that is not bound up in such a way that prevents this acidification process from occurring. The excess nitrogen and phosphorous occurs because of excessive application of superphosphate and the extensive use of clovers and other legumes, which 'fix' or create nitrogen through their root nodules. The nitrogen, ammonia, urea and uric acid in the urine of stock can also lead to acidification particularly in the more intensively utilised areas of the paddock, such as near the watering trough, under the trees, etc.

Apart from the loss of productive land as soil becomes too acid to support crops, the other major problem with excess nitrogen and phosphorous is their contribution to algae blooms should they enter the watercourses (see Paper 3).

The management practice of 'sub and super' was heavily promoted by extension agencies and by a government superphosphate bounty that subsidised the cost. This extension package was widely adopted by farmers because it did lead to large increases in yield. Watson (1992) argues that the agronomists who undertook the work that led to this technological innovation were too narrowly focussed on yield-response curves to properly evaluate the chemical imbalances such a practice would induce.

The temporary solution to the problem is to grow acid resistant plants, and/or to apply lime, an expensive and non-sustainable practice. Ultimately, a new cropping and pasture rotation has to be introduced so that there is much more careful management of nitrogen in the soil.

There are many reasons why farmers might be reluctant to adopt the new crop rotations. Although some of these claims are contested by the extension agencies, difficulties given by some farmers are that these so called 'sustainable crop rotations': require greater skill by farmers with a wider range of crops; require new and/or different machinery; increase workloads at already peak workload times; create increased difficulties for farmers in the marketing of an increased range of crops; require more inputs; require a greater use of chemicals (for weed control); and are not profitable (see Lockie and Vanclay, 1992; Vanclay and Lockie, 1993).

Erosion by water and wind

Soil erosion has long been recognised as a problem, and was the land degradation problem that originally caused the concern that prompted the establishment of extension agencies to promote better environmental management practices. The erosion of soil is a fairly simple process relating to the transportation of soil particles from one place to another. This transportation can occur by wind or by water. Erosion can occur at any time that the soil is not adequately protected from erosive forces.

There are several problems caused by erosion. The primary problem is the loss of soil, usually the top layer of the soil profile and therefore the most fertile soil. The second problem relates to where the eroded soil goes, often silting up dams, muddying creeks and so on. To the extent that pesticide and fertiliser ions are tied to the soil colloids, they are also transported, usually to the nearest creek, causing water pollution and contributing to algae blooms. Wind erosion causes dust pollution in cities and towns. Even when eroded soil remains on the farm, such as piled against a contour bank, the act

of it being eroded changes the structure and friability of the soil so that it is no longer as productive. Fields that have been eroded, not only have lost fertile soil, but can have the very unproductive B Horizon soil exposed. Finally, large areas can be rendered useless to agriculture because of extensive gullying, thus preventing access by agricultural machinery.

There are two major forms of water erosion, gully erosion and rill (or sheet) erosion. Gully erosion is obvious and occurs as a result or unprotected soil during a particularly heavy rainfall or storm event. Rill erosion is the erosion that occurs along every rill (cultivation furrow) in a paddock. Such erosion averages 5 mm per year (50 tonnes per hectare per year) over the whole paddock (Vanclay, 1986). While gully erosion is easy to see, rill erosion is also an insidious process and easily disregarded by farmers. There are strong social norms encouraging farmers not to have prominent gullies on their farm. However, some gullying is unavoidable as it can occur as a result of a freak storm. Unfortunately, there is little social concern governing rill erosion.

Erosion can be prevented by both structural and management techniques. Structural techniques are the use of contour banks, grassed waterways, grass filter strips, and contour cultivation, in order to reduce the erosion risk by, for example, stopping the flow of water across the paddock. Rows of trees as windbreaks would serve as a structural barrier against wind erosion. Management practices refers to the use of conservation cropping practices such as zero or minimum tillage, stubble mulching, managing the cropping cycle so that the paddock is never bare at high risk times, and using agricultural implements that are less destructive of the soil.

Extension agencies heavily promoted contour banks and measured their performance in terms of the number of miles (in the days before kilometres) of contour banks that had been installed in their district. In some cases these contour banks were not appropriate, or were incorrectly designed so that they would pond runoff, rather than directing runoff away to the watercourse. When ponding occurred, if ever the bank broke because of too much water, then the resulting torrent caused more damage than if the bank had not been there. A further problem is that the banks increased the accession of water into the watertable thus contributing to the more contemporary problems of salinity.

Management practices mean that farmers tend to use more chemicals because they can no longer use tillage and burning as a weed control strategy. Historically there were many barriers to the adoption of management practices, largely relating to farmers not being prepared to use zero-tillage methods for a variety of reasons, including the use of chemicals, the unaesthetic composition of the paddock, and the capital outlay required to re-tool. However, management practices tend to be widely adopted now.

Erosion has been a very serious problem in the past, with massive erosion gullies (sometimes over 10 metres deep) being evident throughout Australia as a relic of a bygone age. Memories of large dust storms blowing Australian soil clear across to New Zealand are vivid and widespread. The last major dust storm of note caused severe disturbance in Melbourne in the early 1980s. However, erosion is less of a problem now largely because of farmers' adoption of appropriate practices.

Erosion of river and creek banks is still a major concern. Often agriculture, because of the altered vegetation has resulted in accelerated run-off resulting in increased flash-flooding occurrences. Public works relating to roads and railways are also important contributing factors. In creeks and rivers where tree removal has occurred along the banks, such flash flooding can lead to considerable erosion of banks and surrounding farm land. One of the major concerns of Landcare groups in many catchments is river and creek bank protection.

Soil Structure Decline

Soil structure decline refers to the breakdown of the structure of the soil and compaction due largely to excessive cultivation. Good soil structure is important for the vitality of the soil. Structural breakdown leads to the increased erodibility of soil. In order to prevent structural breakdown, farmers need to reduce the number of cultivations they make, and use less destructive implements.

Nutrient Decline

In the process of agriculture, plants absorb nutrients from the ground and together with water and sunlight produce a crop that is harvested and exported off the farm. Over time there is a dwindling of soil nutrients, not only by their loss through exported produce, but also by accelerated erosion. In the past, nutrients have been replaced through the addition of artificial fertilisers, particularly by superphosphate, but such a practice is expensive and not sustainable. To counteract the problem of nutrient decline, farmers need to adopt crop rotation practices that give much more consideration to the processes of nutrient cycling in the soil.

Other Land Degradation and Agricultural Environmental Problems

There are many other environmental problems that affect agriculture and are caused by agriculture. The five main problems that are of concern to cropping agriculture have been individually addressed. Other problems include infestation of rangelands by woody weeds, plagues of pest, often insect (especially locusts), species. Rabbits have been a major problem and can lead to extensive erosion due to their burrowing habits. In rangeland areas, populations of feral animals, especially goats, donkeys, and horses can lead to overgrazing. While infestations of the prickly pear (a cactus like species) has been successfully controlled by the introduction of biological control in terms of the cactus blastus moth, other attempts at biological control, such as the introduction of the cane toad (*Bufo marinus*) to control the cane beetle, have been a disaster and have led to considerable other environmental concerns, such as the niche expansion activities of the toad. Other introduced species, both plant (prickly pear, lantana, groundsel, blackberry) and animal (rabbit, fox, European carp) have been major problems in various areas and/or at various times. Loss of habitat for native species, and contamination of habitats, especially from water pollution has also had considerable environmental impact.

UNIQUE ASPECTS OF AUSTRALIAN AGRICULTURE

Apart from land degradation which has long been recognised and that has been part of the charter of extension agency activities for some time, and a relatively short agricultural history, there are other unique features about Australian agriculture. The extensive nature of Australian agriculture, the vast distances within the country, and from Australia to potential markets, has meant that the intensification of agriculture that has occurred elsewhere, in Europe for example, has not occurred in Australia. In fact, despite considerable resources being devoted to agricultural research, and to extension, and despite adoption of new management practices, average yields of basic commodities have not changed significantly during the course of the history of Australian agriculture. While the adoption of new management practices did have an immediate effect on yield, in the longer run, the immediate increase in yield overcame declining yields largely due to environmental degradation as Australian agriculture continued to mine the soil.

THE NATURE OF THE AGRARIAN QUESTION

While the biophysical nature of the Australian environment is an important part of understanding the nature of environmental problems, policy makers have been excessively influenced by physical scientists who see the problem only in technical terms. While poor landuse practices (eg. over ploughing, overstocking, over irrigating and excessive use of chemicals, inadequate crop rotations) do contribute to land degradation, it is only one aspect of the tension between agricultural production and environmental quality (Lawrence, Vanclay and Furze, 1992).

Because of this narrow technical perspective and an uncritical acceptance of the social, political and economic status quo, solutions to the environmental crisis are seen only in terms of policy questions such as:

- How can farmers maintain or increase output while adopting more environmentally sound farming practices?
- How can farmers best be educated to adopt conservation technology?
- What incentives ought the government provide to promote adoption of environmental management practices? (Lawrence et al., 1992)

These questions are not technologically or politically neutral. Underlying these questions are assumptions that:

- Agriculture can and should maintain its present trajectory of increasing intensification, extensification and industrialisation;
- The innovation diffusion model best explains farmer adoption behaviour;
- Information about environmental and production issues will change farmer behaviour:
- The state has only a limited role in promoting change (Lawrence et al., 1992).

Environmental issues need to be examined in a broader context, one that includes an analysis of the social construction of agriculture, and the social structure of agricultural systems. Narrow technical analysis and the solutions posed within these views, often based on vested interests, need to be avoided. If Australia is going to undergo a transition to an economically and ecological sustainable future, based on rural social development, agricultural sustainability and ecological sustainability then many views about what constitutes such a future need to be carefully analysed.

Agricultural environmental problems are social in origin, and it is in the long term interests of all Australians that this fact is recognised and acted upon accordingly.

GOVERNMENT POLICY AND RURAL SETTLEMENT: IMPLICATIONS FOR AGRICULTURE AND THE ENVIRONMENT

Many features of the history of Australia have set the stage for inevitable land degradation. These features tend to relate to government policies to develop the countryside and to deal with population and unemployment problems.

The most important of these, in environmental terms, was the system of 'selectors'. Following the gold rush era of the 1850s, a land tenure system was developed which took land away from the 'squatters', who had occupied the land without formal title, and instigated the 'selectors', families usually, who were given formal title to small parcels of land under favourable financial conditions (Dovers, 1992). The amount of land available to individual farmers under this scheme was well below what was required for them to survive. Their attempt at survival produced considerable soil erosion, led to clearing of trees from vast tracts of land (which has contributed to salinity problems today), and produced a people who were fiercely self-reliant, and innovative (creative) with respect to the development of inventions that would improve their situation (eg the stump-jump plough). Similar schemes, for example the 'Closer Settlement', were attempted in the 1890s and subsequent decades (see Dovers, 1992; Bolton, 1981; Davidson, 1981).

Following both world wars, the Australian government opened up new areas of land for soldier resettlement schemes, schemes developed to restore full employment and to further develop the country. These schemes saw many soldiers with no previous farming experience taking up small rural holdings. This not only created a widespread demand for practical information, but a public justification about why agricultural extension ought to be available to all farmers. During the 1960s and 1970s, government development of new agricultural regions in Western Australia (for example, the Ord River Scheme and much of the wheat belt), the Northern Territory (around Katherine) and Queensland (especially in brigalow areas) led to the entry of people new to farming into agriculture.

In other locations, back to the land movements (Metcalf and Vanclay, 1987; Munro-Clarke, 1986), part time or hobby farming, and early retirement schemes have led to the situation of people not from an agricultural background being involved in land management. These people may or may not have production concerns, but in either case, they need to be involved in any conservation programs, especially because of the social and off-site considerations of environmental management.

THE STRUCTURE OF AUSTRALIAN AGRICULTURE

Due to Australia's geographical position in the world, its own internal geographical situation, and its position in the world economy, Australia has been, is, and will continue to be, a supplier of bulk durable agricultural commodities, particularly grains (specifically wheat and rice), cane sugar, meats (which are arguably durable) (specifically mutton, lamb, live sheep export, rangeland beef, and feedlot beef), and fibres (specifically wool and cotton). At present, bulk agricultural commodities constitute approximately 70 percent of Australia's exports (Australian Farm Journal, June 1991) and are expected to continue to do so (Department of Primary Industries and Energy, 1989).

While individual farmers will diversify and produce new crops, such as tropical fruits, these will never be a major aspect of Australian agriculture, partly because of the scale of the production of the durable commodities and also because of marketing difficulties of specialist crops. As will be argued in this thesis, opportunities for value adding of agricultural produce are likely to be limited.

Faced with declining yields due to environmental degradation, and lower world prices because of global overproduction, and the elimination of international trade barriers and subsidies, Australian farmers are experiencing reduced income. The effect of declining incomes is exacerbated by rising input costs. With increased industrialisation of agriculture, and increased reliance on chemical inputs, which are experiencing cost increases, farmers are experiencing considerably reduced terms of trade. In Australia, the average net income of broadacre farmers over the last few years has been negative, ie an after costs, after tax, business loss.

THE SOCIOLOGICAL CONTRIBUTION TO ENVIRONMENTAL MANAGEMENT IN AGRICULTURE

This collection of papers presents sociological interpretations of the major issues relating to environmental management in Australian agriculture, including:

- the causes of land degradation,
- the social and political processes that promote an exploitative agriculture,
- farmers' inability to adopt more environmentally sound management practices,
- why farmers' non-adoption of environmentally sound management practices is rational from their point of view,
- the deficiencies of traditional state agricultural extension agencies,

- the deficiencies of new extension methods and programs,
- the benefits of publicly funded agricultural extension programs which service all farmers,
- the basis of farmer decision making about environmental management,
- · the nature of farmers' attitudes on environmental management,
- and related issues.

Several definitive arguments are developed in this analysis:

- 1. There are major economic, social and environmental consequences for Australia as a result of the processes of economic restructuring in the world political economy.
- The process of structural change in the world agricultural economy will result in the peripheralisation of semi-peripheral nations such as Australia which are dependent upon the sale of bulk undifferentiated agricultural commodities.
- By locating the least desirable agricultural activities in the less 'regulated' nations of the periphery and semi-periphery, transnational agribusiness is engaging in a form of environmental imperialism.
- 4. The globalisation of agriculture will integrate farmers into a world production system which will limit farmers' ability to alter production regimes on their own farm and therefore to become more environmentally responsible.
- 5. The three strategies employed by governments and public extension agencies in dealing with the crisis in agriculture and the crisis in extension -- segmentation, privatisation, and utilisation of group extension and bottom up approaches -- will not resolve environmental problems in agriculture and may well worsen them.
- 6. The changing conception of 'rural' in Europe, with the countryside becoming a place of consumption as much as a place of production, allowing pluriactivity and off-farm income opportunities for farmers as well as urban support for public spending in rural areas, is not likely to occur in Australia. This will limit farmers' income and, in a situation of deteriorating terms of trade for bulk agricultural commodities, will limit their ability to adopt new more efficient and more environmentally sound management practices.
- 7. Extension agencies have been using unsatisfactory models of extension based on an unsatisfactory model of innovation and adoption behaviour.

- 8. The adoption of environmental management practices is fundamentally different from the adoption of commercial innovations because of public social desirability that adoption occurs.
- 9. Farmers' non-adoption of technology and of environmental management practices is rational from their point of view.
- 10. The failure of extension in promoting adoption of new innovations, especially of environmental management practices, is not because of characteristics of those farmers (age, education level, economic status, or cosmopolitanness), but because of the failure of extension agencies to adequately address the needs of farmers.
- 11. Farmers do not have environmentally hostile views or attitudes.
- 12. Attempts to change farmers' attitudes or to promote a land ethic amongst farmers will not increase the rate of adoption of environmentally sound management practices.
- 13. Marginal farmers who are being structured out of agriculture are not marginal because of their inability to farm, or by their lack of adoption of agricultural innovations, but are marginal because they were structured to be marginal in the first place.

It is hoped that through greater insight into the issue of environmental management in agriculture that will be gained through a sociological understanding of the problem, a more economically and environmentally sustainable agriculture can be developed.

The Sociology of the Australian Agricultural Environment Frank Vanclay

PAPER 1:

Environmental and Social Consequences of Economic Restructuring in Australian Agriculture

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ABSTRACT

The changing nature of Australian agriculture is such that corporate farms are becoming more common, family farms are disappearing, and the remaining family farms are losing autonomy by the increasing corporate control of commodity distribution networks, by the increasing significance of contract farming, and by new developments in biotechnology. These changes in agriculture have considerable environmental impact and need to be considered at a policy level if widespread environmental degradation is to be avoided. Furthermore, there are enormous social consequences of these changes that have wide ranging effects not only on the nature of farming but also on the nature of community settlement in rural areas of Australia.

INTRODUCTION: RURAL RESTRUCTURING IN THE SEMI-PERIPHERY

Social change rather than social stability is a characteristic of non-metropolitan regions within advanced capitalist societies. However, change does not occur haphazardly or independently of structural forces within the wider economy but is a direct consequence of alterations within the capital accumulation process. This, itself, is at the very centre of production (and consumption) relations within those societies. To grasp the nature of change within rural society, it is necessary to understand the dynamics of capital accumulation and to recognise the practical manifestations of patterns of accumulation modified by state regulation.

Structural change has several different types of impacts and occurs at several levels. This paper is concerned in particular with identifying the capitalist processes that are facilitating the increasing influence of transnational agribusiness in the agricultural production of Australia and other semi-peripheral nations, and with the attendant social and environmental impacts of those processes.

PROCESSES INCREASING CAPITALIST INFLUENCE IN AGRICULTURE

(a) The Demise of the Post-War US Hegemony

An hegemonic relationship between accumulation and regulation is considered to have been dominant since the second World War. This has been described as 'fordism' and is a regime typified by Taylorist labour processes, the mass production and distribution of consumer goods, the extension and consolidation of trade unionism, and the development of the welfare state (that is, a basically Keynesian solution to the contradictions inherent in class-based post war capitalism). For reasons associated with changes in the international arena (including the collapse of the Bretton Woods agreement and oil price rises in the 1970s), inflation and commodity price uncertainties in the 1980s, and worldwide recession and intensified competition in trade during the 1990s (see Buttel and Gillespie, 1991; Goe and Kenney, 1991), the fordist mode of accumulation and regulation is considered by some as being superseded by a post-fordist regime, one characterised by new industries, production methods, organisational forms, class relations and state policies (see Mathews, 1989).

The extent to which a transition to a full-blown post-fordist economy is occurring or has occurred, and the characteristics of post-fordism, are debatable issues. Nevertheless, a

significant change is occurring in the organisation of transnational capital and in the organisation of society. Whether this represents a fundamentally different mode of production, or whether it represents new forms of organisation under essentially the same mode of production is not yet clear. It is clear, however, that many post-fordist characteristics, such as niche marketing, product diversity, decentralised production, transformation of work, and global sourcing, are being adopted by transnational corporations. Despite post-fordist rhetoric about craft production and intelligent consumption patterns that would reduce the significance of transnational corporations, it is doubtful whether any move to a post-fordist economy represents any significant threat to their power, and quite likely, post-fordist patterns of production are being adopted by transnational corporations in order to enhance their operations.

Restructuring of the US economy has resulted in a major decline in traditional sectors of industry -- including steel manufacture, automobiles, farm machinery and electronics. Firms have responded to increasing global competition and reduced profitability by retrenching labour, by automation, and by moving to new areas of weaker, cheaper and often non-unionised labour. Another feature has been the merging of businesses, spurred on by the increased economic strength of finance capital (Green, 1988). Goe and Kenney (1991) have argued that the crisis in US agriculture has occurred later than that within the industrial sector. Nevertheless, because of agriculture's quite intimate connection with manufacturing industry and finance capital, it is experiencing the same sorts of restructuring pressures. Agriculture is under pressure to develop new and more productive, efficient and flexible food and fibre production and delivery systems. Information technologies and the application of agro-biotechnologies are viewed as the sorts of responses which will provide capital with opportunities for production flexibility and product diversity. It is perceived that, with the mass markets of the older fordist regime giving way to fragmented markets based on increasingly differentiated patterns of consumption, the area of greatest profit lies in 'niche' marketing.

The transition from fordism to post-fordism is not simply one influencing economic organisation. Buttel (1992) following Roobeek (1987), has insisted that economic change has been accompanied by a movement from social democratic to neoconservative forms of social organisation. Trade unions and their influence in industrial relations and national politics have declined, the welfare state and the social wage are being selectively rolled back, economic inequality is increasing, political parties have declined relative to special interest groups and social movements, corporations and market transactions have become increasingly transnational in scope (and thus less amenable to nationally ordered regulation). As part of this change, political cultures have

shifted from an emphasis on mitigating the impacts of private accumulation to that of ensuring the sanctity of entrepreneurship (Buttel, 1992).

For Buttel, the movement from the social democratic (fordist) regime to the emerging neo-conservative (post-fordist) regime is represented by the development of a non interventionist state whose policies support a growing corporate elite and an increasingly differentiated working/middle class comprising poorly paid service sector workers, informal sector workers and an emerging urban and rural underclass (those groups who were once protected by the welfare state) (Buttel, 1992).

In summary, there are three likely outcomes of this transition that are important for agriculture. First, the reduced significance of 'mass' markets will greatly disadvantage those nations (such as Australia) producing bulk undifferentiated commodities, particularly in an era of global overproduction. Second, a reliance on new technologies is viewed as necessary in any advanced system of agricultural production. The extension of computing and biotechnologies are perceived as essential to increased production despite their potential to further polarise agriculture (see Goodman, Sorj and Wilkinson, 1987). Third, the demise of the welfare state is likely to translate into even further reductions in support for rural social infrastructure, with impacts felt by farmers and other rural dwellers.

(b) The Globalisation of Food Production

With the increasing internationalisation of industrial and finance capital, agriculture has become quite vulnerable to decisions made in distant locations. Finance capital has gained an ability to by-pass many of the strictures previously set in place by once protectionist nation states. Two examples of restructuring are, first in the food processing sector (characterised in the 1980s and 1990s by asset stripping, international linkages and buy outs) (see Marsden and Murdoch, 1990) and second, in farming (with credit being provided to transform production relations and to allow the purchase of new technologies).

According to Friedmann and McMichael (1989) and Friedmann (1991), the integration of world capital has blurred any previous distinction between 'agriculture' and 'industry' and that to grasp the changes occurring in farming and in farm-dominated rural regions it is necessary to conceive of an 'agrifood sector' run by transnational corporations which links various elements of rural production to manufacturing and service industries. The

agrifood sector has become an intermediary between agricultural producers and food consumers:

Instead of crops destined for the kitchen pot, agriculture increasingly supplies raw materials to the food processing industry for the production of durable goods. These raw materials become subject to global sourcing and to technically developed substitutions ... Agrifood industries have grown up around two elements in the postwar diet of advanced capitalism: (1) manufactured foods -- composed of several agricultural (and/or chemical) raw materials, notably sugar and oils; and (2) livestock products, especially intensively produced poultry and cattle (Friedmann, 1991: 66-67).

The development of a mass diet via industrial food production processes has been one of the outcomes of the development of a global agrifood sector, a sector whose profits were able to grow enormously through their ability to convince consumers that the purchase of takeaway, prepackaged and convenience foods were a necessary and desirable part of modern living.

With the durable food industry capable of disguising the ingredients of a final product — it was a short step to replacing the costly or unreliably supplied or inferior natural substances with what Friedmann (1991) has labelled 'generic ingredients':

What is wanted is not sugar, but sweeteners; not flour or cornstarch, but thickeners; not palm oil or butter, but fats; not beef or cod, but proteins. Interchangeable inputs, natural or chemically synthesised, augment control and reduce costs better than older mercantile strategies of diversifying sources of supply of specific crops (Friedmann, 1991:74).

This so-called 'substitutionism' (Goodman et al., 1987) allows a higher degree of control by corporate capital over agriculture because it can, through increased interchangeability of components, by-pass entire products and regions in 'sourcing' its industrial requirements.

The production of beef altered from a largely extensive system to an intensive one. The integration became complete with intensive livestock production being linked with the grain (feedstuff) sector particularly in the US. Since the production of 'global food' is no longer the province of national commodity groups, producers find economic advantage in linking with transnational capital (under its terms) to take full advantage of world demand for agricultural products. Under pressures for product standardisation, mixed agricultural production may give way to specialisation and monocultural agriculture with negative environmental implications for those peripheral countries into which this form

of agricultural production penetrates. According to Friedmann, who evokes the fordist/post-fordist dichotomy as a means of understanding changing patterns of production and consumption, the durable food and livestock/feed complexes have reached their limit. Along with world overproduction, farm crises and the spate of rationalisations and bankruptcies in the corporate food sector, there is an underlying trend within the advanced nations to class-based food differentiation with poorer groups required to purchase increasingly standardised foods, and with privileged consumers enjoying a more varied healthier diet.

There are two important elements in this analysis. First, it is anticipated that the earlier comparative advantage enjoyed by so-called settler states such as Australia has virtually disappeared with the emergence of a global food system after the Second World War. It is doubtful that these countries can exert much control in agricultural development either in terms of choice of commodity or in terms of agricultural production strategies utilised. If TNCs decide that Australia, or other semi-peripheral and peripheral nations, will provide bulk undifferentiated products for mass markets, possibilities in those nations for value adding and for capturing higher priced niche markets will be greatly limited. Producers in these countries will be required to conform to demands of companies which want the separation of livestock and crop growing (the continued movement towards specialised systems of production) and which are unconcerned about the environmental or social impacts of these developments. At the farm level, there are growing pressures for farmers to conform to the upstream and downstream components of transnational capital by utilising modern inputs and producing corporate-required outputs. By becoming increasingly subordinated by finance capital, producers will have little room to alter production regimes.

Second, given the continuation of the influence of corporations in supplying existing and new (especially Asian) markets with durable foods, it is likely that there will be increasing pressures on the environment. Ecological problems will invariably increase with any intensification of existing practices (see Lawrence and Vanclay, 1992; 1994). While there may be consumer demand for 'cleaner' (or 'greener') agricultural practices, many of these practices will translate into higher costs of production and so place greater pressure on farmers to increase output as a means of sustaining farm income. This, itself, may cause accelerated environmental degradation, but will also lead to the hastened exit from agriculture of now marginal farmers unable to bear any additional input costs. In conditions where nation states are reluctant to impose tighter regulations for fear of capital flight (as in the semi-peripheral and peripheral nations), it also may result in continued unacceptable levels of abuse of natural resources.

In the period before World War Two and up to the mid 1970s, the nation state largely organised agriculture and provided social stability via policies which encouraged the development of mass consumption and high wages. Since then, transnational capital has relieved the state of its regulating role and has organised new production arrangements. For Friedmann and McMichael (1989), two possibilities for future development present themselves: the growth of global institutions (a World Food Board?) aimed at stabling and regulating capital accumulation, or the reassertion of the 'local' and 'regional' aimed at counteracting the power of the transnationals. A globally coordinated system with localised (or regional) control over the use of resources is Friedmann and McMichael's best guess. How producers and consumers in countries like Australia will act — whether as 'victims' of transnational forces or as active players is the reorganisation of local patterns of production based on ecological and other concerns — is at this time yet to be determined.

(c) Contract Farming

In contrast to the conventional industrial model of vertical integration, agribusiness tends not to engage directly in on-farm production. Instead, the major means of control by agribusiness is contract farming, 'a system in which companies involved wholly or partly in the processing, marketing or retailing of agricultural goods enter into contractual arrangements with farmers for the supply of a particular commodity' (Burch, Rickson and Annels, 1992: 260).

Contract farming results in a transfer of responsibility for many production and environmental management decisions from the farmers to the corporation — with a consequent loss of autonomy for farmers. Corporate concern about profit and cash flow may result in lower investment in conservation activities than would be undertaken by farmers on their own. Furthermore, where environmental degradation occurs, corporations can, because of international sourcing, simply move to another location for their produce requirements. This creates a situation in which corporations need not be particularly concerned about environmental quality, and can leave adoption of environmental management strategies to farmers to make spurred on by competition between regions for the supply of particular commodities to that corporation. At the same time, this competition creates a situation in which farmers cannot invest in environmental management strategies because of declining terms of trade and reduced flexibility in farming operations.

Individually, farmers engaged in the production of produce for a corporation have little power in the relationship. Corporations maintain control over farmers by threatening not to accept their crop, a situation which would be disastrous for farmers because of the lack of alternative outlets for produce in a particular region. Consequently, growers are vulnerable to the whims of the corporation. Growers are forced by the logic of the contract system to cultivate intensively and, in order to ensure the quality of their produce to the satisfaction of the canning company, to use excessive amounts of agrochemicals (see Burch et al., 1992). The system also reduces the flexibility of the farmer in that the contract may specify certain practices that the farmer must adhere to, such as the use of specific chemicals. It also limits the choice of crop rotations and alternative commodities available to the farmer because of the monoculture that develops in locations where contracting occurs. Farmers become dependent on the infrastructure provided by the agribusiness corporation, and in semi-peripheral nations like Australia, with a small, geographically dispersed population, the corporations are able to monopolise the processing and handling of produce very easily.

Burch et al. (1992) argue that the complex nature of the agribusiness system is such that the activities involved in contact farming are not satisfactorily coordinated and this has implications not only for the farmer in that there may be contradictory advice, but also for the consumer in that there may be, for example, inadvertent but structurally built-in breaches of regulations relating to the withholding periods for certain agrochemicals. A farmer may be directed by the field officer to spray a crop with a certain chemical, only to be told by the production control manager to harvest the crop. In some case farmers may be given only 48 hours notice to harvest, whereas some agrochemicals have withholding periods of up to 14 days (Burch et al., 1992).

(d) Agro-Biotechnologies

Biotechnology is being heralded in Australia and elsewhere (see Lowe, 1992) as the most appropriate mechanism for both increasing agricultural productivity and overcoming many of the environmental problems associated with modern agriculture (such as the heavy use of pesticides and weedicides). Some consider biotechnologies will create the best opportunities for a sustainable future (Department of Primary Industries and Energy, 1989; Begg and Peacock, 1990; Bureau of Rural Resources, 1991).

Biotechnologies are expected to allow producers to reduce their levels of inputs (and hence costs) while achieving higher levels of output. Embryo technology, for example, may provide opportunities for transferring superior genes to existing cattle herds and sheep flocks at a lower per unit cost than normal breeding techniques. Vaccines created through biotechnology are considered to be superior to those obtained in conventional ways. Bovine somatotropin -- a natural protein hormone produced through recombinant DNA technology -- will allow more milk to be produced by dairy cattle from the same level of feed thereby increasing profits by lowering milk production costs (see Begg and Peacock, 1990; Baumgardt and Martin, 1991). Experiments in Australian laboratories are designed to confer pest resistance on plants and so reduce or eliminate the need for chemical applications on Australian croplands. The creation of insect-resistant plant species may not only mean that fewer dangerous chemicals will be used in farming but also that the costs to farmers will be reduced. Biotechnologists are also working on ways to 'mop up' chemical pollution and to convert what are now waste materials from food manufacturing into new products. Proponents estimate that biotechnologies may reduce the use of natural resources by between 40 and 60 percent allowing farmers to move rapidly towards sustainable production (Begg and Peacock, 1990). Threats to the further degradation of lands are expected to be averted through new genetic manipulations and applications which reduce input use and allow output increases without soil loss (Bureau of Rural Resources, 1991).

Since biotechnologies are 'enabling technologies', they are likely to have different outcomes according to the purpose of their application. For Redclift (1990) biotechnology will fulfil its promise if it can encourage the development of a low-input, high-tech system of sustainable agriculture in which there are reduced applications of proprietary inputs. The hope then, is that in line with growing public concerns for the environment, scientists will develop plants and animals with pest and disease resistance, salt tolerance and productivity-enhancing qualities which will overcome many of the problems associated with current agricultural practices (see Lowe et al., 1990; Baumgardt and Martin, 1991). However, evidence from both Australia (Hindmarsh, 1992) and abroad (Lacy et al., 1988; Busch et al., 1991; Goodman and Redclift, 1991) indicates that the biotechnological promise is, in the context of existing social arrangements, unlikely to be fully realised.

There are a number of concerns. First, environmentalists point out that if corporate capital is involved in the production and distribution of biotechnologies, the profit motive will distort both the basis of experimentation and the likelihood of benefits being distributed evenly amongst producers. Thus, the production of herbicide-tolerant plant

species is not designed to free agriculture from chemicals but to have farmers purchase a proprietary package of herbicide and herbicide-tolerant seeds (Kloppenburg, 1988; Busch et al., 1991) something which will further the dependence of farmers on the agrochemical industry and increase input costs for producers. Furthermore, with herbicide use continuing at high levels the possibility of chemical resistance amongst weeds is increased and there is a greater likelihood of ground water pollution (Otero, 1991).

Secondly, there is also no proof that genetically modified organisms will be environmentally benign. They may proliferate to occupy 'niches' in ecosystems thus displacing other organisms or produce substances toxic to other organisms. Here, the use of supposedly environmentally friendly genetically modified organisms may result in environmental decimation. Ironically, the new products may be even more dangerous than the dangerous chemicals they have been designed to replace (see Busch et al., 1991).

Thirdly, if costs of biotechnological inputs are reasonably high — which they are expected to be given that they will be corporate, rather than state-released, products — the adoption of the new biotechnologies will be limited to the well-financed and usually larger farmers. That is, many of the possible environmental benefits (of reduced chemical applications) would not, in any case, be available to often-struggling middle 'family' farmers. The very people who might have been most advantaged will inevitably fall behind, concentrating food production among those in wealthier sector of farming. In the US employment in farming is declining faster than virtually all other occupations. With existing trends heightened by biotechnology there will be fewer farmers (Lacy et al., 1991). There is evidence that, in terms of environmental management, corporate-linked agriculture is no better, and is perhaps worse, than family-farm agriculture (see Lawrence, 1987; Strange, 1988; Lawrence and Vanclay, 1992, 1994).

Byman (1990) considers it to be somewhat worrying that new technologies are being advanced as the answer to the problems of environmental pollution and oversupplied markets, when the past applications of technologies have helped to cause those problems in the first place. Redclift (1987) too, has argued that the future of the advanced societies — such as the US, UK and Australia — is premised upon the transformation of the environment, yet the transformation of the natural environment is occurring in a manner which reduces long-term productivity. The 'environmental contradiction' is viewed as the central contradiction of advanced capitalism (Redclift, 1987; and see O'Connor, 1990).

The global economy is dominated by transnational capital and it is the large, transnational agribusiness firms which are controlling biotechnological development in agriculture (Goodman et al., 1987; Kloppenburg, 1988; Otero, 1991). Farming will exist, in its present form, only for as long as it can conform to the profit-making requirements of firms supplying agricultural inputs and of firms involved in the food processing industry - those using either the direct products from farming or farming products converted for use for industrially produced 'biomass'.

(e) Value Adding Activities

Another strategy being promoted in Australia is to 'value add' to products before they leave Australia's shores. At present the \$15 billion of agricultural goods Australia exports is currently converted into \$80 billion abroad. It is argued that if this \$15 billion worth of agricultural products which Australia exports in largely unprocessed form were to be further processed in Australia, there would be higher levels of employment, higher levels of income, and enhanced foreign currency earnings (see Bureau of Rural Resources, 1991).

According to the Department of Primary Industries and Energy (1989:7):

Value adding is the essence of economic growth. Value adding is the means by which individuals and businesses meet their objectives to prosper and grow ... if a country wants to trade for the purposes of economic growth without subsidies, it will only do so via industries, businesses and individuals who are able to compete successfully ... Hence, value adding and the competitiveness of agribusiness are inexorably linked.

The opportunities seen to be available to Australian producers currently producing largely undifferentiated food and fibre for world markets is to link with agribusiness in a manner beneficial to both parties (see National Farmers' Federation, 1993). For agribusiness, the markets abroad are well known and already penetrated by branch firms, providing an easy entree for those producers who seek agribusiness affiliation. For farmers, the sale of specific product lines which can be readily distinguished from those of competing producers will allow consumer brand identification and it is presumed that this will result in increased profits. With extra income, once-struggling farmers will be able to overcome debt problems and begin to undertake much needed environmental repair work. In this scenario, the further integration of family-farm agriculture and international agribusiness will be a cornerstone to both improved environmental sustainability and the continuation of high export earnings — not from any increased

volume of exports, but the sale of higher value goods (National Farmers' Federation, 1993).

The positive environmental flow-on effects suggested above are part of a healthy and prosperous agricultural sector. Would family-farm agriculture be 'reinvigorated' by agribusiness? Agribusiness firms are renowned for their ability to organise their production and distribution activities in the input-supply and output-processing sectors without, as it were, getting their hands dirty on the farm (see Lawrence, 1987; Mooney, 1988; Burch et al., 1992). Market strength and management strategies enable agribusiness to leave the production risks with the farmer, while purchasing raw materials from the farmer as cheaply as possible. It is not on the farm where value is likely to be added but off the farm in food processing factories. The individual farmer has little opportunity for value adding and product differentiation on the farm and is therefore unlikely to receive profits received by those involved in the processing industries. The question that remains is — can Australia benefit from value adding activities in circumstances where transnational agribusiness assists in the transformation of family-farming activities?

The answer would seem to be no. Foreign interests have determined that Australia is not the most appropriate location for value adding. For example, in 1988 five of Australia's top agricultural exporters were Japanese trading houses which sent abroad, in one year, approximately \$7 billion of unprocessed food and fibre (*Financial Review*, 15 March 1988).

Attempts by successive Australian governments to diversify the economy and to have foreign capital invest in food, fibre (and wider) manufacturing appear to have failed. In 1972, so-called 'elaborately transformed manufactures' (embodying high-tech processing and knowledge-intensive applications) comprised 13 percent of Australia's exports. However, this had fallen to 9 percent by 1986 (Fagan and Bryan, 1991:15) and to 8 percent by 1989 (Kulkarni, 1991). For the 1980s, Australia imported value added imports at a rate faster than both domestic growth in GDP and the export earnings of food and materials (Jones, 1989). By the 1990s, Australia had reverted to its 1930s economic base selling 'simply transformed manufactures' (unprocessed or semi-processed raw materials) in exchange for manufactured goods.

This has placed Australia in a difficult economic position. Farming is, at best, a slow growing sector which is susceptible to world oversupply and deteriorating terms of trade. More importantly, Dunkley and Kulkarni (1990:20) suggest:

Trade in [simply transformed manufactures] is unlikely to revive in the near future because of technological change raising global productivity, agricultural subsidies in major countries, a trend to self-sufficiency in developing countries, the emergence of new primary suppliers and possible reduction in demand for [some rural] products for ecological reasons.

Australia's manufacturing industry primarily constitutes branch plants of foreign transnational companies. It is being progressively locked out of Asia-Pacific markets because of cheaper production costs overseas, particularly in South East Asia. There is no reason to believe that local or foreign agribusiness firms will discover advantages in food and fibre processing in Australia that they have been unable to obtain elsewhere. Labour in Asian countries is cheaper than in Australia so it is likely that raw materials will continue to be sent abroad in unprocessed form. This has been begrudgingly admitted by the Federal Government and has been more-or-less accepted by the National Farmers' Federation (1993). According to the Department of Primary Industries and Energy (1989:15):

In considering the question of adding value to Australian agricultural products, it is reasonable to argue that the value adding activity will often take place outside Australia (by companies that may or may not be Australian owned), and that this activity will be initiated by companies positioned near the retail end of the channel rather than near the raw material end.

Without tariff protection which has provided support for Australia's 'infant industries', there are few incentives for firms to move beyond simple semi-processing activities. Significantly, the processed foods area — that described as providing the best opportunities for value adding (Bureau of Rural Resources, 1991) — now forms a declining proportion of total food exports (Wettenhall, 1991). Bulk agricultural commodities constitute approximately 70 percent of Australia's exports (Australian Farm Journal, June 1991) and are expected to continue to do so (Department of Primary Industries and Energy, 1989).

(f) Beef Feedlotting

Feedlot beef enterprises provide another example of change within rural Australia. Feedlot/abattoir complexes are appearing along the inland river systems to take advantage of the reliable supply of water, grain and (unfattened) store cattle. Investment from Japan, Korea, Taiwan and Singapore has been used to develop vertically integrated complexes with direct links to Asian markets. The recent developments initiated by firms

such as TKK, Mitsubishi, Marubini, Nippon Meats and Itoham have included feedlots of up to 60,000 head. In the Riverina region, an area traditionally known for its broadacre cropping and extensive grazing, feedlots with the capacity to house 130,000 head and to turn off 250,000 animals each year, have commenced operation (*Land*, 31 January 1991).

With liberalisation of the Japanese beef market, beef exports are expected to triple by 1995 (Sydney Morning Herald, 17 July 1991). Australian farmers will be contracted to supply grain and unfattened animals to the new complexes. Like feedlotting, contract agriculture is relatively new to Australia (Australian Farm Journal, May 1991:85) and farmers who have lost the protection of marketing boards and/or other support are expected eagerly to seek integration with the feedlots. According to the Executive Director of the Lotfeeders' Association: 'feedlots are going to change the face of the Riverina region, creating a new economy based on supplying grain and cattle to the feedlot industry' (Land, 17 January 1991:10).

Labour relations in the agricultural sector are also being targeted for change. Workers in the feedlot/abattoir complexes are expected to accept 'more flexible and internationally competitive labour arrangements and awards' (Department of Primary Industries and Energy, 1989:67). The first non-union based contract working team has already been employed in an Australian meatworks (see *Stock and Land*, 5 September 1991) with the support of farmers and the National Farmers' Federation. This is in contrast to the high levels of unionisation normally experienced in Australian workplaces. Furthermore, rural workers, in current times of financial distress for Australian agriculture, are being required to place rural community interests ahead of union loyalty (Australian Farm Journal, May 1991). There is large-scale retrenchment from rural based industry with migration of non-locals back to urban areas. The remaining workers tend to be farmers working off the farm, or those who have a farming background. They often do not share traditional blue-collar union ideology, avoid union membership and are therefore vulnerable to structural adjustment in the industrial workplace.

Feedlots are unlikely to be environmentally or socially beneficial to Australian farmers (Lawrence and Vanclay, 1994). While there is some debate about whether lotfed beef is fordist or post-fordist, it undoubtedly does represent some form of value adding. However, given the extent of vertical integration with the feedlot industry, the majority of the profits from feedlot enterprises are expected to flow not to Australian growers but to overseas-based companies. Australian farmers supplying source stock and grain feed on contract are likely to have little flexibility or autonomy, and given the relative

abundance of these inputs little power to set the price. Australian farmers are likely to find that the are suffering twice, both in terms of decreasing prices for their outputs and increasing input costs, and also in terms of declining autonomy.

Feedlots also have an environmental cost. One estimate is that effluent from a feedlot of 40,000 head (the size of those proposed) is equivalent to that produced by a city of 500,000 people (Land, 15 January 1989). Cities of this size require waste treatment works in the order of US\$80 million. Currently, the method of treatment of feedlot effluent in Australia is to contain the liquid in holding ponds and to sun-dry manure for sale to local farmers (Land, 17 January 1991). However, the soils in many parts of Australia where the feedlots are proposed are rain saturated for about a quarter of the year and it is likely that run-off will eventually reach the already-polluted inland river systems (see Narrandera Argus, 21 August 1990). One state's Pollution Control Commission's negative assessment of feedlot beef complexes along the inland waterways was ignored by that State Government which gave approval for their development (Murrumbidgee Irrigator, 22 February 1991). While problems of overgrazing and overcropping associated with conventional agriculture have already caused havoc, the removal of pastures and the replacement with grain to supply feedlots may intensify current environmental problems.

ECONOMIC AND SOCIAL IMPACTS OF RURAL RESTRUCTURING

There have been different outcomes in different countries as the new forces of economic change have begun to impact upon regions within nation states. In countries of the European Economic Community there has been a move from production strategies which have tended to endorse continued expansion of output to those which preserve rural communities and protect the environment (Commins, 1990; Lowe et al., 1990; Berlan-Darque and Klaora, 1992; Glasbergen, 1992; Lowe, 1992). With agriculture gradually losing its status as the major form of enterprise in rural regions, policy is coming to reflect the variety of concerns of rural and urban dwellers. In the US, where an increased diversity of economic activities (particularly the growth of decentralised service and light manufacturing industry) has helped to reduce rural community dependence on agriculture (see Swanson, 1988), new employment opportunities have arisen. There is evidence that changes are not necessarily beneficial for all regions or for all people within all regions experiencing change: labour market segmentation has been one outcome (Summers, Horton and Gringeri, 1990).

Australian governments have responded to global restructuring in a number of ways. At the macro level they have been prepared to integrate their economies into international circuits of capital by deregulating banking, removing regulations on capital flow, orchestrating high interest rate policies as a means of limiting domestic demand and of attracting investment dollars, and seeking to reduce real wage levels to achieve labour competitiveness (Lawrence, 1987; Rees et al., 1993).

The changes have included measures to provide greater market determination to capital allocation, reducing the costs of and improving flexibility in relation to resource allocation, and encouraging greater economic competition (see Stilwell, 1993).

In Australia, the following measures have been applied as a means of integrating the Australian economy into that of the Asia-Pacific Basin:

- · reduction of import tariff levels,
- · freeing of interest rates,
- floating of the exchange rate and lifting of foreign exchange controls,
- · deregulation of the finance and banking industries,
- · conversion of traditional government departments into new state-owned enterprises,
- · privatisation of state-owned enterprises,
- · deregulation and privatisation of state monopoly control in primary industries,
- deregulation of the airline industry,
- forced competition in the telecommunications industry,
- · reductions in public-sector and welfare spending,
- proposals for a value-added tax (Goods and Services Tax).

In relation to agriculture, the vehicle for such integration is the agribusiness corporation. Statutory marketing authorities — once the bastion of family-farm commodity marketing — are viewed as standing in the way of the private corporations (National Farmers' Federation, 1993). It is the latter, which, through strategic links and size advantages, will be capable of providing value-adding to food and fibre production and will help to reorganise farming to reduce inefficiencies (Department of Primary Industries and Energy, 1989).

The agribusiness model — requiring high inputs to achieve high outputs — is likely to alter the pattern of agricultural production in Australia with the effects being increased output, greater pressure on the environment and an increased need for adjustment of those farmers unable to compete under the new rules (Lawrence and Vanclay, 1992;

Lawrence and Vanclay, 1994). Farmer stress -- another obvious consequence of the combination of forces 'rationalising' agriculture -- is one of the least well understood dimensions of the economic restructuring of farming.

It would appear that the removal of the protective mantle of policies which supported and reproduced (albeit, allowing for appropriate structural adjustment of those deemed to be least efficient) family-farm based agriculture will expose producers to further economic stress. For example, any move to post-fordist agriculture will require producers to move from bulk commodity to 'niche' market production. This will require farmers to alter existing production regimes and grow new crops or animals using a variety of new inputs (including advanced information technologies). If, as might be expected, this results in the polarisation of agriculture — with the more capital-intensive agribusiness-lined farmers increasing their share of commodity production and sector income — what will be the fate of those unable to compete? Some of the likely consequences for this group may be:

- reducing farm expenditure to 'match' reduced farm income levels,
- further borrowing to allow expansion and/or change,
- 'pluriactivity' to provide new income sources as a means of supporting a farm-based lifestyle,
- short (and perhaps medium to long) term exploitation of the resource base of the farm as an attempt to improve farm-based income levels,
- selling the farm.

In the first case, the reduction in household expenditure has important social implications. With little money available for entertainment and other social activities, supportive networks may begin to deteriorate with a consequent loss of vitality in the farming district (Lawrence and Williams, 1990; Stone, 1992). With male farmers often being reluctant to seek assistance from counsellors (Fairweather, 1989) there is likely to be a hidden problem which might, at times, manifest itself in stress-related behaviour including alcoholism, increased domestic violence and suicide. So-called belt-tightening (see Lawrence, 1987) was once an acceptable short-term response to price collapse. The rules of rural production have changed with the winding back of state supports for agriculture. Farmers who might once have adopted belt-tightening as a short-term response (and might have been victims of periodic poverty) are likely to be trapped by continued low prices and may become part of a new rural poor — unable to sell their farm and unable to trade their way out. While financial counsellors are likely to interpret this as an 'equity crisis', it is in reality a structural crisis affecting those producing traditional farm commodities in a world where such bulk products have lost their

competitive edge. The future of the traditional family-farm producer in a post-fordist world system is one which needs greater attention.

Some producers will borrow to expand. Again, however, it is not likely to be in the expansion of output of traditional products where major economic benefits are likely to be achieved. While there will be a demand for grain and unfattened animals for the burgeoning feedlot beef industry, this will be with its own limitations (Lawrence and Vanclay, 1994). Other farmers may be able to link with agribusiness (and, perhaps, with local grower-owned marketing bodies) to produce for niche markets. Such 'opportunities' will be limited in a geographical sense and by the management skills of individual farmers. It is the traditional family farmer, producing bulk commodities, who will be isolated from recent developments, and who will be likely to find product diversification and farm expansion a major problem. Obtaining the capital to do either of these things will be difficult unless credit suppliers can be convinced of the long term suitability of such developments. And, where credit is obtained, the need for the farmer to 'perform' for the bank or credit agency is likely to intensify both social and psychological pressures on the farmer.

Pluriactivity is an important option for the smaller farmer within a post-fordist era, being viewed as a survival strategy and as a means of integrating farm-based labour into new areas of capital accumulation (Le Heron, 1991). It is becoming a preferred option for those farmers (and family members) seeking alternative occupational opportunities and lifestyle options. With between one third and one half of farm households in Australia being pluriactive (Lawrence, 1987), it is obvious that job opportunities within regional economies become crucial to the general well-being of a large number of farmers.

There is evidence that the growth of tourism may provide the sorts of jobs which farm women (in particular) can successfully combine with farm work (see Share, Campbell and Lawrence, 1991). Niche opportunities provided by ski field development or the farm holiday trade are providing flexibility to farming and so allowing producers to remain in agriculture. However, not all regional areas are likely to experience new injections of capital (Stilwell, 1992). Much of the economic activity associated with tourism in Australia, for example, is coastal while most of the farmers suffering economic problems are located in inland regions. Furthermore, opportunities for achieving work within country towns have declined because of the removal of government-based services (as part of rationalisation) (Lawrence and Williams, 1990; Stone, 1992). What remains to be done is to examine which, if any, opportunities are being provided to those farmers and farm members who are under stress as a result of global restructuring. Pluriactivity may

be an excellent farm-based option to structural adjustment, but opportunities are likely to remain limited so long as regional economies are not provided with stimuli to attract industry.

Just as there is evidence of overwhelming farmer commitment to the local town and its future (Kidman, 1991), there is also evidence that the deepening recession is responsible for increasing industry closures and economic distress in rural economies. In this sense the wishes of farm family members to take off-farm work are undermined by economic realities of lack of investment dollars. Of course, when development does occur it is likely that it will be on terms of finance capital rather than of local need (see Share et al., 1991).

One outcome of rural restructuring is further pressure on the environment as farmers seek to counteract falling commodity prices by reducing inputs, working the land harder, and reducing expenditure on conservation works. While this may allow farmers to reduce their personal stress over farm income, many are knowingly running down farm resources (usually perceived as a short term option) to remain in farming (Lawrence, Share and Campbell, 1992).

Much now needs to be understood about resource-use behaviour in times of economic stress. What can be stated is that the Australian agricultural environment is under severe pressure as farms seek to employ past (and new) techniques aimed at boosting production. Financial constraints prevent farmers from spending money on needed works to redress soil erosion, while overstocking and overcropping are a consequence of the need to sustain income levels — particularly as a loan repayment strategy (Lawrence and Vanclay, 1992).

The final option for producers is to leave agriculture. While structural adjustment has been a general regime for unviable farmers and has proceeded reasonably smoothly (in Australia) from the 1960s, the stress farmers face leading up to and during the transition out of farming has yet to be fully studied. There are some estimates that the number of farms in Australia will have dropped from 174,000 in the early 1980s to about 70,000 early next century (Lawrence, 1987). If this occurs there is likely to be quite significant social disruption in rural areas. Yet, as stated earlier, in an era distinguished by reduced levels of government involvement in the rural economy, there is likely to be little support offered to those leaving agriculture. While, in Australia, there has been a quite significant increase in the number of rural counsellors, it appears that many assume the role of financial counsellors. Many of the growing social problems remain hidden from view and

there is a certain 'denial' of the personal and family stresses which are occurring as a direct result of the unviability of family-farm agriculture (see Bryant, 1991,1992).

REGIONAL CHANGE

It has been argued by European and some US writers that a focus upon global networks and upon the structural aspects of agricultural production has tended to reduce the importance of 'the rural'. Some regions -- for reasons of natural resource endowments, local policies, labour availability and skill or market proximity -- have managed to attract capital and to develop while others -- particularly those where agriculture is the exclusive generator of wealth -- have faced pressures for contraction. It is possible to point to regions within Bavaria, Colorado, North East England, Ireland and Tuscany as new productive areas which have attracted population and capital, as well as to those which have become economic backwaters (Marsden, Lowe and Whatmore, 1990). There is argument that production flexibility -- something accompanying the move to niche markets -- will advantage rural regions (Urry, 1984). This is because, through the use of new technologies and production regimes, manufacturing and service industries do not have to be large units. And the smaller the unit the more likely it is to be adaptable. In Urry's words, capital is becoming 'indifferent' to where it is located; something which provides opportunities for rural regions to take advantage of economic developments formerly -- and usually exclusively -- obtained by cities.

As rural areas become sites of consumption (in regard to leisure, tourism and recreation), rather than, as in the past, sites of production (ie agriculture), it is likely that new opportunities for economic development will arise. The rural will be a site for the social production of meanings (Marsden et al., 1990) where city-based individuals come to appreciate, as a cultural asset, the 'space' provided by the countryside. While there will be varied and competing meanings, this is indicative of the potential politicisation of the rural. An obvious example is the degree to which urban dwellers demand (and obtain) conservation works and 'clean food' rather than leaving agricultural production and resource use in the hands of farmers and agribusiness interests. If rural society was once a distinctive entity seen as different from (that is, usually inferior to) that of the city, in the post war period the spatial division between rural and urban has become blurred (Mormont, 1990). While 'space' will continue to provide important insights into the development and reproduction of social relations (when 'localism' may become a key term in understanding local responses to global changes), the 'rural' will not be a self-

evident category but a term used by different groups in different combinations to attract different forms of economic development. For Mormont, farmers may use 'natural food' labels to obtain 'value-added' benefits, environmentalists might seek to shift agricultural policy to protect endangered species, tourist operators might appeal to visitors to experience the 'real' countryside, and so forth. The term 'rural' will slide between those wishing to achieve some economic, social or political outcome. It may become very trendy to live in a 'rural' village or to own a small 'property' in the bush -- something now possible due to communications technology and guided by lifestyle preference. Furthermore, space becomes attractive to those whose worklife occurs in urban settings (Mormont, 1990). New uses for rural space by new groups of users will ensure that conflicts arise. In some instances, farmers may find they have new allies in their attempts to remain in farming. Altered affiliations are possible. Their effect might be to redefine farming as 'land management' or to promote the countryside as the logical location for new industries. Whether the rural is viewed as something to be exploited, or as something to be preserved and nurtured, will be based largely on the collective assets of those making decisions about rural resource use. There is a specific opportunity for local coalitions of farmers, conservationists, professionals and so forth to oppose particular global trends and to foster others. According to Lowe, Marsden and Munton (1990:6):

The balance and combinations of use and exchange values on land, homes and recreational space in the countryside is in a state of continual flux as different fractions of capital seek to exploit rural space, open up new markets and thereby produce new systems of exchange. [State policies of] deregulation [and]... privatisation ... often lead to acute conflicts between, for instance, the protection of publicly-regulated use values and the attempted imposition of productivity-oriented exchange values. For many groups living in urban and rural areas, parts of the countryside thus represent pockets of space for the public consumption of use values in a world dominated by exchange and commodity values; and for this reason the retention of such use values may be vigorously defended.

The implications of these changes for rural regions of Australia are many. First, 'rural' will be a category employed by groups other than farmers and with meanings broader than agriculture. Farmers are likely to find themselves defending their version of what constitutes 'rural' and what are legitimate and desirable activities within that space against those with new definitions and with new priorities. Conflicts may arise which will not necessarily enforce current patterns of land use and production.

Second, with the possible growth of more flexible production not tied to coastal or other areas of high population, rural regions may attract new groups of people whose training and forms of employment will stimulate economic growth. They may help to 'shape'

social space according to their (usually gentrified) views of what constitutes modern life and actively defend their definitions against others. They may represent at the local level the articulate forces which can oppose inappropriate developments which seek to exploit unskilled labour or cause environmental havoc. That is, they may encourage certain forms of development while opposing others. This is certainly evident in the growth of the alternative lifestyle or multiple occupancy movement in Australia (Munro-Clarke, 1986; Metcalf and Vanclay, 1987).

Third, Massey (1984) argues that capital movement shapes regions by utilising and manipulating spatial differences to capture higher levels of profit. Changing circumstances in rural areas due to decreased farm viability result in the establishment of a supply of labour in non-metropolitan regions, and the increased potential for the exploitation of that labour by what might, in other language, be construed as 'growth' and 'development'. According to Massey, this results in the 'spatial division of labour'.

Although the changing nature of regions will have definite impacts on Australian rural society, there are many uncertainties as to the full extent of these impacts. It is not altogether certain that the changing nature of regions will be as dramatic in Australia, with its vast land mass and relatively small population, as it will be in more densely populated nations of Europe and North America. Nevertheless, areas surrounding major centres of population and regions noted for their natural beauty already experience pressure to conform to urban demands, and rural communities in those regions have responded to the potential created by that demand in the form of altered forms of production. It is unlikely, however, that the vast bulk of Australian agricultural areas—much of which are not close to centres of population and not particularly aesthetically or otherwise attractive in terms of other demands that may be placed on these regions—will be significantly affected by the changing concept of region.

There are also other concerns about the validity of the claims about the impact of the changing role of regions. If new industries do emerge, would farmers be capable of combining their usually less-viable on-farm activities with new work opportunities? Marginal farmers find themselves in a situation of 'agricultural involution' (Geertz, 1963), in which they cannot afford the capital outlay to invest in alternative forms of production, and where they have minimised their cash outlays by retrenching on-farm labour and adopting low-input agricultural systems which have low returns. This survival strategy locks them into a situation which they cannot change and which ultimately leads to decreasing equity. By reducing farm labour, the workload of the owner-operators increases to fill all their available time. Off-farm work by the farmer inevitably means the

sacrificing production on the farm. Marginal farmers are also unlikely to have the skills that provide them with the potential to find off-farm work, or to adapt their farm to sites of pluriactivity. Changes in agricultural production and non-agricultural on-farm production are more likely to be undertaken by farmers in the higher socio-economic categories.

The final concern is that in a 'disorganised' de-regulated post-fordist economic system, it may be difficult to establish what are realistic and beneficial local opportunities and what are attempts by the metropole, driven by capitalist pressures, to 'dump' inappropriate and/or environmentally harmful industry in rural areas in order to relieve urban political pressure.

CONCLUSION

Global economic change is disadvantaging certain sections of Australian agriculture. It is essential to understand the nature global developments and their likely impacts in any assessment of the opportunities for family farm survival and/or growth in Australia. There will continue to be a substitution of capital for labour in agriculture, the growth of agribusiness, greater farmer involvement with agribusiness, and pressure on farm units to adjust to a regime of decreasing commodity prices. Farmers will have some opportunities to expand their activities — so long as they link with and conform to the production needs of corporate capital. One of the main effects of the changes now occurring will be further 'adjustment'. Some farmers will have the chance to supplement farm income with off-farm work. But in the context of reduced commitment to regional policy on the part of the state, only certain farmers and regions are expected to benefit. Farmer stress will quite possibly increase over the next decade, exacerbating already existing social and personal problems among farm family members.

Niche marketing will increase but, again, it would seem that TNCs rather than growers and their organisations will exploit these opportunities. With the state largely unwilling to intervene to support agriculture and inland rural communities, the fate of people living in rural areas will become increasingly dependent on private investment decisions. It is unlikely in the context of declining business in rural towns that individuals and companies will readily invest in smaller towns. The move to a post-fordist or 'neo-conservative society' will quite probably create greater levels of social inequality in rural regions at the same time as it increases pressure on the environment.

Just as it would seem that the prognosis for the physical environment is bleak, so to the prognosis for the human environment. The outcomes for rural people living in an era of post-fordist state policies and economic development arising from supposed free market forces — while admittedly difficult to predict — is likely to be poor.

The Sociology of the Australian Agricultural Environment Frank Vanclay

PAPER 2:

Agricultural Change and Environmental Degradation in the Semi-Periphery: The Case of the Murray-Darling Basin, Australia

Geoffrey Lawrence and Frank Vanclay¹

in McMichael, P. (ed.) (1994), Agro-Food System Restructuring on a World Scale: Toward the Twenty-First Century, Ithaca: Cornell University Press, (in press).

INTRODUCTION

Despite exhibiting the expenditure and lifestyle patterns of an advanced metropolitan nation, Australia occupies a 'semi-peripheral' position in the world economy². An important feature of Australia's development, based historically on primary produce exports, has been the ability of successive federal governments simultaneously to appease labour (through high wages), local capitalists (via protectionist policies and justified by infant industry arguments) and farmers (through a mantle of subsidisation, technical support and marketing arrangements). As Australia has become increasingly integrated into global circuits of capital, the impacts of investment decisions by transnational capital and the state in its efforts to reduce balance-of-payments deficits are leading to a further deterioration in Australia's semi-peripheral status.

We wish to thank Phil McMichael and Raymond Jussaume for helpful comments on an earlier draft of this paper.

There is considerable debate about what constitutes the semi-periphery (see Martin, 1990). It is usually accepted that semi-peripheral nations occupy an intermediate place in a global network of unequal exchange, obtaining few benefits in their economic dealings with the metropolitan core but receiving net benefits when they engage in exchange with the periphery (see Arrighi, 1990). These semi-peripheral nations play an important yet subordinate role in world capital accumulation. While their living standards may for periods mirror those of the metropoles, their economies are highly vulnerable to changes within the international marketplace. As Martin (1990;8) has emphasised: 'the semi-periphery bears the burden of the modern Janus: facing oligopolistic and political pressures from core zones and economic competitions from the periphery below'. Some writers (see Korzeniewicz, 1990) prefer to view a country like Australia as belonging to the metropole: others (Armstrong, 1978; Clegg et al., 1980) have produced evidence that Australia has remained economically dependent during the twentieth century and exhibits most of the features of a semi-peripheral nation. We share the view of the latter authors. If Australia were ever at the 'perimeter of the core' (Arrighi, 1990), it is now more than at any time in its European history drifting further towards the periphery.

In the period of economic vitality from the Second World War to the early 1970s, environmental issues were rarely addressed in political debate. The prevailing ideology was one of economic and agricultural 'development' — not only as a means of contributing to the reconstruction of a war-ravaged world, but also as a means of stimulating internal economic growth. Rural producers were encouraged to produce as much as possible utilizing the most advanced technologies. The price signals from the international market and the backing of the state overruled some of the more obvious realities of price instability and environmental degradation. The excesses of the development policies and practices of the post war years culminated in a number of rural economic crises from the early 1970s and the acknowledgement of quite profound environmental damage.

The breakdown of domestic protectionist policies, the reduction in international regulations, and the transnationalisation of the global economy, have created certain internal tensions in Australia. While political parties adopt an active stance in seeking domestic and international funding to stimulate industrialisation, the economy is actually being deindustrialised in line with its role in the Pacific Rim economy. As a high-cost labour region, Australia is seen to be more suited to raw material production. This has placed pressure on the primary industries — agriculture and mining — to attain the necessary overseas income to help sustain the nation's metropolitan-style standard of living.

The problem for Australia, however, is that any intensification of agricultural production is likely to have a major impact upon the environment. Yet the state — diminished in power as integration with international markets and firms increases — is structurally bound to support such intensification. It would appear that at the very time metropolitan nations are showing clear signs of a movement to post-fordist industrial strategies, Australia is being required to conform to the interests of transnational food processors by maintaining fordist strategies of production. The growth of the hitherto unfamiliar beef feedlot industry serves as an example of the type of development required by international capital and accepted by a compliant Australian state — seeking investment as a means of offsetting balance of payment difficulties. While the environment is now certainly on the political agenda in Australia, it is the forests and coastal waters which have received the greatest public concern. Agriculture continues to exploit the land. The decline of fordist agriculture in the metropoles and its re-location to semi-peripheral nations like Australia, might be best considered a form of environmental imperialism —

the exploitation of the resources of weaker nations in the world order as the core nations move towards 'clean', post-fordist agricultural development strategies.

In this chapter, the Murray Darling Basin (MDB), a large and important agricultural region in Australia, provides a case study allowing examination of the environmental impact of changes as the nation is integrated into the Pacific Rim economy.

THE AUSTRALIAN ECONOMY IN THE GLOBAL ORDER

Following white colonisation in 1788, Australia's economic development was linked closely to Britain's need for cheap raw materials as inputs to manufacturing industry (McMichael, 1987). Britain's intention was to ensure growth in its own manufacturing industry, and political and social stability in the colonies from which raw materials were obtained. The emergence in Australia in the early nineteenth century of a property-owning bourgeoisie utilizing the labour of an agrarian proletariat provided the basis for capital accumulation in the pastoral industry. The state — a representation of British social organisation — was city based and was both a seeker of, and a conduit for, British capital investment. Following population inflows during and after the gold rushes of the 1850s, the consolidation of pastoral holdings, and the continued growth of the urban labour market, Australia developed a small manufacturing sector (Boreham et al., 1989). While labour was well organised and challenged capital for improved pay and working conditions, it was nevertheless largely compliant (Connell and Irving, 1980). It also identified with the nineteenth century bourgeois vision of progress.

'Development' was a motivating economic and political catchery, associated with the Australian adage 'if it moves shoot it; if it doesn't chop it down' (see Smith and Finlayson, 1988). The clearing of native vegetation and the destruction of wildlife (categorised as 'vermin'), together with the widespread adoption of farming practices more suited to British than Australian conditions, had a major impact in the first 100 years of white occupation. By 1901, the federation year of the Australian States, land had been exploited to an extent that wheat yields were about half those recorded in earlier times, and native pastures had been extensively damaged through overgrazing (Heathcote and Mabbutt, 1988).

Australian staple exports continued to rise to meet the needs of Britain, while Europe -particularly after the devastation of the First World War -- became an important market
for Australian agricultural products, Declines in the terms of trade for wool and wheat

meant that labour was progressively shed from agriculture and new machinery was harnessed as a means of achieving productivity gains. Pastoral and farming activities moved into the drier, less environmentally suitable, regions of the continent (Catley and McFarlane, 1981). The state provided continued support for agriculture and initiated various scientific and organisational councils to both boost production and provide a basis for orderly marketing. It provided railways, electrical power, irrigation schemes and subsidised credit (Shaw, 1990).

Before the Second World War, some 79 percent of Australia's exports were farm products (Gruen, 1990). However, during and immediately after the war, Australia's traditional exports -- wool and wheat -- were either unable to be transported or were given a low priority status by importing countries. As a consequence, surpluses rose in Australia. Politicians perceived that future problems would no doubt occur if the nation relied too heavily on agriculture and the government implemented a number of measures including continued high protection for manufacturing industry, increased immigration, and the encouragement of foreign capital investment to provide a basis for 'balanced' economic development.

When conditions improved in the post-war years, there was a commitment from the British to purchase Australian agricultural products. Beef was to have a special priority and the Australian Government recognised the opportunity of developing a northern beef industry (Catley and McFarlane, 1981). Such a policy was seen to have the added advantage of leaving Australia's 'vulnerable' northern borders with Asia less exposed to potential aggressors (Davidson, 1966). 'Northern Development' received the unusually high status of a government portfolio. Agricultural development, particularly the substitution of labour by capital, continued alongside the growth of urban manufacturing industries.

By the late 1960s, Australia had moved away from Britain as a trading partner: the US had become Australia's largest supplier of imported goods, and Japan its largest market for exports (Gruen, 1990). However, Australia's manufacturing industry was construed to have failed to develop successfully as an export sector. It was mineral development spurred by Japanese and US capital which kept the Australian economy reasonably buoyant — even during the world oil shocks of the 1970s.

The farmers have fared the worst since the beginning of the post war economic slump in the 1970s. Since that time, the contribution of agriculture to Gross Domestic Product, to employment, and to export earnings, has been deteriorating steadily (Lawrence, 1987).

Efficiency and productivity goals have been imposed upon agriculture and rural reconstruction measures have supported farm amalgamation and the removal of smaller, less viable, producers. Farms have increased in size and decreased in numbers, with those farmers remaining harnessing the latest technologies in an attempt to achieve competitive advantage (Williams, 1990). Despite this, US and EC subsidisation and price and market support has led to Australian producers experiencing quite severe terms of trade declines. Increased exposure to markets — brought about through the policies of governments from the early 1970s — has, in concert with deregulation and the removal of subsidies, placed Australian producers in a precarious position.

Since the great bulk of Australia's output enters the world market as unprocessed foods and fibre, it faces the vagaries of price fluctuation associated with climatic variability, buyer resistance, changing industry and consumer demands, and tactics by competing countries. For example, with the current depressed prices for wool and wheat, the typical wheat-sheep farm will receive as little as US\$1680 for fiscal year 1991-92. The Australian Bureau of Agricultural and Resource Economics has predicted a further 21 percent decline on this figure for the following year (Australian 26 June 1991, Bulletin 16 July 1991). In 1991-92, the agricultural terms of trade -- a measure of cost/price pressures in farming -- is expected to fall by 15 percent from the previous year to one of the lowest recorded levels. With economic conditions in farming considered to be as severe as they were in the 1930s and 1890s, and with farmers having experienced a major drought due to the El Nino Effect (Australian Farm Journal, November 1991), it is estimated that at least one third of Australian farmers will become economically unviable (Bulletin, 16 July 1991). Unable to obtain bank loans for expansion and facing declining markets and rising costs, it is expected that the majority of this group of producers will be forced from agriculture by the year 2000.

Since markets tend to produce 'minimum cost' solutions (Gruen, 1990), rather than optimal environmental-maintenance solutions, the response of farmers during the continuing crises of the 1980s and 90s has been to produce ever higher volumes for export — thereby collectively exacerbating the very market and resource use problems producers seek, individually, to overcome (Lawrence, 1987). Importantly, the main spillover effects of short-term decision-making imposed upon farmers by the realities of the global market place have been declining rural incomes and quite severe ecological destruction (Lawrence, 1987; Cameron and Elix, 1991; Lawrence and Vanclay, 1992).

THE AUSTRALIAN RESPONSE

There was a series of major government enquiries during the 1970s and 1980s including: the Crawford Report on structural adjustment in Australian manufacturing industry; the Myer Report into technological change in Australia; the Campbell Inquiry into the financial system; the Jackson Report on the development of manufacturing; and, more recently, the Garnaut Report on Asian-Australian trade relations. These can be read together to provide a coherent theme: while heavily protected local manufacturing industries have fulfilled certain social goals, many industries — particularly in areas where Australia must compete with countries of low wage labour — are uncompetitive internationally. The key to the future for Australia is seen to be the development of industries based on the latest technologies and which provide opportunities for value-adding. Economic growth will be achieved by increasing exports from Australia's resource-rich primary sector and through development of a skill-based sector. In turn, it will import cheap manufactures from Asia and capital from the metropolitan 'core' nations (see Clegg et al., 1980).

The Garnaut Report develops this theme more fully. Garnaut (1989) insists that Australia must attach itself to the 'ascending' economies of East Asia and develop new initiatives including trade liberalisation, greater Asian immigration and increased foreign investment (Garnaut, 1989; *Sydney Morning Herald*, 20 November 1989). Garnaut argues that during the 1965-86 period, Australia's share of world exports fell from 2.1 percent to 1.4 percent, while at the same time East Asia's contribution grew from 11 to 26 percent. This is seen to be reflected in per capita income levels which increased by as much as 40 (Taiwan) and 50 (Japan) times in roughly the same period (*Sydney Morning Herald*, 23 October 1989).

Australia is required to satisfy the demands of (that is, to produce goods for) Asian markets. Since wage levels are much higher in Australia than overseas, the necessary liberalisation of the economy may result in industrial restructuring, with East Asian investors providing capital and direction. It is further argued that only by becoming more internationally competitive (via restructuring) will Australia advance its role in Asia.

The main recommendations of the Garnaut Report and of the previous trade-related enquiries have been accepted by Australian governments. They have progressively removed barriers to manufactured imports and capital on the basis that this will force Australian secondary industry to compete internationally³. More flexible labour relations (a move from unionised collective bargaining to individual employer-employee contracts) are also viewed as essential to future economic prosperity (Thomas, 1991).

However, far from being 'successful', the emerging trend is that of Australia being deindustrialised (as economic activity in manufacturing declines), delabourised (in association with the introduction of labour-displacing technologies), and rationalised (through the centralisation -- merging -- of capital). Over 80,000 jobs per year have been lost from the manufacturing sector since 1974. New imported technologies have reduced the workplace power of organised labour. Rationalisation has led to business mergers which favour international integration of key sectors of Australian industry (Stilwell, 1986).

In essence, the transnational capital 'Pacific Rim strategy' (Catley and McFarlane, 1981) has specific requirements: the Pacific-based center nations, Japan and the US, are to provide capital and technology; Australia, Canada and New Zealand are to deindustrialise while concentrating on the delivery of cheap foodstuffs, fibre and energy; the newly emerging industrial powers, Taiwan, Singapore and South Korea are to produce manufactures (including items such as cars, clothing and footwear) with cheap labour.

What is of particular importance here is the extent to which the clearly-defined role of Australia as a raw material provider for East-Asia runs counter to the development of environmentally-sound domestic agricultural practices.

³ The structure of trade provides the basis for problems in Australia's current account. In 1986-87, Australia recorded trade surpluses in food, wool, iron ore and fuels, and deficits on manufactures, machinery and transport equipment. As Jones (1989:49-50) notes:

This structure of trade is characteristic of what is often called 'semi-peripheral economies'. There is a heavy dependence on primary and resource-based exports, with higher value added commodities concentrated in the pattern of imports. [For the 80s] a wide range of 'value added' imports had increased faster than the growth in GDP and in exports of food and materials,

Furthermore, Australia's dependence on manufactures and machinery from abroad has meant that the country has run high deficits with countries like Japan, the US and Britain.

THE PRESENT STATE OF THE AGRICULTURAL ENVIRONMENT IN THE MURRAY-DARLING BASIN

Australia has a vast array of production regions and commodity types and therefore it is somewhat inappropriate to discuss environmental problems in the context of an homogeneous 'Australia'. However, one important 'natural' region is the Murray-Darling Basin (MDB). The MDB is Australia's most important agricultural region: it is also a region experiencing severe environmental degradation.

Basin agriculture, producing one third of the nation's output, is based predominantly on wheat cropping, the open grazing of sheep and cattle and intensive horticulture (confined to irrigation areas). The majority of farms are family owned-and-operated with annual production of Basin Farms in the order of US\$8 billion (Crabb, 1988; MDB Ministerial Council, 1990).

This achievement has taken its toll. The soils of the Basin are nutrient deficient, thin, and are easily damaged by floods, droughts and agricultural practices such as continuous cultivation (Ockwell, 1990). Increasing acidity and rising salty watertables are also a severe problem. Yet the economic development of the Basin has required the clearing of native vegetation, the damming of rivers, the heavy irrigation of vast tracts of the semi-arid inland (areas which, for millennia, received an average annual rainfall of less than 10 inches), and the introduction of destructive foreign plants and animals.

Soil formation rates in the Basin are so low that the notion of an 'acceptable loss' is rejected by scientists (see Smith and Finlayson, 1988). At present, estimates of soil loss are that for each tonne of grain produced, some 13 tonnes are either blown or washed away (O'Reilly, 1988). Between 40 and 60 percent of farmers in the Basin are considered to employ inadequate on-farm measures to combat soil erosion on their properties (Vanclay, 1986).

Salinity is another major problem. Both irrigated and non-irrigated (dryland) areas of the Basin have experienced quite severe salting. Salinity in irrigation areas is associated with rising watertables due to excessive irrigation and inadequate drainage. Dryland salinity is also due to rising watertables, with modern pastures and crops using less water than the complex ecosystems they replaced. Dryland salting can also be caused by the eventual exposure of salty lower soil horizons arising from the erosion of topsoil by overgrazing and tree clearing (Vanclay and Cary, 1989). The outcome of both forms of salination are productivity losses which have been valued at US\$80 million per annum (Cook, 1988). It

is predicted that at present rates of salting, many of the Basin's most productive irrigation areas will be unable to grow fruit trees within 50 years (O'Reilly, 1988).

The total cost of land degradation is calculated to be hundreds of millions of dollars per annum (Australian Farm Journal, November 1991; Fray, 1991; MDB Ministerial Council, 1990). Other problems, such as habitat destruction, the extinction of native plants and animals, as well as the loss of water quality because of turbidity, industrial effluent discharge, sewage, and agrichemicals, are impossible to 'cost'. In total, it is estimated that some US\$1.3 billion will be required to address present environmental problems in the Basin (see Crabb, 1988).

Tree planting schemes and other initiatives have begun, with the Federal Government providing funding for the so-called 'Decade of Landcare'. In addition, there are some 900 Landcare groups Australia-wide (*Australian Rural Times*, November 1991). Ironically, just as the Federal Government has begun to provide monies for environmental improvement, State governments have endorsed development strategies which act counter to the wider goal. For example, while the Federal Government has initiated and funded the Billion Trees Program (the planting of one billion trees by the year 2000), over a billion trees have been removed from a relatively small region of Queensland since 1985, in accordance with that State's land development strategy (Beale and Fray, 1990).

FUTURE OPTIONS: AGRICULTURAL SUSTAINABILITY OR FURTHER EXPLOITATION?

Views differ significantly on the precise causes of the environmental problems of the Basin and on the policies that might be implemented to address them. The favoured approach is to view past problems as occurring because of inappropriate attitudes to the environment on the part of farmers, lack of knowledge about the damage caused by agricultural practices, and the policies of past governments which subsidised and fostered large-scale land clearing, ill-conceived irrigation developments and excessive chemical applications (see Cameron and Elix, 1990; Dumsday, Edwards and Chisholm, 1990; MDB Ministerial Commission, 1990; Vanclay, 1992a). It is also generally believed that 'adaptive management' schemes, including remedial action initiated by farmers and governments, will be the key to environmental sustainability in the Basin (Mackay and Eastburn, 1990).

What is often forgotten are the economic conditions under which market-oriented agricultural production takes place. The structural characteristics of Basin farming — high production risks, a relatively fixed supply of available land, discontinuous applications of labour, low prices, and low income elasticities of demand for agricultural products (Williams, 1990; and see Buttel, Larson and Gillespie, 1990) — are long term realities and will mean continued low returns to producers. Furthermore, the global marketplace creates the structural tendency for farmers to overproduce, to have short term planning horizons, and to disregard the long-term returns from soil conservation (Buttel et al., 1990; Redclift, 1987; Rickson et al., 1987; Vanclay, 1992a).

In the current period of low returns, Basin producers are knowingly making agronomically incorrect decisions as a means of ensuring short term economic survival (Bulletin, 31 July 1990). Increased production (overgrazing and the farming of marginal lands) and minimising the application of inputs (such as lime to prevent acidification) have direct crop yield and environmental implications. However, reduced farm income (due to low commodity prices), the lack of equity and the reluctance on the part of farmers to borrow (and banks to lend) in times of falling prices, means a shortage of capital. These factors prevent, or inhibit, the adoption of techniques considered necessary to improve the environment. Many farmers, compelled to work off the farm for additional income to service debts, find that they are neglecting their farms: they do not have the time to engage in the labour-intensive land-conserving activities that are required. In the classic sense of 'agricultural involution' (Geertz, 1963) farmers lack the ability to change their situation or to take risks to experiment with new production strategies such as conservation farming techniques. Large-scale environmental degradation is a serious outcome of the present farm financial crisis. In a 1991 survey of 4000 Australian farmers, 30 percent indicated no money would be spent during the year to address environmental degradation on their farm, while a further 50 percent indicated that the poor economic outlook would limit what could be done (see Fray, 1991). The MDB Community Advisory Committee (1991:23) has recently conceded that 'on-farm land management practices are expensive and their implementation, in this time of economic price problems, threatens the survival of the farms'.

When price levels improve, Australian farmers — like their competitors abroad — purchase inputs designed to increase production and/or lower unit costs, rather than invest in conservation technology. New mechanical, chemical and biological inputs drive the farm further towards specialisation, including the pursuit of fordist-style monocultural practices (which contribute to environmental degradation) (see Buttel et al., 1990). Similarly, some consider that the 'new' solutions such as zero or minimum

tillage create their own environmental problems resulting from the increased use of herbicides (Cameron and Elix, 1991; Barr and Cary, 1992). More disturbingly, most soil conservation practices, especially the planting of native trees, are not profitable for the individual farmer. This is especially so in times of high interest rates and when future discounting techniques are applied (Rickson et al., 1987; Vanclay and Cary, 1989; Cameron and Elix, 1991; Vanclay, 1992a). Australian farmers do recognise soil degradation as a general problem, but the vast majority of producers reject the notion that their own soils are being degraded (Rickson et al., 1987; Vanclay, 1992a).

The trends towards fewer and larger farms, greater reliance on technology, and increasing specialisation in production — all in the context of world overproduction — provide the foundations for the continuation of an environmentally exploitative agriculture, one which 'constrains' efforts to attain sustainability. Redclift (1987) goes further in condemning the present course of modern agriculture. He argues that sustainable systems are characterised by diversity and stability in achieving a high level of biomass. In contrast, in modern agricultural systems large quantities of biomass are achieved by the applications of high levels of artificial inputs in less-mature and less-diverse ecosystems. For Redclift, sustainability and commercial agriculture are logically incompatible.

Rather than seeking reduced-input systems to provide a sustainable basis for farming in the Basin, there has been a growing interest on the part of capital and the state to introduce new (and potentially more damaging) forms of agriculture.

NEW TECHNOLOGIES AND STRATEGIES

Since Australia is conforming to a pattern of development which will serve the interests of the growing Pacific Rim market, it will be required to increase both volume of output and the 'value added' component of that output if it desires increased income from agriculture (Department of Trade, 1987; Bureau of Rural Resources, 1991). At present, Australia annually exports US\$12 billion of agricultural produce. This is converted abroad into US\$64 billion of processed goods (Bureau of Rural Resources, 1991:2). Significantly, half of Australia's major exporting firms are Japanese-owned and they send about US\$6 billion of unprocessed food and fibre abroad in any one year (see *Financial Review*, 15 March 1988).

The Federal Government has initiated a number of measures to stimulate technical efficiency in agriculture and to make producers more responsive to international price signals. Not only has it reduced levels of protection so as to expose the farming sector to the world marketplace, it has also removed regulations which have been construed as retarding Australian agriculture's links with transnational agribusiness (see Lawrence, 1987; Campbell, Lawrence and Share, 1991). Furthermore, as stated earlier, by eliminating many of the restrictions on capital inflow and deregulating the banking sector, the Federal Government has provided the opportunity for foreign capital to influence significantly the future course of agricultural development in the Basin. Two important changes have been the Federal Government's attempts to stimulate the growth and application of agricultural biotechnologies; and the development of the feedlot beef industry.

The Federal Government is fostering the development of 'enabling technologies', which, because of the financial risks involved, might not be considered as potential economic investment by the private sector. Of 46 new technologies that were considered to be potentially capable of transforming agriculture, genetic engineering was ranked the highest (Bureau of Rural Resources, 1991). Consequently, biotechnologies are to be selectively fostered by government polices. New biotechnologies are viewed optimistically as the solution to the dilemma of stagnating productivity in agriculture. Wheat, cotton, and a variety of other crops, will be 'dependent upon ... genetic manipulation technologies' and become the 'basis for a sustainable agricultural system' (Bureau of Rural Resources, 1991:3,17; and see Begg and Peacock, 1990). Genetic fingerprinting techniques will aid application of Plant Variety Rights legislation where the sale of new plants can be organised for the company holding a patent on genes to 'reap an appropriate return' (Bureau of Rural Resources, 1991:7).

Biotechnologies are also considered to provide the greatest opportunities for vertical integration within farming industries (Department of Primary Industries and Energy [DPIE], 1989). This is regarded as desirable by the state because it will allow transnational capital to exert influence over Australian agriculture and thereby to effect the integration of Australian agriculture into the world economy. New directions in farming will not be led by statutory marketing authorities or by other quasi-governmental bodies (as in the past), but by transnational agribusiness. According to a Department of Primary Industries and Energy document (DPIE, 1989: Abstract): 'anything that blurs market signals, prevents adaption or has governments take unnecessary responsibilities is an impediment ... the increasing industrialisation of Australian agribusiness is essential, desirable and inevitable'. Accordingly, the state considers it is the agribusiness firms

which understand the international marketplace and have the managerial know-how to capture new custom (DPIE, 1989).

New agricultural products will develop through market-driven arrangements. Cotton is an example of a crop which will, through advanced biotechnologies, assist Australian farmers to improve market share. A new crop for Australia in the 1950s, cotton has become the fifth major export commodity and is the fastest growing of all agricultural industries. Some 80 percent is sold in raw form to the East Asia region. Farms are generally large agribusiness concerns and are heavily reliant upon extensive agrichemical inputs. The industry is dominated by corporate interests. It has no statutory marketing boards and receives no subsidies or protection (Wormwell, 1990).

Feedlot beef enterprises provide another example of change with the Basin. Feedlot/abattoir complexes are appearing along the river systems of the Basin to take advantage of the reliable supply of water, grain and (unfattened) store cattle. Investment from Japan, Korea, Taiwan and Singapore has been used to develop vertically-integrated complexes with direct links to Asian markets. The recent developments initiated by firms such as TKK, Mitsubishi, Marubini, Nippon Meats and Itoham have included feedlots of up to 60,000 head. In the Riverina region of the MDB, an area traditionally known for its broadacre cropping and extensive grazing, feedlots with a total annual production capacity of 250,000 head, have commenced operation (*Land*, 31 January 1991).

With liberalisation of the Japanese beef market, beef exports are expected to triple by 1995 (Sydney Morning Herald, 17 July 1991). Basin farmers will be issued with contracts to supply grain and unfattened animals to the new complexes. Like feedlotting, contract agriculture is new to the Basin (Australian Farm Journal, May 1991:85) and farmers who have lost the protection of marketing boards and/or other support are expected eagerly to seek involvement with the feedlots. According to the Executive Director of the Lotfeeders' Association: 'feedlots are going to change the face of the Riverina region, creating a new economy based on supplying grain and cattle to the feedlot industry' (Land, 17 January 1991:10).

Labour relations in the agricultural sector are also being targeted for change. Workers in the feedlot/abattoir complexes are expected to accept 'more flexible and internationally competitive labour arrangements and awards' (DPIE, 1989:67). The first non-union based contract working team has already been employed in an Australian meatworks (see *Stock and Land*, 5 September 1991) with the support of the farmers and the National Farmers' Federation. This is in contrast to the high levels of unionisation normally

experienced in Australian workplaces. Furthermore, rural workers, in current times of financial distress for Australian agriculture, are being required to place rural community interests ahead of union loyalty (Australian Farm Journal, May 1991). There is large-scale retrenchment from rural-based industry with non-locals migrating to urban areas. The remaining workers tend to be farmers working off the farm, or those with a farming background. They often do not share traditional blue-collar union ideology, avoid union membership and are therefore vulnerable to structural adjustment in the industrial workplace.

ENVIRONMENTAL IMPACT

While rural restructuring raises important questions about the effects of change on rural communities and about the overall structure of the newly-emerging agricultural economy, what appears to have been ignored by those supporting change is the impact of restructuring on the environment.

The development and release of the products of genetic manipulation may have profound and deleterious effects on the Basin's agriculture. There are concerns about ecological damage from new organisms, the use of greater volumes of herbicides (as commercial crops are modified to be resistant to proprietary products), increased pesticide applications with consequent damage to aquatic and terrestrial ecosystems, and increasing costs to farming as agrichemical companies develop biotechnological seed/chemical packages (ACA, 1990; Hindmarsh, 1992).

Developments in the cotton industry (agronomic and biotechnological) are likely to intensify existing environmental problems. For example, while cotton may be one of the 'glamour' crops (Wormwell, 1990), it is heavily dependent on agrichemicals and is known to have already caused quite serious downstream pollution (Lawrence, 1987).

Of perhaps greater significance is the development of feedlots. One estimate is that effluent from a feedlot of 40,000 head is equivalent to that produced by a city of 500,000 people (Land, 15 January 1989). Cities of this size require waste treatment works in the order of US\$80 million. In contrast, the traditional method of treatment of feedlot effluent in the Basin is the containment of liquid in holding ponds and the sun-drying of manure for sale to district farmers (Land, 17 January 1991). Expansion of feedlotting is likely to result in seepage and run-off that will eventually reach the already-polluted Murrumbidgee River (see Narrandera Argus, 21 August 1990), considered the 'lifeblood'

of the Riverina. A State Pollution Control Commission's negative assessment of feedlot beef complexes along the inland waterways was ignored by the State Government which gave approval for their development (*Murrumbidgee Irrigator*, 22 February 1991). While problems of overgrazing and overcropping associated with conventional agriculture have caused havoc in the Basin, the removal of pastures and the replacement with grain to supply the feedlots may intensify current environmental problems. The potential for erosion is higher on cropping land than pasture land (see Heathcote and Mabbutt, 1988; Buttel et al., 1990) and a greater volume of fertilizers and agrichemicals will inevitably be employed.

FORDISM, POST-FORDISM AND THE PACIFIC RIM

It would appear from the foregoing analysis that new options for Basin agriculture have the capacity to stimulate higher levels of production — but at the further expense of an already seriously-degraded environment. This is despite assurances from the Federal Government and scientists that biotechnological applications and new management regimes will produce a more sustainable agriculture (see Begg and Peacock, 1990; Bureau of Rural Resources, 1991).

The question is, how is it possible to explain, theoretically, Australia's acceptance of potentially more harmful agricultural strategies for regions, such as the Basin, which are already greatly disadvantaged by existing capital-intensive agricultural practices? Why, in other words, has Australia so readily adopted a role in Pacific Rim development which seems to ensure that its economic growth is contingent upon acceptance of further environmental degradation?

The answer appears to be in the movement towards a post-fordist economic structure in metropolitan nations and the 'exporting' of environmentally-harmful fordist production strategies to the semi-periphery and periphery as the metropolitan nations adopt more strict environmental regulation. In an attempt to maintain their position in the world economy, semi-peripheral nations are driven by the need to balance trade deficits. To achieve this, they usually rely upon external capital investment and are therefore compliant in the acceptance of environmentally-damaging fordist production methods. The net effect of this is to worsen lifestyle conditions in the semi-periphery and to increase economic dependency, resulting in what might be best described as the further peripheralisation of the semi-periphery.

Fordism has been associated with a system of mass production based on the development and sale of standardised commodities to undifferentiated national markets. Motor vehicles, petroleum and electronics were the key elements of a system which fostered productivity increases in industry as well providing a social-democratic system of regulation which ensured widespread consumption of mass produced items. Full employment was a social goal of the trade union movement — a powerful agent in the fordist regime and responsible for shaping the welfare state (see Roobeek, 1987; Buttel and Gillespie, 1991; Hampson, 1991). Rising wage levels which occurred in tandem with productivity increases mitigated tendencies towards underconsumption and falling profits (Hampson, 1991).

According to French regulation school proponents (see, for example, Lipietz, 1987), the regime of capital accumulation which produced the 'golden age' of fordism after the Second World War began to founder in the 1970s (Sauer, 1990). The causes of instability during this time were significant oil price increases, the collapse of the once-stable Bretton Woods agreement, growing levels of inflation and the transnationalisation of the economies of nation states — associated with global domination by the corporate sector (see Marsden, Lowe and Whatmore, 1990).

The technological opportunity for reorganising production was, from the 1970s, based largely on the computerisation of industry. Instead of requiring large factories with relatively unskilled workers using heavy machinery, computerised systems provided opportunities for production flexibility. For example, shorter production runs became possible and improved the capacity for firms to move quickly from one product to another. Skilled workers using sophisticated computerised equipment provided a competitive base for new industries which could identify and readily serve 'niche markets' (see Piore and Sabel, 1984).

Although the mass production (fordist) and flexible specialisation (post-fordist) dichotomy has been viewed critically by theorists (see Williams et al., 1987; Foster, 1988; Sayer, 1989; Gartman, 1991; Hampson, 1991), it has nevertheless become an important distinction in the understanding of contemporary agrarian social change (Kenney et al., 1989; Goe and Kenney, 1991; Friedmann, 1991).

From as early as the 1930s, but particularly in the three decades since the Second World War, farmers in the advanced economies -- producing largely undifferentiated products for national and later world markets and 'consuming' industrial inputs -- have been

progressively integrated into the circuits of international capital (Kenney et al., 1989). Commercial family-farm agriculture became dependent upon the products of mass production such as the tractor and other agricultural machinery as well as fertilizers and chemicals. Price supports and a variety of other 'welfare state' initiatives (including taxation concessions, input subsidies and commodity disposal mechanisms) provided farmers with conditions for stable production. The working classes of the advanced economies were advantaged by cheaper foods which were mass produced in much the same manner as industrial household goods. New forms of management and distribution, as embodied in 'fast food' restaurants, enabled agricultural products to be commoditised in ways which ensured uniform quality and competitive pricing (see Kenney et al., 1991).

According to Friedmann (1991), the fordist food regime enabled a series of commodity chains -- particularly those uniting farmers to consumers -- to develop and link into one of three agri-food complexes: wheat; livestock/feed; and durable foods. The livestock/feed complex is the one of greatest significance in the fordist diet. In the US, extensive livestock production had been replaced by intensive methods designed to standardise meat production while taking advantage of increasingly cheaper grain feeds (Friedmann, 1991). Pigs, cattle and poultry were enclosed in increasingly smaller areas and fed grains and supplements which were standardised to produce the highest possible grain-to-meat conversion ratios. The cattle feedlot and associated abattoir became a prototypical example of 'factory farming' in the metropolitan countries such as the US, Britain and Germany. Meanwhile, nations such as Australia and Argentina -- areas of cheap grazing lands -- continued to produce meat for the growing global mass market in hamburgers, frankfurters and canned-meat products (Friedmann, 1991)⁴. The growth of intensive livestock production in center countries was premised on extension of the

⁴ There is some confusion over what constitutes 'fordist' agriculture. For example in regard to feedlot beef, Friedmann (1991) considers that intensive animal production, combined with feedgrains, forms part of a fordist food regime, in that it produces an industrial beef product based on mass production techniques and destined for a mass market. Friedmann also argues, however, that extensive beef production which provides meat for hamburgers and hot dogs (a mass market) can be distinguished from intensive beef production which provides meat to 'privileged consumers' (niche markets). Feedlot beef in Australia is produced largely for the Asian restaurant trade. With the recent rapid expansion of the beef feedlot industry, production of marbled beef has increased enormously, the price has dropped dramatically, and consequently, it is becoming increasingly less elitist. Consequently, while it may have been arguable that marbled or 'Kobe beef' was post-fordist a few years ago, this is no longer the case.

Fordism' takes its name from production strategies based on standardised products for a mass market, using largely unskilled workers on semi automatic assembly lines (Gartman, 1991). Thus, feedlotting changes the nature of agricultural employment as it requires a largely unskilled workforce and reduces the autonomy and flexibility of farmers who provide grain and source stock. Consequently, in terms of production strategies, feedlotting would seem to be fordist, rather than post-fordist.

'American diet' -- first to Europe and later to Japan and the newly industrialising countries of the Pacific Rim (Kenney et al., 1989).

With the quite significant structural problems which the US economy faced in the 1970s, the fordist production regime in agriculture was undermined. Kenney et al. (1989) explain that the marketplace for foods has become fractured as mass consumption diets have given way to middle-class interests in ethnic foods, chemical-free foods and 'healthy' foods. Friedmann (1991:86) notes also that there is a growing class differentiation in the diets of the advanced nations: 'While privileged consumers eat free-range chickens prepared through handicraft methods in food shops, restaurants or by domestic servants, mass consumers eat reconstituted chicken foods from supermarket freezers or fast food restaurants'. Although standardised and highly processed foods remain a key element in global food distribution, the metropolitan nations are experiencing — as part of the crisis in fordism — rejection of the very techniques, methods and products which so successfully tied food production to consumption in the post-war years.

Capital no longer supplies integrated national markets. It operates globally to supply regional and enclave markets using a mixture of fordist and post-fordist production regimes. With transnational capital having the overall say in the form and location of production, it is capable of orchestrating global production to take account of new consumer demands or profit-making opportunities.

Another essential, but inadequately discussed, part of the story is the growth of 'green' movements in metropolitan nations. There is an emerging consensus in these nations that past agricultural practices are incompatible with food quality and environmental safety. For example, Hirsh and Roth (quoted in Sauer, 1990:269) have argued that 'the dynamics of the fordist reproduction process leave in their wake a progressive scale of ecological destruction'. This, in addition to animal rights arguments, is one of the main reasons for European resentment of factory-farming methods. Environmentalists in a country such as Germany have introduced both ethical and cultural arguments in questioning 'high tech' agriculture and its future. Thus, animal husbandry is no longer something to be left to farmers — it must be guided by ethical principles and allow the interests of consumers and environmentalists to be placed alongside those of the producer (Sauer, 1990). In rejecting factory farming, German consumers are providing direct and explicit support for family-farm based reproduction strategies and environmental security (Sauer, 1990).

Sweden, too, has initiated moves to strengthen environmental protection legislation and to provide financial support for family-farm units. This has been interpreted as both a challenge to mass production agriculture, and evidence of the 'greening' of agricultural policy in Europe (see Vail, 1991). Moves are afoot to assist producers to convert cropland to pasture, and there is an associated move to grass-fed beef, away from intensive forms of meat production.

Buttel (1992) has described the process of incorporating 'green' considerations into the economic, social and political policies of the state as 'environmentalization'. He anticipates that the process of environmentalization -- which embodies resource conservation, sustainable development and social justice elements -- has the capacity to challenge the bases of technocratic productivist methods and ideologies.

In the US, agriculture has been central in the debates about environmental pollution (see Kenney et al., 1989). As in the case of feedlotting, where there is a growing awareness of ecological damage and of undesirable animal husbandry practices, there is likely to be capital flight to regions of the world less prepared or able to impose rigid environmental constraints on production. In addition to Goe and Kenney's (1991:152) assertion that large scale production of any commodity will be a low-value business, always threatening to move to places with low land values and low labour costs', regional and national regimes of environmental regulation will guide decisions about industry location.

In the EC (and especially Britain) where the countryside is becoming as much a 'place of consumption' as a 'place of production' (see Munton, Marsden and Whatmore, 1990), those whose economic and social interests are in tourism, retirement or recreation are forcing farmers to both conserve and preserve the landscape. The new dual-income 'gentry', ever-conscious of the advantages of rural living, are capable of mobilising and organising the community in an effort to 'protect' village and community life (Cloke and Thrift, 1990). Environmental pollution is very much an issue of concern for these groups.

Lipietz (1987) argues that environmental problems arising from fordist production strategies have been highlighted by the groups who have lobbied for better work practices and for the realignment of business interests to issues of environmental safety. And, for Goe and Kenney (1991:152), 'as long as a lack of environmental restrictions ... permit an adequate rate of return for mass produced commodities, [fordism] will continue'. The irony is that while the environmental degradation of Australian farmlands would seem to necessitate radical changes in production methods, what Australia is

gaining is the uncertain futures of biotechnology and the discarded fordist production methods of the metropolitan nations.

Capital is seeking new ways of extracting economic surplus in an increasingly competitive global economy, with the impacts of change being uneven and usually socially disruptive (Redclift and Whatmore, 1990). New arrangements between finance and industrial capital have tended to undermine decisions made by national governments. Credit finance — upon which the transnational economy is reliant — is notoriously mobile between regions and industries (see Marsden, Lowe and Whatmore, 1990). In Australia, it has facilitated most of the mergers and rationalisations which have taken place in agribusiness and has sought new products (such as cotton, feedlot beef and tropical fruits), new regions (such as the traditional broadacre farming areas), and new methods (vertically integrated production, direct contracts with growers, intensive animal production and biotechnological applications) to help to reorganise Australian agriculture along corporate lines.

The language of post-fordism is in fact that of finance capital and its transnational allies. Instead of specialising in broadacre cropping and grazing under a state-organised system of statutory marketing boards, Australian farmers are being told to adopt more 'flexible' production regimes and seek 'niche markets' for their 'value added' products. The irony here is that Australian farmers have been renowned for their diversified production regimes, at the farmer level if not the national level, and for the ability of their monopoly marketing bodies to find niche markets. Furthermore, value adding for products like meat, wheat and wool has been notoriously difficult because of market distance and labour costs. Because of overproduction in agriculture, effective strategies were necessary just to secure markets and often involved specialised markets and production. Examples of this are the live sheep trade and the kosher butchery, certain types of fatenhanced meat as well as lean meat. However, much of this has not resulted in value adding, but has served only to secure a market for certain goods in a situation of overproduction. Consequently, some of the possible means of value adding in agricultural commodities are excluded by overproduction. It is also becoming recognised that value-adding will take place closer to the retail, rather than the raw material, end of commodity chains (DPIE, 1989). With the removal of tariff protection for 'infant' industries, there is little incentive for firms to move beyond simple semi-processing activities in Australia.

The post-fordist discourse is not all hollow rhetoric. There is evidence that those manufacturing industries which remain in Australia are exhibiting post-fordist

characteristics, particularly new production strategies, new management strategies, new technologies, and production for niche markets (see Mathews, 1989, 1992; Australian, 14 November 1992). Agriculture, too, cannot be construed to be uniformly fordist. Biotechnological innovations and applications, providing opportunities for more varied production regimes and specific markets is quintessentially post-fordist (see Goodman, Sorj and Wilkinson, 1987). Again, in post-fordist style, the new beef feedlot/abattoir complexes are seeking to use more 'flexible' labour arrangements and produce a specific product -- marbled beef so desired by the Asian restaurant trade. However, the fact that the Asian restaurant trade is itself a vast decentralised (mass) market for uniform marbled beef strips, makes it difficult to sustain the notion that this represents 'niche' production.

It is necessary to recognise that the movement from fordist to post-fordist strategies will be both regionally uneven and over-determined temporally by state policy and by existing and potential conditions of surplus extraction. There is little doubt that livestock producers in the MDB and in other regions of Australia are becoming enmeshed in corporate production relations aimed at forcing on-farm specialisation (of both crops and stock) and the integration of those producers into the fordist, transnational livestock/feed complex. Friedmann (1991:71) concurs: 'food is no longer simply something produced by farmers and bought by consumers, but a profitable product of capitalist enterprise, transnationally sourced, processed and marketed'.

CONCLUSION

Foreign capital is poised to dictate the form Australian agriculture will take. Banking interests have usually helped to reorganise agriculture to fulfill short term profit making goals and have endorsed intensification of farming. Transnational agribusiness -- pressed by governments, consumers and environmental lobby groups within the metropolitan nations to initiate more ecologically sound practices -- has turned to Australia as a location for investment. This is being encouraged as Federal and State regulations disappear and as the nation seeks foreign capital investment to overcome balance of payments deficits (Lawrence and Campbell, 1991).

As Buttel (1992, following Redclift, 1987) has argued, 'debt stress' is one of the major forces driving countries (particularly those in the periphery and semi-periphery) to introduce production-boosting technologies and practices, which result, inevitably, in environmental degradation. Martin (1990) has stressed that historical analyses of the

nations within the semi-periphery have tended to indicate their failure to move towards core status. Even if we accept, as Niosi (1990) argues, that Australia has been closer to the metropole than the periphery, it might be assumed that the current combined trajectories of deindustrialisation and the agribusiness domination of family-farm agriculture is likely to push Australia closer to the periphery.

The present pattern of capital accumulation is one which Australia, as a recipient of production regimes abandoned by the center, will be forced to accept if it hopes to become part of the Pacific Rim economy. The danger is that the relationship of Australia and the Pacific Rim will come to resemble that of Mexico and the US. Like Australia, Mexico is well suited to range-fed beef, and as Sanderson (1989:227) has commented 'technological and capital investments in ... [beef production] would be better spent in ecologically sustainable, low technology range management'. Instead, the beef industry in Mexico has been made to conform to US demands for grain-fed animals, irrespective of Mexico's traditional practices.

Pollution is known to increase in line with the application of intensive forms of animal production (see Redclift and Whatmore, 1990) and, in particular, with the separation of beef raising and grain-growing activities (see Commins, 1990).

By locating the least desirable agricultural activities (and toxic industries generally) in less 'regulated' countries of the periphery (see Piore and Sabel, 1984) and semi-periphery, the metropolitan nations — through the transnational corporations originating from those nations — are engaging in a form of 'environmental imperialism' — specifically, the formal or informal control over economic resources in a manner which advantages the metropolitan power, at the expense of the local economy (see O'Connor, 1971).

Notwithstanding the obvious and well-focused criticisms leveled at attempts to explore 'peripheral fordism' (see Cataife, 1989), this analysis has sought to provide an explanation for regional changes in a nation whose self-determination is being progressively compromised.

In Australia, the MDB is being restructured as a food factory and effluent disposal system for the increasingly wealthy consumers of the Pacific Rim. Importantly, but not surprisingly, the state in Australia is unwilling to impose tighter controls for fear of driving away much needed capital investment. Indeed, many of the State and local governments have a vested interest in ensuring that growth is not hampered by the imposition of tighter controls.

Embedded within the changing structure of world capitalism, Australia is hostage to decisions made by those whose international economic power can not only influence —but effectively determine — the structural character of local agriculture. At present, there is little evidence to counter the view that farming will be considered as a convenient means of obtaining cheap inputs to the Pacific Rim's burgeoning consumer market for meats and for inputs to the food and fibre processing industries. The increasing level of subsumption of Australian farms with respect to agribusiness parallels the increasing level of subservience of the entire Australian economy to transnational capital (see Jones, 1992). For agriculture, the effect is economic marginalisation for many farmers and the continued degradation of Australia's environment.

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PAPER 3: A Blue Green Politics?

Frank Vanclay and Geoff Lawrence *Arena* 1992, No 98, 10-14.

Late 1991 saw media attention focused on blue green algal blooms on the Darling and Hawkesbury Rivers giving us some respite from the Hawke-Keating leadership issue, the imminent collapse of the Soviet Union and the civil war in Yugoslavia. Reports were of a 1200 kilometre algal bloom along the Darling River. *The Weekend Australian* of early December described it as: 'a green death ... a poisonous emerald hue ... spreading through the arteries of Australia. ... Rivers ... being choked in a toxic tide. ... The world's worst freshwater outbreak of toxic algal contamination'.

The event had all the symptoms of a media beat-up, with the dramatic and the superficial being relied upon to build the story. Pictures of bright green waterways, sludge, and sewer pipes spewing into the river were interspersed with those of frowning shire clerks, worried farmers and river-side dwellers, and white-coated CSIRO scientists. Blooming Algae! How would we survive?

That blue green algal blooms have occurred in dams and rivers (albeit on a much reduced scale) for decades and that their causes have been well documented were points often overlooked in the media analysis. Moreso still was the fact that blooms are symptoms of a much greater problem - that of the widespread environmental deterioration of the Murray-Darling Basin (MDB) and of the problems inherent in the management of such a large and semi-arid basin.

Algal blooms are of serious concern because it is toxic to stock and humans, and the 1991 outbreak is reported to have killed hundreds of cattle and sheep. The water cannot be treated by boiling, and conventional water purification plants in Australian towns do not adequately detoxify the water. Therefore, algal blooms pose a severe threat to town water supplies and the health of people living along inland rivers. Many towns have had

to rely on expensive emergency measures such as the carting of freshwater from elsewhere. It is this threat to human life that makes the story newsworthy - not that it is symptomatic of widespread environmental deterioration.

Algal blooms develop only under certain environmental conditions: sunlight, still water, warm temperature and an ample (over-)supply of nutrients, particularly phosphorous. While there are historical reports of algal blooms in the Murray River last century and in England as early as the 12th century, and that algal blooms can potentially occur naturally, their natural occurrence is very unlikely especially on the large scale. While blue green algae organisms may be naturally present in the water in small quantities, algal blooms indicate an environmental system that is exceeding normal equilibrium limits. The high level of nutrients required for a bloom does not normally occur naturally. Algal blooms are therefore an human created problem of too much nutrient in the water.

The reason why the problem occurred in late 1991 was that low water flow, high temperature and high nutrient levels occurred simultaneously. If any of those conditions had not been present, the bloom may not have occurred. However, its occurrence is no surprise as large scale toxic blooms of this kind have been predicted for the Murray-Darling for over 10 years. Despite government reports warning of high nutrient levels for years - with some suggesting that phosphorous levels are up to 80 times that recommended for environmental safety - little action has been undertaken. Even the objective of the task force set up to investigate the algal bloom is only to protect human health directly affected by the outbreak.

The MDB supports some 140 urban communities and contains 40 percent of the nation's farms. It accounts for half the nation's cropland, three quarters of its irrigated land and over half the country's flock of sheep and lambs. It is the nation's premiere agricultural region producing in the vicinity of \$10 billion per annum - primarily foreign revenue earnings. The area is noted for its flatness, predominantly low and very variable rainfall, low runoff and low and variable water flow.

One cannot overlook the physical constraints upon land and water use. For example, flow rates are subject to enormous seasonal and annual variation and it would be difficult to quantify the exact impact of the extent of human activity on the rate of flow. Nevertheless, it is clear that flow rates are affected by human activity especially in times of low flow. The numerous weirs and dams, and the enormous use of river water for stock watering and irrigation mean that in low rainfall times, when water levels in the river are low, there is an increased use of river water.

In times of high rainfall, surplus unallocated water is granted to irrigaters and thus any regular flushing of the river system may not occur. In drought times, such as the Basin has been experiencing, overgrazing and loss of ground cover can lead to accelerated rates of erosion. Evaporation rates are also higher, further reducing the flow rate of the river. The rural crisis and low prices for stock, means that farmers tend to be overstocked because of a reluctance to sell. Low farm incomes also means little investment in environmental protection. Consequently both the drought and the rural crisis have contributed to accelerated rates of erosion and to the 1991 bloom.

Where the eroded soils have nutrient fertilisers embedded this will lead to enhanced prospects for algal blooms. Soil particles - with phosphate attached - eventually find their way to the rivers system. Scientists have grave concerns about the existing level of silting of the river systems. Phosphates which have accumulated in the silt will continue to act as a nutrient bank which will feed the algae for decades no matter what is done to address the problems in the short term. Much of the nutrient load is chemically locked up in the sediment. Under certain conditions these phosphate ions may be released to provide further nutrients. Superphosphate was heavily applied on Australian farms over the last 50 or so years, particularly on the Darling Downs, the headwaters on the Darling River, and considerable amounts of nutrient could be present in the silt at the bottom of the river. Agricultural chemicals (pesticides, weedicides and defoliants) also kill zooplankton which feed on blue green algae. Chemicals that are sulphur based may have the effect of assisting bacteria to release phosphorous entrapped in the silt.

There may be things that can be done to try to improve the level of nutrient in the river. Sewage treatment plants along the river need to be upgraded to remove nutrients from the discharge. Ideally they should not discharge into the river but into local wetlands where vegetation can extract any residual nutrients.

Urban (and rural town) runoff is a major cause of water pollution in rural areas with storm water drains typically leading directly to the nearest watercourse. While farmers may use high quantities of agricultural chemicals, their application rate is far lower than that of urban (and town) people in their backyard. People in rural towns (and cities) need to become more aware of the environmental implications of their backyard activities.

The river banks need to be fenced to prevent stock from watering - and therefore defecating - directly in the river. This will also prevent riverbank erosion and will reduce the amount of silt and any entrapped nutrients from entering the river. By revegetating

river banks, erosion can be further prevented and the vegetation itself serves as a buffer to capture and utilise the nutrient-containing runoff from nearby cultivation.

Analysis of flow rates of the river needs to be undertaken and a priority water rights allocation be given to the river to ensure adequate flow at all times.

Agricultural inputs (at least their loss from the agricultural system) need to be reduced. This will be achieved by lowering the quantity of inputs applied, changing the types of inputs used to more environmentally friendly forms, changing the form of agriculture to a production system that is less dependent on and/or more efficient in the use of these inputs, and minimising the loss of these chemicals from the agricultural system into the environment by reducing erosion and runoff. By improving the agricultural management practices of farmers - especially in terms of conservation farming, particularly stubble retention (to reduce erosion and runoff), and appropriate rotations (to maintain high yields and soil fertility without the use of artificial inputs) - much less nutrient is likely to enter the river systems.

Immediate adoption of these suggestions is not likely, nor in fact, is medium term adoption. While these suggestions may seem obvious and harmless enough, there is enormous cost involved. Many of the farms affected are marginal - marginally viable farmers on marginally viable farmland. The cost of the required changes such as fencing off the river and installing pumps and water troughs (which have their own environmental problems) would be beyond the means of these farmers and would mean that they were altogether unviable. The environment has for ever been subsiding Australian agriculture. Rural shires often have a small rates base largely based on these marginal farmers. These shires are unlikely to be able to afford to upgrade their sewage systems. The rural crisis means declining population and wealth in rural areas making these rural shires even less likely to invest in large scale capital infrastructural works. The widespread adoption of environmentally sound agricultural practices by farmers is unlikely for a myriad of reasons largely related to farmers' economic and social situation.

In a fragile environment where drought is always a threat, land and water management is a real problem. Commercial farmers can stay in business only by improving productivity and efficiency - something which translates, in most cases, to increasing the stocking rate of animals, clearing more land, extending monocropping systems and employing potent agrichemicals and fertilisers. Economic logic for the individual farmer dictates that these practices must continue. To stay in business the latest techniques and methods must be employed. Undesirable 'externalities' such as nutrient-rich runoff are exported

downstream. The real cost of modern agriculture is never fully established because the environmental effects of poor agronomic practices rarely show up on the balance sheets of the individual farmer. It is the widespread incremental decline of farmlands together with the incremental pollution of water systems which are the real concerns for rural Australia. They occur because of a failure of the marketplace to 'cost' the environmental degradation of capitalist agriculture and the reluctance of governments to employ a tighter system of regulation for land and water users in the MDB. The problem of nutrient overload is a so-called non-point problem. Everybody is contributing a small degree and no-one is prepared to take individual responsibility or action to prevent the problem. Our lifestyle and value system is so much dependent on destruction of the environment that we cannot conceive of an environmentally benign life. Country towns are renown for their garden competitions, competitions that largely reflect and endorse the excessive use of water and horticultural chemicals, the very chemicals that are causing the problem. But no-one likes a brown garden.

Instead of government regulation for environmental quality, new agricultural developments such as the expansion of the cotton industry and the development of feedlot beef are believed to herald the productive and prosperous agribusiness future for Australia. Both are great polluters - cotton in terms of fertiliser and chemical runoff and prodigious use of irrigation water, and feedlots in regard to environmentally unsound management of effluent. It has been estimated that a beef feedlot of 40,000 head produces as much effluent as a city of half a million people. The MDB is unlikely to be able to sustain large scale development of the feedlot industry.

In other areas of the Basin, such as the brigalow region of Queensland, farmers are allowed to poison trees and clear vegetation in their efforts to bring new land into production. Furthermore, of the 170 or so sewage treatment plants in the Basin, only a handful have the capacity to remove phosphates - the major cause of algal growth.

The MDB Ministerial Commission is virtually unable to change current practices. It has no legal authority to impose fines, or to plan for water use. The States have been simply unwilling to cede powers to a body which may (and should) overrule the policies of both state and local governments.

Although there is a group led by representatives of the MDB Ministerial Commission looking of ways of reducing nutrients, Australia neither has a national water policy nor a nationwide system of regulation to deal with those polluting the environment. In fact, one body now looking at Australia's water resources, the Industries Commission is

known for its endorsement of privatisation rather than regulation. It may be that recommendation will be made to give farmers a licence to exploit the Basin's water resources - justified by an ideological commitment to the Almighty God of Australia's Economic Development.

The fortuitous flushing of the river by mid December rains has washed the issue from media discussion and public consciousness. While the toxic bloom may be gone - and there is some doubt about this - the latent problem of nutrient overload and environmental management of the Basin remains. While rivers are viewed as a natural waste and reticulation system (part of the national infrastructure) rather than as a life source, there will continue to be water pollution - and algal blooms. Blue green algae has the dubious honour of being the world's simplest life form - that is, of course, if we exclude the people who ravage the waterways of the MDB in the name of short-term profits.

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PAPER 4:

The Social Context of Farmers' Adoption of Environmentally Sound Farming Practices

Frank Vanclay

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INTRODUCTION

Land degradation is Australia's most serious environmental problem and has been recognised as a problem since the 1930s (Messer, 1987). Many techniques for preventing land degradation exist, yet these have not been widely adopted by farmers. There are many soil conservation practices, some which have been around for 40 years or more, which, according to the soil scientists, would greatly reduce the long-term land degradation currently experienced on Australian farms. At first glance, the lack of adoption appears to be surprising, since many of these techniques would require little or no change to overall farming practice and many could be implemented without significant cost to the individual farmer (Donald, 1982; Chamala, Keith and Quinn, 1982; Pampel and Van Es, 1977). Some techniques, especially the establishment of deep-rooted perennial pasture species such as lucerne, which are recommended salinity mitigation strategies, are considered to be profitable for farmers (Oram, 1987; Thorne, 1991). Why, then, do Australian farmers not adopt the soil conservation technology that is available?

The lack of adoption of conservation farming practices by farmers indicates that land degradation is not primarily a technical problem. The issue is not the lack of techniques of soil conservation or of sound land management practices but the social, structural, perceptual and financial situations and processes that act to prevent farmers from adopting those techniques. It is, therefore, important to examine the situation of farmers to determine from their point of view reasons for the non-adoption of practices that technical experts clearly believe would solve, or at least reduce, the soil degradation problem.

THE CALL FOR A CHANGE IN FARMERS' ATTITUDES

Politicians and conservationists often comment in off-the-record statements that farmers' attitudes to the environment are not conducive to effective land management and that the solution to the environmental problems experienced on Australia's farms would most likely require the changing of farmers' attitudes. Many urban people also consider that farmers are not the stewards of the land that they would have us believe they are and that farmers have little intrinsic concern for the land. Of course, it is very unlikely that any person in the public arena would wish to go on public record stating this, even if this is their personal opinion. Nevertheless, former Minister for Primary Industries Kerin (1984) and former Prime Minister Hawke (1989:44) have made remarks indicating that a change of attitude would be important in dealing with the land degradation problem.

The adoption of a land ethic is actively promoted by Dr Brian Roberts, a previous chairman of the Soil Conservation Association of Australia, and a member of the Commonwealth Soil Conservation Advisory Committee (see Roberts, 1990); and it is also the platform of many (soil) conservation organisations. The Soil and Water Conservation Association of Australia considers that the problems of inadequate land management will remain 'until such time as the whole community accepts the need for stewardship and adopts a land conservation ethic' (Standing Committee on Environment, Recreation and the Arts (SCERA), 1989:105). As a witness to the Inquiry into the Effectiveness of Land Degradation Policies and Programs, Dr Smiles, Chief of the CSIRO Division of Soils, also endorsed the notion that 'there needs to be a public reappraisal of attitudes to land management' (SCERA, 1989:61). Furthermore, the National Soil Conservation Program has five goals, the fifth being 'that the whole community adopt a land conservation ethic' (SCERA, 1989:66).

These calls have a political element. By placing the failure of soil conservation adoption on farmers, governments can claim that the responsibility for the problem lies with farmers, not with government. Indeed, education campaigns to increase farmers' awareness of the problem are likely to be far less costly than other potential action. From a political perspective, the call for attitude enhancement is understandable. The land degradation issue is complex and costly, with actual payoff generally outside political time frames. In many cases success would not be obvious and it is quite likely that small efforts by governments would have very little effect. But all this rests on the premises that farmers' attitudes are actually environmentally negative and that attitudes adequately predict behaviour.

FARMERS' ATTITUDES TO CONSERVATION

Although a fundamentally important concept in psychology, 'attitude' does not enjoy a uniformly accepted definition. However, as a general approximation, attitudes are some form of 'learned predisposition to respond in a consistently favorable or unfavorable manner with respect to a given object' (Fishbein and Ajzen, 1975:6). Methodologically speaking, an attitude is an intervening hypothetical construct mediating the influence of an external stimulus on an individual's response to that stimulus (Figure 1).

FIGURE 1: SIMPLISTIC ATTITUDE MODEL

Stimulus	Attitude	Response
(environment)		(behaviour) (action)
		(opinion)

It is generally accepted that farmers will adopt soil conservation technology when they consider themselves to be at risk (that is, perceive land degradation on their land) (Rickson et al., 1987). The attitude then mediates the relationship between the perception of the environment (stimulus) -- in this case the recognition that land degradation is occurring -- and the appropriate response which is the adoption of soil conservation technology. According to this model, farmers with the right attitude (those who are conservation minded) will adopt soil conservation technology, while those with environmentally-destructive attitudes, or less positive attitudes, will continue to let the land degradation occur unabated.

Vanclay (1986,1992) tested this model by developing five attitude scales to measure the different aspects of farmers' attitudes to the environment: stewardship, conservation is economic, the importance of conservation, seriousness of off-site damage, and no erosion problem. Each scale consisted of several items scored on a five point Likert scale (1 = strongly disagree; 5 = strongly agree) with the total scale scores averaged to allow scoring on the original measurement. The scales were developed from a bank of attitude items completed by a sample of 92 Darling Downs farmers for a major study of farmers' responses to soil erosion.

Darling Downs farmers had high scores (on average agreed) for the scales: stewardship (mean=3.8), importance of conservation (3.9), and conservation is economic (4.0); with lower scores (on average were undecided) for the scales, no erosion problem (3.1), and seriousness of off-site damage (2.8). There was very little variance in the scores, indicating consensus among farmers on these issues (Table 1).

TABLE 1: ATTITUDE SCALES -- DESCRIPTIVE STATISTICS

	no of	Cronbach	min	max	mean	std	% who
	items	alpha	score	score	score	dev	agree
Stewardship	9	.74	2.1	4.9	3.8	0.48	96
Importance of Conservation	8	.68	2.4	4.9	3.9	0.48	94
Conservation is Economic	11	.73	3.2	5.0	4.0	0.41	100
No Erosion Problem	10	.63	2.2	4.2	3.1	0.45	60
Seriousness of Off-site Damage	5	.53	1.4	4.2	2.8	0.64	30

Potential range from 1.0 to 5.0; n=90.

Stewardship refers to the notion that farmers are stewards of the land and that farming is a way of life that places implicit responsibility on farmers to look after the land for future generations. The stewardship concept recognises that farmers may have to make uneconomical decisions in order to protect the land. It embraces the notion that there is more to farming than economic management. Ninety-six percent of Darling Downs farmers had an attitude favourable to the notion of stewardship (i.e. had scores>3.0 on the stewardship scale).

Almost all the Darling Downs farmers believed in the importance of conservation. This was measured by a scale covering issues of the importance of conservation to farmers and to the community in general, especially as far as the future was concerned. All farmers also believed that soil conservation was economic. Given these attitudes of Darling Downs farmers, this should suggest that the adoption of soil conservation technology would not be a problem on the Darling Downs. Not only did these farmers have appropriate attitudes, they also believed that soil conservation is economic. There is no reason to believe that farmers on the Darling Downs should be any different, at least to any major degree, than farmers anywhere else in Australia. It is very likely that similar

results would be obtained from any representative sample of Australian farmers in any geographical location. Although attitudes are learnt, and therefore changeable, they tend to be stable over time since they are the result of years of socialisation and of internalisation of experiences. It is unlikely that these attitudes would change from year-to-year or season-to-season. However, despite the attitudes remaining stable, other influences affecting resultant behaviour may change, so behaviour may change even though the underlying attitudes remain the same.

Unfortunately, the existence of these attitudes is not associated with the adoption of soil conservation technology and the absence of land degradation on the Darling Downs. Soil scientists argue that large proportions of Darling Downs (and other Australian) farms are not adequately protected against land degradation. Combining the figures of the Queensland Department of Primary Industries (Soil Conservation Services Branch) with categories developed by the NSW Soil Conservation Service, it was determined that 45 percent of the Darling Downs farmers in the study had not adequately protected their farms against soil erosion (Vanclay 1986). Clearly, the fact that farmers have appropriate environmental attitudes does not guarantee that they will adopt the necessary practices. It also suggests that educational campaigns aimed at improving the attitudes of farmers are likely to fail. What then does explain the contradiction between farmers' attitudes and their lack of adoption of necessary practices?

THE CONTRADICTION BETWEEN ATTITUDES AND BEHAVIOUR

The first obvious explanation is that the measurement of farmers' attitudes is affected (biassed) by the potentially enormous influence of social desirability in this sort of attitude measurement. As a corollary, it might be claimed that farmers are actually hostile to the environment, despite the results of these attitude scales. Farmers are astute enough to be aware of the politics of conservation and the socially desirable answer is obvious to anyone responding to the questionnaire. It would be difficult to rule out social desirability argument, except perhaps by repeating the research including some sort of social desirability measure. Alternatively, it could be assumed that social desirability affects farmers equally; that the mean scale score for each farmer is elevated, but that differences between farmers is still meaningful. If this were to be the case, those with higher conservation scores would be expected to have higher levels of adoption of technology and be more likely to protect their farm from land degradation. Vanclay (1986) undertook discriminant and regression analysis to identify the socioeconomic

correlates of adoption of soil conservation technology, using 'protection', a dichotomous measure indicating whether the farmer had adopted sufficient and appropriate soil conservation techniques to adequately protect the land against soil erosion, as the dependent variable. In that study, there was no indication that stewardship or conservationism (as measured by any of the five scales) was positively associated with protection. Furthermore, there was some evidence that the non-protectors actually had stronger conservation attitudes. This finding supports the general conclusion that, even if the attitude scales are contaminated by social desirability response bias, farmers' attitudes to conservation do not predispose them to adopt soil conservation technology.

The finding that attitudes are not generally predictive of behaviour is not unique to this study and is well recognised in psychology. It is only under certain conditions that attitudes are expected to have any strong effect on behaviour. Myers (1989:558) lists these conditions as:

- (i) when other influences that affect our attitudes and our actions are minimized;
- (ii) when the attitude is specifically relevant to the behaviour; and
- (iii) when we are keenly aware of our attitudes.

If we consider farmers responding to the environment and determining whether or not to do anything (Figure 2), the connection between the stimulus (the environment) and the response (adoption) is not only, if at all, affected by their attitudes. It is also affected by their perception of the environment (the perception screen) and by their personal and financial situation or context (the context/situation screen).

Perception Context/ Screen Situation Screen STIMULUS RESPONSE ATTITUDE (environment) (behaviour) (action) (opinion) Knowledge Resources Information Finance Knowledge Information (etc)

FIGURE 2: MODIFIED ATTITUDE MODEL

Farmers are unlikely to adopt soil conservation technology to the satisfaction of soil scientists if they have differing perceptions about the nature and extent of land degradation on their land. Furthermore, even where they do perceive land degradation, they are unlikely to adopt soil conservation technology if they lack appropriate information and/or have other demands on their capital and time. In the context of Myers' conditions:

- (i) The situation of farmers' adoption of soil conservation technology is heavily affected by a wide range of other influences. The range of possible actions the farmer may undertake in response to the situation is considerable and there are many influences on farmers' attitudes, including processes that may lead to the denial of the problem (cognitive dissonance);
- (ii) Attitudes to the environment (such as stewardship and conservationism) are very general attitudes consisting largely of 'motherhood' statements which also experience a high degree of social desirability. These attitudes do not determine specific behaviour. In the situation of land degradation, even where farmers recognise it occurring on their farms, there is a wide range of appropriate behaviours and there is much conflicting technical information.
- (iii) Farmers are not generally aware of their attitudes to the environment. They think that surveys like this are a waste of time and do not conceive of or intellectualise their responses in the way that urban professional people might. Farmers are much more likely to respond according to notions of good farm management which exist in the farming subculture and the local peer group.

Recognising the wider situation of farmers and the general nature of conservation attitudes, it might be expected that there would be strong attitudinal support but low adoption.

In the Darling Downs, there is a further explanation for the contradiction. Darling Downs farmers not only had high scores on the 'stewardship', 'conservation is important', and 'conservation is economic' scales, they also believed that there was no (real) erosion problem and that the loss of soil from soil erosion is exaggerated by people who are not farmers. They also tended not to believe (were undecided) in the 'seriousness of off-site damage'. With their beliefs that soil conservation practices were economic and the small nature of erosion problems generally, farmers considered that most of the work required to be done to protect farms against erosion was already done (or soon would be) and that no major changes to agricultural management practices or technology was required. This suggests that the farmers may be less concerned about land degradation than soil scientists consider they should be and that they may not appreciate the full implications or seriousness of the erosion problem.

TABLE 2: FARMERS' CONCERN ABOUT EROSION (DARLING DOWNS)

	Darling Downs	Local Area	Own farm
Not a Problem	0	0	15
A small problem	1	17	37
a medium problem	11	37	37
a major problem	88	47	11
Total (n=90) (modified from Rickson et a	100 al.,1987)	100	100

TABLE 3: FARMERS' CONCERN ABOUT SALINITY NOW (VICTORIA)

	Central	Neigh-	Own	
	Highlands	bourhood	farm	
Not a Problem	4	23	53	
A small problem	20	30	32	
a medium problem	30	23	10	
a major problem	45	24	5	
don't know	2	0	0	
Total (n=131) (Vanclay and Cary, 1989)	100	100	100	

TABLE 4: FARMERS' CONCERN ABOUT SALINITY 20 YEARS IN THE FUTURE (VICTORIA)

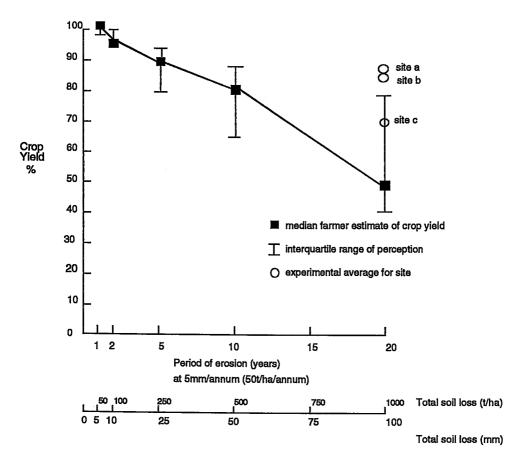
	Central Highlands	Neigh- bourhood	Own farm
Not a Problem	3	12	28
A small problem	4	11	24
a medium problem	14	35	24
a major problem	75	39	21
don't know	5	3	2
Total (n=130) (Vanclay and Cary, 1989)	100	100	100

Farmers are concerned about land degradation as a general community problem but tend to consider that it is not a problem that will affect them personally (see Tables 2, 3, and 4). Farmers consistently understate and misperceive the extent to which their farms are affected by land degradation (Cameron and Elix, 1991; Chamala, Keith and Quinn, 1982; Rickson and Stabler, 1985). Research by Rickson et al. (1987) indicated that were farmers to appreciate the full extent of land degradation that does occur on their farms, they would quite likely act to prevent it. Rickson et al. found that farmers' estimates of anticipated yield losses for a nominated hypothetical erosion rate of 5 mm per annum (the currently accepted, estimated average erosion rate for unprotected properties on the Darling Downs) exceeded the actual yield losses in field experiments at a nearby site on the Darling Downs simulating that erosion rate (Figure 3). The median anticipated yield loss by farmers was 50 percent of current yield after 20 years of erosion at 5 mm per annum, while the maximum yield loss obtained in any of the three experimental plots was actually only 30 percent after removal of 100 mm of top soil (Rickson et al., 1987). The actual yield loss obtained will vary enormously according to local conditions, especially on the Darling Downs where there are very deep soils and very shallow soils in very close proximity (the gilgai phenomenon). Consequently, there may be locations on the Darling Downs, and elsewhere in Australia, where actual yield losses will be much higher than the figures reported here. Nevertheless, the research demonstrates that farmers do recognise the relationship between erosion and yield loss, and on average, anticipate large yield reductions at the currently estimated levels of soil erosion.

Discussions with farmers revealed that farmers could not accept that there was an erosion rate of 5 mm per annum on their farms. The anticipated yield losses are high because they consider 5 mm per annum erosion to be an enormous and greatly exaggerated erosion rate.

Nevertheless, it does indicate that if farmers can be brought to accept that high rates of erosion are actually occurring, they may be likely to adopt soil conservation technology. However, it is also likely that their estimates of yield losses will be moderated as they come to accept higher erosion rates as being normal.

FIGURE 3: SOIL EROSION AND CROP PRODUCTIVITY



(adapted from Rickson et al., 1987)

THE NATURE OF LAND DEGRADATION AND OF FARMERS' RESPONSES

Land degradation has pervasive and intensive forms (Barr and Cary, 1984). While farmers generally respond positively to the more obvious forms of erosion, extreme intensive forms of accelerated erosion may evoke a fatalistic acceptance response (Chamala, Rickson and Singh, 1984; Williams, 1979). However, the insidious nature of pervasive forms of land degradation, especially in their early stages, are such that the effects are slight, not obvious, and even if noticed are easily dismissed as being due to other factors. Roberts (1991) relates a story about an old South African farmer who, when asked whether he had seen any changes on his farm over his lifetime, replied, upon serious reflection, 'I think the rocks are growing'.

The principal forms of land degradation occurring on the Darling Downs are sheet and rill erosion, the subtle processes which together are responsible for eroding an estimated 5 mm of soil per annum (50 tonnes per hectare per annum) on inadequately protected cultivated land. Sheet erosion is not obvious at the point of erosion, while rill erosion is recognisable by the very small gullies (rills) that form as water runs across the paddock. Although in aggregate, these forms of land degradation erode an enormous amount of soil, at the individual level, on a day to day basis, the effects of this soil loss are not obvious. However, the ways to prevent soil erosion are well understood and soil erosion processes are relatively easy for farmers to understand.

Although soil conservation technology is costly and may require some change to farm management, there are clear benefits to the individual farmers who adopt it, probably within the farming lifetime of that farmer. Nevertheless, while there may be substantial, perhaps almost uniform, technical agreement that various forms of management practices (such as contour cultivation and stubble mulching) and structural practices (such as the use of contour banks, grassed waterways, and diversion banks) are practical, appropriate and required on most farms, technical disagreement exists over the appropriateness of so-called conservation cropping (at least when defined as zero or minimum tillage) (see Barr and Cary, 1992b). While farmers may, in principle, agree with extension officers about the use of some of the recommended practices, they tend to disagree over the extent of their use. For example, there is very little disagreement that steep slopes should not be cultivated and should be left as permanent pasture. Disagreement occurs in determining what constitutes a steep slope with, typically, extension officers recommending permanent pasture on slopes which farmers might normally cultivate (for example, slopes just over 8 percent).

Soil salting is more insidious in nature, in that it is not only a slow process but also temporally and spatially distorted. According to the currently accepted model of dryland salinity, farmers who experience salting are not generally those farmers whose farming practices will prevent soil salting. The process of water infiltration into the watertable has occurred since the land was first cleared and salinity control techniques implemented now are unlikely to have an effect on watertable levels for a very long time. The model of the salting process is complex -- although not beyond farmers' understanding -- but is not necessarily generally accepted by them. Salinity control measures are costly, have almost no short-term or even medium-term effect on the severity of salting and may require major changes to farm management. There is also considerable disagreement about the technical and plausible solutions to the problem. This is recognised by the extension agencies in the development of what are referred to as 'best-bet' strategies. Consequently, there is little incentive for farmers to participate in soil salting control (Vanclay and Cary, 1989), and farmers' participation is likely to require a great deal of faith on the part of the farmers (Barr and Cary, 1992a). Importantly, there is some suggestion that farmers are being asked to grow trees where trees are unlikely to have grown before (see Cary and Barr 1992; Barr and Cary, 1992a).

FARMERS' KNOWLEDGE OF LAND DEGRADATION

The research concern of Vanclay and Cary (1989) in the Central Highlands of Victoria was the extent of farmers' knowledge about soil salting. Seventy-nine percent of farmers knew that dryland salting was a consequence of tree loss and/or watertable changes. Seventy-six percent knew that the solution to salinity required tree planting and/or the growing of deep rooted species. However, in an area where all farmers were in close proximity to discharge areas, only 57 percent were aware that salt-tolerant species were early indicators of soil salting. Clearly, of these three issues, farmers' knowledge of the early warning signs was the limiting factor in their overall picture of the salinity process.

The above figures relating to farmers' knowledge levels are overstated since very lax criteria were used. In terms of the early warning signs, any salt tolerant species was accepted. In reality, many salt-tolerant species, such as salt bush, appear only at the very late stages of salting, and even the recognised salt-indicator species such as barley grass and spiney rush occur at such a stage that it may be impossible to reverse the salting process.

The same argument holds true for soil erosion. If farmers become aware of the early warning signs, they will begin to recognise these signs on their own and other farmers' properties. The recognition of the farm to be at risk from land degradation is one of the factors that is predictive of soil conservation technology adoption (Vanclay, 1986). Furthermore, if farmers become aware of the early warning signs, they have an opportunity to respond to those visual cues while there is still time. The potential to dismiss the need for adoption because of a fatalism associated with dramatic intensive events is reduced. It is most desirable that farmers be made aware of the early warning signs.

The problem here is that the early warning signs are general, not specific, indicators of a 'problem'. In all situations of land degradation, the early warning signs could be attributed to other causes. For salinity, soil erosion, acidification and some other forms of land degradation, the early warning signs include poor seed germination rates, change in species composition in pasture, reduced proliferation and lack of vigour in plants. Farmers could easily and logically explain many of these changes as being due to the lack of fertiliser, too much fertiliser, the wrong sort of fertiliser, poor quality fertiliser, poor quality seed, the lack of rainfall, too much rainfall at the wrong time, too high temperatures, too low temperatures, pests, weeds, the influence of the neighbours' activities, residual influences from previous crops and sprays, and many other possible causes. Furthermore, for most of these early warning signs, it would also be impossible for an extension officer or other expert to determine precisely what was the real cause.

For soil erosion by water, the warning signs could also include coloured runoff, turbid creeks and dams, build-up or loss of soil around fences, silted-up creeks and soil on the roadways. However, most farmers are so used to seeing these signs that they regard this as the usual situation.

The early warning signs for salinity include salt indicator species such as barley grass and spiney rush. However, these plant species are not restricted to salty environments and are

frequently associated with general waterlogging, not necessarily being due to rising (salty) watertables. Nevertheless, the prolific establishment of these species is usually associated with high groundwater salinity (Jenkin and Morris, 1982), although farmers may not believe this to be the case.

Given that in most cases farmers have not experienced reduced yields that are not seasonal fluctuations, farmers would be very reluctant to interpret early warning signs as indicators of land degradation, that is, as evidence that they would need to change their farm practices; rather they would be far more likely to accept one of the many other possible explanations.

Since the visual cues to land degradation appear after significant degradation has already occurred and since these visual cues are easily dismissed, there is enormous potential for soil testing kits in promoting adoption of conservation farming techniques. Soil testing kits, when used on a regular basis, can identify soil salting, acidification and other forms of land degradation long before significant degradation happens and well before the visual cues become apparent. Since these kits give concrete indicators (that is, digital read-out) of rising salt levels or of increasing acidification, they provide indisputable evidence to the farmer that there is an increasing land degradation problem (see Powell and Pratley, 1991).

MEDIA IMAGES OF LAND DEGRADATION

Farmers have 'conservation-oriented' attitudes and are aware that land degradation is an important environmental issue, at least as a general issue. Yet they fail to perceive themselves to be at risk from land degradation. Rickson et al. (1987) have demonstrated that farmers do accept that land degradation has serious economic implications and that significant yield losses may occur if they were to experience land degradation. The reason why farmers do not consider themselves to be at risk is because they do not know the early warning signs of land degradation and because of the presentation of land degradation in its most severe form in media images of land degradation. Any examination of land degradation in the media, be it the popular press (see *The Australian Magazine*, April 29-30, 1989), the conservation press (see *Habitat Australia*, February 1988), and much, if not all, of the extension literature all rely on dramatic visual images of severe forms of land degradation (dry, salt encrusted bare patches; 3 metre deep gullies).

Very few farmers actually experience land degradation in the severe forms depicted in the media and extension literature. Consequently, while farmers' awareness and attitudes are being heightened by the images, the images themselves are telling farmers that because they do not have land degradation like those images they must not have a problem. We can surmise that the media and extension literature have been counterproductive in the message it portrays.

Since farmers are unlikely to adopt soil conservation technology when they do not believe themselves to be at risk (Bultena et al., 1981; Chamala, Keith and Quinn, 1982; Pampel and Van Es, 1977; Rickson and Stabler, 1985), the promotion of dramatic images and the consequent ignorance of the early warning signs by farmers are major barriers to adoption of soil conservation techniques. It is obviously desirable that farmers recognise the early warning signs and that extension literature reduce the emphasis on dramatic images.

This may be difficult. Soil conservation departments employ publicity/publications officers who usually have an advertising, public relations or journalism background. They seem to highlight the more dramatic images (perhaps an important technique in advertising) and seem incapable of harnessing images that are less dramatic. The presentation of the less dramatic early warning signs may require a radical rethinking of how extension information is communicated to farmers.

FARMING SUBCULTURE

Society is not homogeneous. There are many groups within society and each group tends to develop a particular subculture, a set of behaviours and attitudes expected of people in that group. While still remaining part of the wider culture, each group develops a unique identity. The farming community is no different from any other group in this respect. Subcultures are not prescriptive and there can be diversity within the subculture. Furthermore, many people may belong to more than one subculture and may be placed in situations of having contradictory role expectations. Not all farmers will subscribe to all aspects of the farming subculture. Because we are socialised into our culture and subcultures, in a continuous and subtle process, we may not be aware that these subcultures actually exist and we may not be conscious of all of the aspects of the subculture. However, this lack of recognition or cognition of the subculture does not prevent our subcultures from being an important part of our life or a significant factor in determining our behaviours and attitudes. Peer pressure is part of the enforcement of the

subcultural expectations: but peer pressure is intense and readily experienced by the individual. Peer pressure explains why individuals do things (and not do things) which might not be in accordance with more widely accepted behaviour. Socialisation into a subculture accounts for people's normal everyday behaviour, is not intense and not necessarily experienced or perceived by each individual.

The obvious manifestation of the farming subculture is in farmers' dress: their checked long sleeve shirts, moleskin trousers, elastic sided riding boots and akubra hats. When it looks like rain, driza-bones are an essential part of the farmer's attire. A preference for country and western music is also expected. While this may be something of an overgeneralisation, the farming subculture does emphasise certain attitudes. There are three major components that can generally be distinguished: stewardship; farming as a way of life; and a unique form of (rural) political and social conservatism. These are sometimes grouped together as agrarianism, although agrarianism is not a unidimensional phenomenon (Flinn and Johnson, 1974) and tends to concentrate on the conservatism and non-economic orientation to farming, often ignoring the stewardship aspect (see Flinn and Johnson, 1974; Buttel and Flinn, 1975,1977; Carlson and McLeod, 1978; Buttel et al., 1981; Craig and Phillips, 1983; Singer and Freire-de-Sousa, 1983; Molnar and Wu, 1989). Australian farmers exhibit high levels of agrarianism (Craig and Phillips, 1983).

The subculture works at two levels: at promoting certain attitudes, ideas and beliefs that members of the subculture are supposed to have; and at specifying certain behaviours and practices. This means that much of the behaviour of individuals may be in response to subcultural expectations (the sociological model), rather than as a result of the individual's own attitudinal response mechanisms (the psychological model). Part of the problem in relation to the adoption of new techniques or management practices is that these techniques and practices are not generally accepted within the subculture. Consequently, only the innovators within the community are likely to adopt them (see Rogers, 1983). However, once these techniques have gained wider acceptance within the subculture, the majority of farmers can be expected to adopt them. The task, therefore, is to promote the acceptance of techniques and management practices within the farming subculture.

Some years ago there was a subcultural insistence that farms have perfectly straight furrows. In fact, rural show days often had competitions to determine who could produce the straightest furrows. This has now been replaced with an acceptance of contour cultivation. Contour cultivation is not universally adopted, of course, with some

farmers finding the management of their farm too difficult with contour cultivation. Nevertheless, there is no longer a subcultural obstacle to the adoption of contour cultivation. Gradually, other aspects of conservation farming will need to become accepted parts of the farming subculture.

Recreational ploughing' or 'recreational tillage' also needs to be subdued. Farmers have a strong work ethic, yet farming is an activity that may mean at certain times of the year there is not a lot of work that needs immediate attention. Some farmers feel that unless they are doing something productive, like driving tractors, they are not working and many farmers are not used to the idea of leisure. There is clear evidence that many Australian farmers overcultivate their land, and that they use ploughing as a therapy to avoid some of the stresses of life. Ideally, the importance of the tractor in farming life needs to be de-emphasised and farmers need to be better trained to deal with the sometimes long periods of leisure time they are likely to enjoy.

SITUATIONAL CONSTRAINTS ON FARMER'S ADOPTION

Land degradation processes are complex, some control measures are costly and there is limited short-term return for investment in soil conservation technology. In fact, in situations of high interest rates, with future discounting entering into the calculations, it is likely that many soil conservation techniques and management practices are not economic (Quiggin, 1987). Except where land degradation reduces the capital value of the land or yields, land degradation is an externality to the economic situation of farmers. The off-site consequences of erosion and, in the case of soil salting, the temporal as well as spatial separation of consequences from management practices, makes land degradation external to the immediate concerns of the farmer. Consequently, in situations of conflicting technical information, unpredictable markets and uncertain return for investment in soil conservation, it may be economically rational for farmers to avoid widespread adoption of soil conservation technology.

In recent years, farm incomes have been considerably diminished due to reductions in the world market prices for the major Australian agricultural commodities, the removal of the floor price for Australian wool and general deregulation of tariffs. It is estimated that the average net farm income for Australian farmers in 1991-92 will be around \$2000, with further reductions expected in future years (Lawrence and Vanclay, 1991). Land values have also fallen, reducing farmers' equity in their properties and functioning to prevent further borrowing for capital improvement as well as preventing the transition of

the smaller farmers out of agriculture (Lawrence and Vanclay, 1991).

Many Australian farmers are in a situation of 'agricultural involution' (Geertz, 1963), not being able to afford to undertake any capital improvement and not being able to change management strategies that involve any risk, or a perception of risk (Lawrence and Vanclay, 1991). No matter how environmentally aware these farmers may be, if they don't have the capital to outlay, or are prevented from borrowing further, they can't undertake any adoption of soil conservation strategies that involve additional spending. Their economic situation means that their primary concern must be their immediate economic survival. The economic barrier is a major barrier to change, but it is not the only barrier. Adoption of conservation farming techniques has also been lower than desirable during times when commodity prices and farm incomes were high. When farmers' income is severely limited they have no flexibility (at least when they have adequate incomes they have the possibility of adoption of new techniques and practices).

Having farmers adopt the recommended soil conservation technology and management techniques will often require their going against economic self-interest; their putting aside other priorities for capital; their rejecting some of their own ideas and knowledge about their local environment; and their accepting the models and knowledge of the extension agencies. As Barr and Cary (1992) suggest, much more than a leap of faith on the part of the farmer is often required.

Farmers tend to be older than the extension officers they deal with. Too often, extension officers and agencies fail to appreciate the experiences and knowledge of farmers. Farmers may have had a lifetime in dealing with their land. It is true that land degradation continues to exist on farms, but it continues to exist on many of the farms that may have complied with previous extension agency dictates about desirable land management practices. In many cases, advice given by extension agencies in the past has been wrong, or at least has not lived up to expectations, and may have caused more problems than it has provided solutions for farmers (see Frank and Chamala, 1992). Some farmers are tired of hearing from yet another extension officer that all they have to do to protect their land from land degradation is to adopt a particular practice or technique. Often, information provided by extension agencies has been ill-timed, making farmers consider extension to be irrelevant. Farmers also complain that they are treated as 'idiots' by extension agencies (Woodhill 1991). The language used by the extension agencies and their staff is often patronising and prescriptive. We do not need to 'educate farmers' -rather we need to learn from them, at least to understand their situation. The subculture of extension officers also tends to promote a patronising attitude towards farmers.

Extension officers generally perceive farmers' beliefs to be different from their own, although in fact they tend to share the same beliefs as farmers (Earle, Brownlea and Rose, 1981).

Farmers are also placed in the situation of receiving contradictory advice. Soil conservation agencies are not the only agencies in the business of extension. In some states, the same agency that promotes soil conservation may have other extension officers whose job it is to promote commercial innovations. In other states, government agencies are structured so that commodity-based extension is the responsibility of one agency, while conservation extension is the responsibility of another agency. In both situations, there may be very little communication between (and within) agencies, and farmers are given different — and often conflicting — information. In addition to state government agencies, many other groups are in the business of extension. Various commodity bodies such as the Australian Meat and Livestock Corporation as well as agribusiness interests, particularly agricultural chemical manufacturers and distributors, also actively provide advice to farmers. In addition, farmers seek information from rural publications and from each other.

Even where farmers may accept the information presented to them, they are not always in a situation where they can comply. They have conflicting goals concerning the use of their time, the use of their capital, and the ideal ways to manage their farm. In times of unpredictable markets, farmers may wish to maintain flexibility. This limits the use of the deep-rooted perennial pasture species desirable for salinity control, because they lock farmers into grazing. Obviously, where achievement of sound land management requires considerable capital investment on behalf of the farmer, in terms of investment in new equipment, structural practices, seed and agricultural chemicals, the economic situation of the farmer is important. Where farmers have low equity levels, when interest rates are high, market prices for produce low and farmers have competing priorities for capital expenditure, investment in soil conservation is likely to be minimal.

The stage of life of the farm family may be important in determining goals for time and capital. There may be conflicting goals of improved housing or education of children. Many farms suffer from poor quality housing because farms are inherited, and farm housing tends to date from the time the land was first settled. Furthermore, owing to patterns of inheritance and the fact that farm families have tended to be relatively large, farms may have numerous shareholders, with the non-farming shareholders having different expectations and demands for the use of capital than the farming shareholders, usually preferring dividends to reinvestment of capital. The large size of farm families

and the resulting inheritance 'battles' have produced considerable tension over landuse and property disbursement.

In other situations, the problem is exacerbated because the land degradation may be an off-site and non-point problem. That is, the farmers largely responsible for the problem may be different from the ones experiencing the negative effects of the problem. This is particularly the case with dryland salinity. Accessions to the watertable occur in areas of preferential recharge, such as the rocky tops of hills which have vertical or oblique sedimentary strata and on the slopes often used for cropping and grazing. These recharge areas may be a considerable distance from the discharge areas, usually the low lying areas, where the effects of salting are noticed. Consequently, where the farmers experiencing soil salting are convinced that they need to do something, the accepted model of salinity requires them to convince other farmers in the recharge areas -- who may not be experiencing any ill effects from salting and are not likely to -- to participate in salinity control programs. Farmers who engage in such programs as the planting of trees (particularly on rocky hilltops) and the growing of deep-rooted pasture species on hill slopes, cannot restrict any benefit that adoption might have on watertable levels to themselves. Furthermore, because of the very slow rate of movement of subterranean water, it is likely that the farmers who suffer most will not benefit until a very long time has passed.

Although governments provide some financial incentives to encourage adoption of soil conservation measures, these seldom cover the full costs borne by farmers. All this suggests that farmers are unlikely to participate in adoption for conservation reasons alone. However, farmers tend not to act in an economically 'rational' way; they respond, instead, to farming culture and the notions of good farm management that exist within their community. In terms of farm management, farmers generally do what they regard is required, often consciously knowing that such an activity may not be economically rational. Such activities are justified as being part of the farming way of life (stewardship) and necessary in order to improve the farm for their children. This has meant that at times farmers' expenditure patterns have been inappropriate — something which has resulted in financial trouble with increasing interest rates and declining product prices and land values.

The constraints upon adoption, therefore, are not necessarily economic, but opinion-related. Farmers fail to adopt soil conservation technology because they are not satisfactorily convinced that it is necessary. In terms of salinity control measures, Vanclay and Cary (1989) found that many farmers failed to participate in adoption for

very practical reasons. Some of the reasons they gave were wrong but, based on the logic and premises of the farmer's explanation, the decision not to adopt was sensible. The task for extension agencies in Victoria was to change farmers' opinions of the particular deep-rooted species being recommended (phalaris and lucerne) — something which would necessitate increasing the farmers' level of knowledge of these species.

THE VALUE OF LANDCARE

The cause of the problem of land degradation is social, not technical, in nature. However, in terms of the economic and social situation of farmers, the lack of adoption is understandable. Extension agencies have alienated farmers and have failed to appreciate the extent of farmers' knowledge and experience in dealing with land management issues. The problem is also social in that many of the consequences of land degradation are off-site or outside the farming lifetime of the farmers. The solutions to land degradation therefore require community concern for the economic situation of farmers and community support for adoption of conservation farming strategies. Landcare, as a strategy for group extension, is likely to provide a suitable model for overcoming many of the problems that have been described.

In particular, Landcare is likely to empower farmers by making farmers themselves responsible for setting the agenda of the land management issue they address and the strategies they employ. It legitimizes their indigenous local knowledge. Landcare will also potentially create a public acceptance of new ideas and land management strategies. Because farmers are meeting other farmers in a forum to specifically discuss land management strategies, new ideas are likely to gain legitimacy within the farming subculture much more readily than they would by diffuse innovation processes that occurred with individual extension strategies. As a local initiative, individual Landcare groups can respond to the particular needs of the members of that group. Landcare is also likely to be a suitable organisation to assist farmers in dealing with the off-site consequences of land degradation.

However, in order to be effective, Landcare groups will need to be satisfactorily served by well-informed extension agencies in order to ensure that their information and other resource needs are met. State governments that believe Landcare will be as a strategy for reducing their commitment to extension ought to reconsider. The enthusiasm and energy of Landcare groups will quickly be lost if the are not properly serviced. Extension agencies and individual extension officers who see Landcare as part of their domain, rather than as a mechanism for empowering farmers, are likely to jeopardise the effectiveness of Landcare and alienate farmers again. The concept of 'ownership' that farmers attach to their Landcare group and the activities of their group is likely to be very important in the success of that group and of those activities.

Landcare groups also need to ensure that they develop appropriate community organisational structures. Burnout of group leaders, loss of enthusiasm and eventual decline in the group will occur unless appropriate safeguards are implemented. Landcare is similar to any community organisation in most respects, and Landcare groups and the extension agencies sponsoring Landcare can learn a great deal from community organisational structures (see Chamala and Mortiss, 1990).

Extension agencies also need to be aware that while Landcare is about empowering farmers, only some farmers are actually empowered. Landcare becomes another organisation in which the politically and socially astute elite of the local community can dominant others. Far from Landcare empowering all farmers, it is quite likely that certain individuals will have their interests served by Landcare at the expense of other individuals (see Gray, 1992).

Funding for Landcare needs to be carefully considered. Already there is the perception amongst some farmers that Landcare is just another way of getting money (Woodhill, 1991). It is important not to let Landcare degenerate into just another social club, and it is likely that funding should reward positive action undertaken by each group.

There also needs to be some consideration given to the effectiveness of Landcare both in terms of implementation of conservation farming strategies (however this may be defined in each region) by members of Landcare groups and in terms of the coverage of Landcare. If large numbers of farmers are not being adequately serviced by Landcare, and continue to use environmentally unsound farming practices, consideration will need to be given to encourage their participation in Landcare, or to find other mechanisms which will encourage their adoption of conservation farming strategies.

CONCLUSION

Land degradation is primarily a social, rather than a technical, problem. A disproportionate amount of research has been spent on physical research, with insufficient attention being placed on the social aspects of land degradation. Land degradation is social in nature for the very reason that solutions to land degradation exist but are not adopted by farmers for a wide variety of social, economic, cultural, perceptual and situational reasons.

Farmers do not have environmentally hostile attitudes. Rather, they endorse concepts of stewardship and conservation. It is highly unlikely that attempts to improve farmers' attitudes will increase the adoption of soil conservation practices. Although adoption of soil conservation technology may not be economically rational for the individual in the short term, farmers do see conservation as having wider economic rewards and do appreciate that land degradation does significantly affect future yields. Farmers are also sufficiently concerned about the issue of land degradation. However, while most see their local area to be at risk, only few consider that their own farms are at risk from land degradation. This is due to a misperception and underestimation of the land degradation processes. Farmers fail to recognise the early warning signs of land degradation because most media and extension literature usually present dramatic images of severe forms of land degradation. The protection of Australia's farmland does not require promotion of changes in farmers' attitudes, but does require an increase in farmers' knowledge of the land degradation processes and symptoms and the acceptance of conservation farming techniques within the farming subculture. Regular use by farmers of soil testing kits is likely to lead to the early detection of land degradation and to the adoption of soil conservation technology and more appropriate land management practices.

The encouragement of conservation farming strategies through Landcare groups is likely to lead to greater acceptance of these ideas within the farming subculture, and will lead to greater adoption. However, there are barriers to adoption which also need to be addressed.

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PAPER 5:

Farmer Rationality and the Adoption of Environmentally Sound Practices: A Critique of the Assumptions of Traditional Agricultural Extension

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ABSTRACT

Traditional extension has been a top down process: scientists developed products and methods which, following promulgation by extension agencies, farmers were expected to adopt. Extension agents considered farmers who failed to adopt new techniques to be recalcitrant and irrational. Farmers' attitudes and their lack of knowledge were considered to be the main barriers to adoption. Little consideration was given to farmers' points of view. The idea that resistance or reluctance to change might have some logical basis was never considered. Recent analysis reveals that most 'barriers' have a rational basis and can be categorised as: conflicting information; risk; implementation costs and capital outlay; intellectual outlay; loss of flexibility; complexity; and incompatibility with other aspects of farm management and farm and personal objectives. Social and perceptional issues also affect adoption. This paper examines the conceptual concerns about the efficacy of traditional extension practices and highlights farmer considerations regarding the adoption of environmentally sound practices.

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INTRODUCTION: THE CRISIS OF EXTENSION

Agricultural extension is in a period of crises: a financial crisis in terms of reduced government funding; an effectiveness crisis in that extension does not appear to be successful in promoting adoption, particularly of environmental management practices; a legitimation crisis in that farmers do not believe that extension is relevant to them; and a theoretical or paradigmatic crisis in that, particularly in the USA and Australia, but less so in Europe, the relatively recent rejection of traditional models of extension has left a theoretical void as there are not sufficiently well developed theories and models that are widely endorsed to take their place.

While it may or may not be of concern that many of the production practices promoted by extension agencies are not being adopted by farmers (see Buttel et al., 1990), the level and severity of environmental problems within agriculture give an environmental imperative to extension that has not previously existed. In Australia, with rapidly degrading environments due to accelerating salinity, acidification and other environmental degradation processes, the need for effective extension to promote the adoption of environmental management practices is great.

Despite this great need for effective extension, the crisis in extension and in agriculture generally means that extension agencies are in a period of change. As a consequence of their own financial constraints and altered priorities, governments are reducing extension services, segmenting their client base, and privatising their operations. Despite rhetoric about 'community development', 'group facilitation', and 'farmer directed extension', many modern extension programs such as group extension are also being adopted by governments as a means of reducing the costs of extension rather than because of their demonstrated superiority as an extension strategy (Lawrence et al., 1992).

Traditional extension was based on the social-psychological model of diffusion of innovations, which is best represented by Rogers (1983). This model has become very limiting, contradictory, does not sufficiently explain farmer behaviour and has been substantially rejected (Buttel et al., 1990). That there has not been a replacement model has left something of a theoretical vacuum in extension. Extension has become, in many ways, a discipline in search of a paradigm. The new models of group extension such as Landcare have been developed without a substantial theoretical basis and rest upon a certain amount of ideological faith about farmers' desires to join 'self-help' groups.

In Australia, extension agencies embody aspects of traditional extension thinking and, at

the same time, a commitment to new methods of extension. Even though there is enthusiasm about these new models of extension, it is still adjudged that extension is not working and that farmers are reluctant to adopt the conservation technology that is being promoted. Furthermore, extension agencies and agricultural research agencies are apparently unaware of the implications of these new 'bottom-up' (cooperative and group) approaches to problem solving.

This paper proposes that the non adoption of technology, especially of many environmental management strategies, by farmers may be quite rational from their point of view. It also argues that while traditional extension methods and philosophies may have been more or less successful in the promotion of commercial innovations (a debatable point not relevant here), they are inconsistent with the promotion of environmental innovations. Furthermore, it is argued that the barriers to adoption, and the promotion of environmental management practices is problematic for modern extension approaches as well. Because of the primacy of traditional extension thinking in Australian extension agencies, a stronger and/or more detailed critique of traditional extension is provided than may be necessary for an European audience.

COMMERCIAL INNOVATION VERSUS ENVIRONMENTAL INNOVATION

Traditional extension is based on the model of innovation diffusion that dominated American rural sociology in the 1960s and 70s (Buttel et al., 1990). The important features of this model are that it is based on social-psychological notions of individual decision making, but does not see adoption as a simple, single act, rather as a complex pattern of mental processes and activities occurring as a set of stages: awareness, information, evaluation, trial, and adoption. Adoption is theorised to occur as a sigmoid growth curve when graphed as cumulative percentage and which is normally distributed when graphed as frequency over time. This leads to classification categories such as innovator, early adopters, early majority, majority, late majority and laggards (see Rogers, 1983).

The classical model of adoption is predicated on commercial innovations that apply equally to all farmers for whom the technology is designed. Commercial innovation refers to those innovations that are developed primarily for commercial reasons. With commercial innovation, non adoption affected no-one other than the non adopting farmer, and since adoption was in the farmer's self interest, it was assumed that adoption would eventually occur.

With environmental innovations — that is the use of techniques, methods and approaches to improve land management rather than to increase farm productivity — the costs of adoption are borne by the individual farmer, while the benefits are social. Often the costs outweigh the benefits for an individual farmer, at least in commercial terms. Such adoption is, therefore, not in the farmer's economic interest and the result is large-scale non adoption. As will be argued later in the paper, there are many other fundamental differences between environmental innovations and commercial innovations that make the adoption process of environmental management techniques much more complex, and their adoption much less likely.

Nevertheless, there are many compelling social and environmental reasons why farmers' adoption of improved environmental management practices is socially desirable. Much of the impact from land degradation is in the form of 'off-site' damage, a term referring to all the impacts that are of concern to people other than the commercial concerns of the individual farmer, including loss of the productive potential of the farm for future generations, impacts on downstream water users, impacts on neighbours, loss of wildlife habitat, loss of ecological diversity, water pollution, air pollution, exhaustion of non-renewable farm inputs (eg phosphates) and the destruction caused by their use (as on the island of Nauru²), and so on.

A consequence of the existence of a difference between commercial and environmental innovations is that different policy instruments including regulatory and subsidy approaches may be required for the promotion of environmental innovation while voluntary approaches were generally satisfactory for commercial innovations. The problem, however, is that regulatory and subsidy-based approaches are the antithesis of 'bottom-up' approaches — the very ones being endorsed by the state as a means of saving public money and encouraging group decision making at the local level — and to the

Nauru is a small island nation (area 20 km², population 7,000) in the Pacific Ocean from where all of Australia's superphosphate was mined. Nauru, in geological terms, is a colonised coral atoll which has over millennia accumulated bird guano. In less than the 99 year mining lease held by the British, the environment of the island was completely destroyed by the removal of the phosphate (leaving only coral pinnacles amongst which nothing will grow), the society was completely destroyed by first an economic boom which saw Nauru having amongst the highest per capita GNP in the world, and then a bust, now that the supply of phosphate is exhausted. Nauru has no industry, very few people work, the inhabitants live on government handouts (from government investment of phosphate levies), and because of the high level of income and the lack of activity, obesity and other health problems are rampant. Phosphate was extensively applied to Australian farms particularly in the post war years up to about 1980, with the government subsidising the cost of phosphate through the superphosphate bounty. The effect of the bounty disproportionately benefited rich farmers, and meant that excessive amounts of superphosphate were used contributing to current environmental problems such as acidity and blue-green algae blooms in the inland waterways. While productivity did increase as a result of the large amount of superphosphate used, it is now considered that much of the increased yield was due to trace elements in the superphosphate and not the phosphate itself.

philosophy of economic rationalism that is prevalent in Australia (Vanclay and Lawrence, 1993).

Significant off-site impact associated with land degradation and the uneconomic nature of many appropriate land management activities, especially on the large-scale, suggest that community support for land protection is desirable. A further reason to support community involvement is that, in many cases, fault cannot be placed with individual landholders but with government policies and social attitudes that encouraged the clearing of land in the first place. Extension agencies have also played a role in encouraging the adoption of what are now known to be environmentally unsustainable practices (Frank and Chamala, 1992). Salinity, in particular, is temporally and spatially distorted — the watertable accessions that have caused dryland salting potentially having occurred decades ago and several miles from the discharge sites — and where there are deep leads and aquifers even further afield (Vanclay and Cary, 1989).

With environmental innovations, new technologies are not universally applicable. Rather than being concerned with adoption of the technology per se, a more appropriate measure to consider is protection (Vanclay, 1986). Protection is a measure to determine whether a farmer has adopted or implemented a sufficient range of environmental management strategies appropriate to the environmental situation of that farm. Obviously there is no limit to what a farmer might do in terms of protecting the farm. However, for a particular production commodity in a particular region, a set of environmental management techniques can be devised which would be generally agreed upon as being the basis of what environmentally aware farmers should seek to achieve in order to manage their farm in a relatively sustainable fashion. In this type of analysis, farmers who happen to have the best tracts of land are usually required to do very little in order to qualify as 'protectors' (Vanclay, 1986), while those on poorer tracts may have to implement quite substantial changes to ensure environmental sustainability.

A further complication with environmental innovations is that they tend to be qualitatively different from commercial innovations. Commercial innovations tend to be what might be described as add-on technologies, which require little modification to farm procedures. Appropriate environmental management in agriculture requires major changes in land use and to farm management. It is well established that add-on technologies are far more likely to be adopted than practices that require major land use change, even where significant economic advantages can be demonstrated in the case of the latter (Donald, 1982).

It could be argued that commercial innovations were promoted by extension agencies using the traditional extension concepts focussing on the promotion of simple, single technologies. Effective environmental management, on the other hand, is more complex, requiring not only a change in management behaviour or the use of a particular technology, but, potentially, a different way of thinking: the adoption of systems thinking and whole farm planning. Röling (1993) argued that moving towards environmental management could be seen as a cumulative and incremental learning process and not about the adoption of innovations. Nevertheless, (Australian) extension agencies entrenched in traditional extension thinking tend to perceive and promote environmental management practices as discrete management practices or technologies (environmental innovations) in much they same way as they would perceive and promote commercial innovations; only the goal is environmental rather than commercial. Examples of the promotion of environmental management as a commodity or single innovation or technology abound even though these practices are complex and often require a change in farm management: contour cultivation, so called 'sustainable crop rotations' to reduce artificial nitrogen use, establishment of deep rooted perennial pastures, improved management of stock rotations, stubble mulching, and zero tillage systems.

In addition, some conservation measures promoted by extension agencies possibly did not require major changes to farm management, and were also promoted as commodities to be introduced, for example: contour banks and other structural works, grass filter strips, and strip cropping. The promotion of contour banks was so important within Australian extension agencies that the success of the extension office in each district was measured in terms of the miles (referring to the time before Australia adopted metric measurement units) of contour banks that had been constructed, and the speed at which they could be built. The facts that: in many instances, banks might not have been required; that they contributed to problems such as salinity by increasing watertable accessions; or that if they were not properly surveyed and constructed, they contributed to increased erosion in the event of pondage and the bank breaking; was not considered relevant to the evaluation of extension agencies.

It is not necessarily the case that there is always a conflict between environmental and commercial innovations. However, existing evidence of the widespread adoption of what might be described as environmentally sound practices, indicates that adoption of those practices occurs because of commercial reasons rather than because of the environmental benefits of those practices, especially among 'commercially oriented' as opposed to 'farming-as-a-way-of-life' oriented farmers (Buttel et al., 1990). Thus, minimum tillage has been adopted because of labour and energy savings, and deep rooted perennial

species have been adopted because of their cost effectiveness. Nevertheless, environmental benefits do accrue irrespective of the motivation for adoption (commercial or environmental). Commercially motivated adoption of environmental management practices does not, however, ensure that environmental benefits will be maximised.

THE CRITICISMS OF TRADITIONAL EXTENSION

There are numerous criticisms of traditional extension and the use of the adoption diffusion model dating back to the early 1970s. Nevertheless, institutional inertia and other reasons have meant that (Australian) extension agencies have not yet seen the limitations of the traditional model, and have not fully adopted new models of extension (which themselves are not free of problems). Because of the commitment of (Australian) extension agencies to traditional thinking, it is worth reiterating the essential elements of the criticisms of traditional extension. In our analysis, five important criticisms of traditional extension are predominant and have relevance in the promotion of environmental innovations.

First, extension, based on the linear model of knowledge utilisation, has uncritically, even unquestionably, accepted the products of agricultural science research (ie innovations) as being *improvements* (Fliegel and van Es, 1983) and has taken 'a promotional posture toward technological change' (Buttel et al., 1990:46-7). Extension has identified its task to 'sell' technology to farmers without considering the appropriateness of this technology to farmers. Kloppenburg (1991) argues that extension (and rural sociology) had become the handmaiden of the scientific-industrial agribusiness complex in that it accepted that all farming problems could be overcome by the continued application of conventional science. Even when it was perceived that science had caused the problems, the solution was more science. From this perspective, extension agents are seen literally as 'agents of the state' in the promotion of practices that are endorsed by the state and that ultimately conform to the economic desires of agribusiness.

Secondly, this uncritical acceptance by extension has resulted in considerable social (Goss, 1979; Lowe et al., 1990; Röling et al., 1976) and ecological (Stockdale, 1977; Clark and Lowe, 1992) impacts as a result of the technological change fostered by extension. The adoption/diffusion model itself ignores many of the important social issues such as the unequal distribution of impacts and benefits of the technology (Goss, 1979; Röling et al., 1976). The service provided by the extension agencies reaches, differentially, the better educated and more economically powerful farmers.

Thirdly, the adoption/diffusion model only applies to production innovations and not to the adoption of conservation technology. Despite establishing that the correlates of adoption for environmental innovation are different from those for commercial innovation (Pampel and van Es, 1977; Taylor and Miller, 1978), extension has not, until recently, criticised the fundamental basis of its existence or its commitment to the adoption/diffusion model. One aspect of this issue is that extension based on the linear model is seen as the promotion of discrete technologies (ie having the characteristics of a commodity, see Röling, 1992a), whereas environmental management is not only about individual technologies but about different ways of thinking and about the management of whole systems. A further serious implication of the failure to perceive of the difference between commercial and environmental innovations is suggested by Buttel et al. (1990) who claim that by this approach, rural sociology (as a discipline) supports, in a narrow way, voluntarist (non-regulatory) approaches to resource management and cannot support alternative positions such as regulatory approaches simply because the model assumes that adoption will always eventually occur.

Fourthly, farmers' local 'indigenous technical knowledge' has been marginalised, trivialised, subordinated and ignored by the 'techno-strategic discourse' that has dominated agriculture (Kloppenburg, 1991). Traditional extension has assumed that farmers had nothing to contribute to the discussion about what was needed in agricultural technical development. Given the hegemony of technocratic discourse, those adopting were seen as 'innovators' and held in high regard, while those not adopting (and/or rejecting) new technologies were labelled as 'laggards' and viewed disparagingly. In this way the knowledge and skills of the latter group were marginalised and discredited, virtually eliminating any challenge, from 'below', of 'scientific' agriculture. Agricultural extension is seen in these terms as espousing, uncritically, pro-corporate ideology and the expansion of transnational agribusiness (see Lawrence, 1987).

Finally, the social, political and cultural context of agriculture and of adoption behaviour has been ignored. Adoption is seen as an individual decision based on formal rationality, while the structure of agriculture itself is taken to be independent of any social or political context (Long and van der Ploeg, 1989; Vanclay, 1992a).

In addition to these general criticisms it is apparent that the classical adoption/diffusion model has other faults. Adoption does not always occur according to the predicted distribution. In practice, the shape of the cumulative adoption curve, or the frequency/time curve varies considerably (Buttel et al., 1990). Adoption does not

necessarily follow the suggested stages from awareness through knowledge, trial and adoption. Particularly with environmental innovations, it is not always possible to trial the new technologies since the new technologies tend to be indivisible and therefore cannot be adopted in part. Farmers are therefore, not surprisingly, cautious about committing themselves to complete adoption of management practices that they have not trialed. The classical model assumes that awareness and knowledge will always filter through to all sections of the farming community -- but this is not necessarily the case. Even with a concerted awareness-raising campaign, knowledge of an innovation does not permeate to all groups. Farmers utilise a range of information sources and different farmers have different information sources. Furthermore, awareness and knowledge do not always lead to adoption. In some cases, particularly with environmental innovations, awareness and knowledge may be held by farmers, but because of other factors affecting the decision making process, adoption does not occur. In the traditional model of extension these are known as the barriers to adoption. Sometimes the knowledge basis necessary for adoption is held by farmers but rejected by them -- often for good reason -because the knowledge basis defies the farmers' notion of common sense and historical experience (see Barr and Cary, 1992).

THE RATIONALITY OF FARMERS

For Weber, the process of rationalisation is the movement from a society based on substantive rationality to a society based on formal (capitalist) rationality, a process he despised (Beilharz, 1991) but believed was inevitable. Weber considered formal rationality to be the explicit calculation of economic factors in monetary terms and the subordination of all other goals or values in life. Substantive rationality is somewhat ambiguously defined by Weber but in its simplest form is the opposite of formal rationality in that it is not constrained to purely formal or goal-oriented rational calculation (Weber, 1976 cited by Mooney, 1988). What is implied in the notion of substantive rationality is the legitimacy of value-oriented action.

Weber's notions of formal and substantive rationality have been applied to classify American farmers into two (Rogers, 1987; Salamon, 1985) and four (Mooney, 1988) ideal types. Salamon (1985) and Rogers (1987) classify 'commercially oriented' farmers as 'Yankee' farmers, while they classify 'farming-as-a-way-of-life' oriented farmers as 'Yeoman' farmers. Mooney (1988) adds C. Wright Mill's notion of craftship to the concept of substantive rationality to provide a more concrete notion of substantive rationality as applied to farmers. Placing the 'formal rationality – substantive rationality'

continuum on one axis, Mooney (1988:68) adds a second axis of 'market situation' reflecting 'a continuum of positive and negative privilege with respect to the market in property and skills but also includes the level of market monopolisation of input and output factors'. This provides four sectors which he labels "Economists' Model Farmer" and 'Poor Farmer' at the formal rationality (capitalist) end, and 'Successful Family Farmer' and 'Marginal Family Farmer' at the substantive rationality (craftship) end. He then provides a description of each idealised type.

Jan Douwe van der Ploeg (1990, 1993) has also been classifying farmers into different groups based on his and/or Hofstee's (1946) concept of farming styles. The essential feature of the concept of farming styles is that different groups of farmers have different notions about the most appropriate way to farm in order to fulfil their objectives, which may include, but are not limited to objectives relating to production levels, farming techniques, environmental management, animal welfare and so on.

Somewhat similar to the concept of farming styles is Vanclay's (1992a) argument about the existence of (regional) farming subcultures to which farmers are socialised and which includes norms about appropriate farm management.

Extension is based on the presupposition of economic calculation by farmers — that is, formal rationality. Quite clearly, Salamon, Rogers, Mooney, van der Ploeg, Vanclay and others have identified considerable sections of the farming community that are not classified as adhering to formal rationality. That some farmers do not adopt some innovations which, according to formal rationality, are clearly economical, while other farmers do adopt other practices which are clearly not economical, is further proof that much farmer decision making is not based upon formal rationality.

What follows is a discussion of the barriers to adoption particularly of environmental innovations, and an argument that establishes how, from the farmers' point of view, such non adoption may well be rational: not only in the substantive sense where non adoption is appropriate because of the primacy of non-economic values and goals, but also in many situations it is apparent that non adoption is economically rational. The importance of this approach is that it further legitimises the claim that more attention ought to be placed on farmer concerns and that farmers' opinions ought be considered more carefully in agricultural research and extension particularly in relation to environmental management and sustainable agriculture.

THE SO-CALLED 'BARRIERS TO ADOPTION'

In the classical adoption diffusion model, adoption is regarded as being inevitable because the model assumes that the innovations are beneficial (economical) and that farmers are economically rational. Thus in the case of commercial innovations, there are no barriers to adoption; the lack of adoption is explained solely by the lag time in the communication of the innovation from the extension agency to the individual farmer, in how long an individual farmer takes to try-out an innovation, and whether the farmer is psychologically and structurally an innovator, or laggard, on the adoption curve. Sometimes the opportunity to adopt new technologies might be limited by infrastructure such access to inputs and to markets.

The notion of a barrier to adoption is an attempt to adapt the classical model of adoption to account for non adoption where it is recognised that there might be reasons for such non adoption. According to the traditional model and except for the limitations of knowledge, motivation and capacity to adopt as described above, barriers to adoption do not exist for commercial innovations -- innovations were economic and adoption would automatically follow farmers' awareness of the innovation. A notion of barriers to adoption recognises that for some innovations there would be reasons why adoption does not occur. In principle, this could apply to both environmental and commercial innovations in any expanded or enlightened model of extension and adoption behaviour that accepted the validity of substantive rationality. Barriers to adoption is an important concept in dealing with environmental innovations because it recognises that some environmental management practices may not be in the best interests of individual farmers even if their wide scale adoption is socially desirable. A major aspect of the recognition of these barriers to adoption is the consideration of how farmers may be persuaded to change their behaviour, or in other words, how the barrier, or hurdle, might be overcome.

Thus, even if it accepts that it may not be in the interests of farmers individually to adopt some management practices, the notion of a barrier to adoption only logically exists under the traditional concept of extension since it rests on the normative conceptualisation that the new technologies or practices ought to be adopted, and that the management practices will be beneficial to farmers, or to the environment.

In the new models of extension based on the Agricultural Knowledge and Information Systems (AKIS) concept of extension (see Röling, 1988; Röling, 1990; Röling and Engel, 1990), such as Landcare in Australia, ideologies of 'farmer first', and 'bottom-up'

approaches (see Chambers, 1983; Chambers et al., 1989, Richards, 1985) mean that because farmers are responsible for setting the agenda and determining the priorities for extension activity, barriers to adoption do not logically exist since there no longer is a normative reason (within the perspective) why adoption ought to occur. The moment that a normative argument for adoption is made, such as the need for adoption of environmental management practices because of an environmental imperative, extension must be considered as a policy instrument (see van Woerkum and van Meegeren, 1990; cf Röling, 1988). Thus the concept of a barrier to adoption is inconsistent with an AKIS perspective.

Of course, having accepted that extension is a policy instrument and a legitimate tool of government for the manipulation of behaviour for socially desirable purposes, such as environment management, does not mean that AKIS style methods of group extension (eg Landcare) may not be the most appropriate or effective way to actually achieve that aim. The important and only difference is that the group facilitator must manipulate, albeit subtly, the learning processes and knowledge environment of group members so that they, in the end, arrive at the socially desirable view (Vanclay, 1992a).

In this method, it is unlikely that there will be substantial barriers to adoption since once the farm study group has accepted the importance of a particular practice for commercial or environmental reasons and it has entered the subculture, or farming style, of that group, each individual farmer is likely to conform and adopt the practice. Similarly, until there is general recognition of the importance of a particular environmental problem and of the suitability of the management practice dealing with that problem, widespread adoption it is not likely to occur.

Many extension agencies have not appreciated the implications of these arguments about the barriers to adoption and persist with notions about the need for persuasive extension ignoring completely aspects relating to the rationality of what is being promoted and the social context of adoption. Thus various extension agencies promoting conservation practices use similar concepts and thinking as is used with the extension of commercial innovations. To these agencies, even where an awareness of meaningful barriers to adoption exists, farmers who fail to adopt are often regarded as ignorant, short sighted, recalcitrant and laggards. Historically, and perhaps presently, the objective of much extension research has been to identify the perceived barriers and to establish strategies about how to improve the targeting of the message so as eliminate the barrier, with little consideration that farmers may be carefully choosing *not* to adopt, or that their reluctance to adopt may have a rational basis, at least from the point of view of the

farmer.

Many different reasons are given by farmers as to why they have not adopted a particular technology or management practice. Often non adoption is for very pragmatic reasons, where the technology being promoted was simply not suited to the new environment or social context (see Röling, 1988; Frank and Chamala, 1992). While many of the reasons relate to the specifics of particular commodities, environments and the technology or management practice being promoted, it is nevertheless possible to identify eleven key considerations. Some of these points are recognised within the traditional extension model (see Rogers, 1983), and others have been made by some of the critics of traditional extension (eg Buttel et al., 1990). However, the conceptualisation of these eleven points is original and is related specifically to the adoption of environmental innovations.

- 1. Complexity. In general terms the more complex the innovation, the greater the resistance to adoption. Complexity makes the innovation more difficult to understand, and generally requires greater management skills. This increases the risk associated with the innovation. Many environmental management practices are complex and require a detailed understanding of physical processes. In some cases, such as with salinity, farmers know what is being stated and what is being promoted to address the problem. They simply don't believe or agree with the scientific explanation for salinity (Barr and Cary, 1992; Cary and Barr, 1992; Vanclay, 1992a; Vanclay, 1992b; Vanclay and Cary, 1989). Farmers are acting quite rationally by preferring to adopt less complex innovations over more complex ones and by not adopting complex practices at all.
- 2. Divisibility. Divisibility allows for partial adoption. Farmers can adopt that part of an innovation that they like or that is consistent with other farming objectives. Obviously, therefore, the more divisible into component parts an innovation is, the more likely it is to be adopted. Under the traditional model of adoption of commercial innovations, partial adoption will inevitably lead to complete adoption. Partial adoption is viewed as a form of trial adoption. Where innovations are not divisible, they are not likely to be adopted, especially if they have other detracting attributes. In this case, farmers must be totally committed to the new innovation before adoption. Such a commitment is unlikely for a range of reasons, and consequently farmers are acting rationally when they do not adopt technologies that are not divisible. Environmental innovations, because they are about total farm management, tend not to be divisible and are, as a consequence, less likely to be adopted.

- 3. Congruence Incompatibility with farm and personal objectives. Farmers are more likely to adopt innovations that are compatible with other farm and personal objectives. Where innovations are complex and indivisible, they are also likely to represent major changes in the management of the farm and therefore not be compatible with other operations on the farm. Farmers' personal needs for the use of capital and income such as the education of children, expenditure on household goods, as well as farm requirements such as the purchase of new machinery may mean that capital expenditure is not consistent with farm and personal goals at that point in time. The desire to maintain flexibility because of uncertainty in the market place also means that innovations that are not consistent with this goal are also likely to be resisted. Because of the fundamental changes to agricultural practices associated with most new environmental strategies, most environmental innovations are not compatible with current farm management practices. Non adoption under these circumstances is rational from the farmer's point of view.
- 4. Economics. Under the classical model of adoption of commercial innovations, the more an innovation will provide concrete economic benefits, the greater the rate of adoption. While there are many factors that affect farmers' decisions to adopt and farmers do not necessarily act in an economically rational way (Vanclay, 1992a), everything else being equal, it would be reasonable to expect that the more economically beneficial an innovation is, the greater the rate of adoption. The ratio between short term and long term benefits will also affect the decision to adopt, with the adoption of practices having a higher ratio of short term benefits taking precedence over practices having only long term benefits. Because environmental innovations rarely provide direct economic benefit to the individual farmer, especially when future discounting techniques are applied (Quiggin, 1987), there would be very little adoption of environmental innovations if farmers were to base their adoption decision solely on economic criteria. Fortunately, farmers employ a range of criteria in their decision making processes. Nevertheless, it is a truism that the more expensive environmental management practices are (in terms of immediate financial and intellectual capital outlay and the labour required, and in terms of the benefit/cost ratio over time), the less likely adoption will be. If farmers were being strictly rational, little adoption of environmental innovations would occur. They ought not be criticised for not adopting when the economic situation does not warrant it.
- 5. Risk and Uncertainty. Risk is usually associated with commercial innovation because it refers to the farmers' concern that the capital and other resources invested in adopting the technology will not result in any benefits. However, the concept also refers to

environmental innovation in that farmers need to be sure that the conservation technology will actually provide the anticipated environmental benefits and outcomes. There is an element of risk. Farmers could expend resources adopting a new technology, buying new machinery, and altering the management of the farm in order to farm more sustainably — but with the new technology actually failing to solve the environmental problems it was intended to solve. In this sense the risk is always greater for environmental innovations than for commercial innovation. With commercial innovations the main risk is capital outlay and perhaps the yield of one season. With environmental innovations the risk includes the capital resources expended — often considerable when production strategies are required to be altered — and the production for that season. These are weighed against the production for future seasons if the environmental degradation is not stopped. While farmers do not necessarily make conscious and sophisticated analyses of the degrees of risk in adopting technology (the information required to do this is seldom available), they are aware of the implications of particular choices.

- **6.** Conflicting Information. No new technology, especially that designed for conservation purposes, is free of debate about its applicability and effectiveness. Farmers receive information from numerous sources and those sources often contradict each other (Vanclay, 1992a). In a situation where there is already some uncertainty, conflicting information further suggests that non adoption is an appropriate management strategy. The fact that much of the drive toward 'sustainability' is seen to be directed by governments and promoted by 'green' movements is another concern for farmers. They are often suspicious of the motives of both. They often feel that 'city' ideas are being forced upon them thus undermining the status of the knowledge about sustainability
- 7. Implementation Cost Capital Outlay. In addition to the economics of the innovation in terms of whether or not the innovation will increase profit, it is necessary also to consider the capital required to adopt the new technology. Much commercial innovation, and some environmental innovation, requires considerable capital outlay in the form of new machinery, seeds, agrochemicals, and earthworks. Often, adoption of new techniques may require the farmer to forego income until the new system is established. In this situation, the farmer must have the resources not only to adopt the new technology but also to survive the period until the new innovation produces income. In the current period of farm financial crisis, many farmers have negative net incomes, and with declining farm land values and equity levels, many farmers have no borrowing power. In other words, farmers just do not have the capital resources available to them to adopt any new technology that requires a capital outlay. In addition to the lack of

capital to outlay, the farm financial crisis means that most farmers are unwilling to take any risk because failure might have disastrous consequences. Risk taking behaviour is more likely when the farmer can afford the consequences of failure (cf Cancian, 1979). Geertz (1963) calls this 'agricultural involution' — the situation in which marginal farmers can not adopt new technology, even where there may be clear economic reasons to adopt, because of their inability to deal with the consequences of potential failure, and their lack of capital to invest in any change.

- **8.** Implementation Cost -- Intellectual Outlay. In addition to the capital costs associated with adoption of new technology, there are also intellectual costs. Farmers may have to learn new ways of doing things. Many of the new recommended farming strategies require much greater knowledge about cropping systems and about the chemicals that are used in modern agriculture. This classification is similar to 'complexity' but relates to the knowledge base of the individual farmer rather than to an objective measure of complexity. Farmers would not be unique in attempting to minimise the amount of knowledge needed in order to conduct their operations.
- 9. Loss of Flexibility. Many new environmental management practices reduce farmers' flexibility. Farmers like flexibility because it means that they can change commodities in responses to prices and climatic conditions. Perennial pastures lock farmers into grazing. Zero-tillage systems with chemical control of weeds restrict the range of crops that can be grown and the rotations of those crops. Farmers are quite likely to resist the adoption of new technology that restricts their flexibility. With fluctuating market prices, farmers are acting rationally by wanting to maintain flexibility.
- 10. Physical and Social Infrastructure (Farming Subculture or Farming Style). Economists and physical scientists readily accept that the lack of appropriate infrastructure in the region is a barrier to adoption. Many types of commodities are tied to particular marketing infrastructures that may not exist in certain areas. Consequently, adoption is not likely unless the appropriate infrastructure exists. In the same way that we can conceive of a physical infrastructure, we can also consider a social infrastructure. Farmers frequently suggest that other farmers are an important source of information about farming. Where centralised marketing arrangements exist for many commodities (such as in Australia for example), many farmers have not regarded themselves to be in direct competition with their neighbours, making sharing of ideas, knowledge, and sometimes equipment, commonplace. Except for a small number of maverick innovators, most farmers would not want to be the only one to undertake a new practice, or grow a new crop. Consequently, adoption has to wait until there is sufficient interest in the

innovation to promote wide-scale adoption. Thus an agreeable social infrastructure is necessary for widespread adoption.

Such a notion of a social infrastructure is one component of the classification of the barriers to adoption. However, it maintains a physical science conceptualisation about barriers to adoption. There is another dimension to the social infrastructure that impacts on adoption, the farming subculture (Vanclay, 1992a) or farming style (van der Ploeg, 1990; van der Ploeg, 1993). Sociologically, it is known that the influence of the farming subculture or farming style is very important (Vanclay, 1992a). Conforming to subcultural norms is a fundamental aspect of social behaviour in any group, whether it be an academic subculture, an extension subculture, or one of the farming subcultures (farming styles) in a particular region.

In farming subcultures, there are norms about the agricultural practices that are acceptable in that group. Part of the reason why land degradation occurs is because farming subcultures do not have sufficient sanctions against inappropriate environmental management. Within farming subcultures, in Australia at least, there is a notion of individualism — that is, that individual farmers have the right to do what they like with their farms. This notion of independence also means that farmers do not critically comment on the farming practices of other farmers directly to those farmers, even when they do not agree with the way those farmers are running their farms — although there may be a lot of discussion about other farmers behind their back. The subculture also means that ideas that are different from the ideas currently held in the subculture are likely to be rejected. The subculture is not prescriptive — change is possible and not all individuals adhere to the subculture — but nevertheless the subculture is a powerful force in resisting change.

An important feature of farming subcultures (or farming styles) is that while specific environmental management practices are not part of the subculture, adoption is not likely to occur irrespective of the benefits. Conversely, when environmental practices and environmental thinking enter the subculture, mass adoption is likely irrespective of the disadvantages. Thus the important thing in the promotion of environmental management is the acceptance of the practices and thinking within the subculture or farming style.

11. Environmental Perception and Media Promotion. Considerable research has established that farmers are likely to adopt environmental management techniques when, among other things, they consider themselves to be personally at risk from environmental degradation (Rickson et al., 1987; Vanclay, 1986). However, much of the extension

literature, conservation literature, and general media reports depict land degradation in its most dramatic forms: deep erosion gullies, salt encrusted pans, or exposed tree roots revealing considerable wind erosion (such as the Dust-bowl images that are frequently presented). The presentation of land degradation in this dramatic form is counterproductive (Vanclay, 1992a; Vanclay, 1992b). While farmers are made aware of the issue, they do not see the same degree of degradation occurring on their own farm and consequently believe they do not have a problem. They will claim this even when it is known that the problem may be serious in their own locality (Vanclay, 1992a; Vanclay, 1992b, Vanclay and Cary, 1989). Where farmers do experience land degradation in such a severe form, farmers may feel powerless to address the problem, and adopt a fatalistic attitude rather than undertake any reclamation action or fundamentally change their management practices (Chamala et al., 1984; Williams, 1979).

These eleven barriers to adoption explain why farmers' non adoption of commercial and especially environmental innovations is understandable, logical, and quite likely rational (certainly within the concept of substantive rationality). The rationality of these barriers to adoption of environmental innovations means that adoption of environmental management practices is not likely to occur no matter whether traditional extension techniques are used or whether new extension approaches are used. Furthermore, farmers' adherence to non-rational aspects of farming subcultures or farming styles, such as having an anti-change sentiment, or a distrust of outside 'urban' experts, must be considered legitimate aspects of being human. Scientists and every other group in society are not totally rational in their own life and work, either. Thus non adoption of environmental management practices is understandable, and farmers should not be blamed for non adoption.

THE RECONSTRUCTION OF AGRICULTURAL SCIENCE AND SUSTAINABLE AGRICULTURE

Kloppenburg (1991) endorses the 'farmer first' approach (see Chambers, 1983; Chambers et al., 1989; Richards, 1985) on the grounds that the present scientific 'way of knowing' is inappropriate as a model for future sustainable development and for the extension of democratic principles. It is only in recent times of economic crises in agriculture, environmental pollution, agribusiness domination, corrupted markets and concerns about food quality that a criticism of scientific agriculture is emerging as a strong force within the United States and Australia (it has existed for some time in Europe). Kloppenburg argues that by 'reconstructing' agriculture, new insights and perspectives will supposedly

develop. Local knowledge can be rediscovered and incorporated into an understanding of sustainable options; feminist approaches can alert us to issues of 'diversity, affection, responsibility, [and] accountability' (Kloppenburg, 1991:539) and systems thinking can remove current barriers between farmers and agricultural scientists. Unorthodox, alternative approaches are likely to emanate, Kloppenburg argues, from the rediscovery of local knowledge and from the continued critical examination of the impacts of orthodox science. For Kloppenburg, then, the 'crisis' of extension cannot be viewed in isolation from the more general crisis of agriculture — one brought about by adherence to a narrow set of technocratic methods, products and ideas.

Clearly, Kloppenburg and others (eg Chambers, 1983; Chambers et al., 1989; Richards, 1985) place faith in farmers' ability to develop their own sustainable, affordable and economically productive ideas and techniques which will challenge (and displace) the existing science of agriculture. The assumption is that farmers' knowledge can produce sustainable outcomes in the context of economically productive farming systems. This is to ignore the facts that farmers' knowledge has been utilised in the development of existing practices and knowledge; that farmers have come to rely heavily on existing practices and knowledge and generally endorse scientific applications in agriculture, and that scientific agriculture may be just as capable — if not more capable — of finding sustainable solutions as is indigenous knowledge (see Molnar et al., 1992).

Molnar et al.'s (1992) major criticism of Kloppenburg is that he distorts the importance of local knowledge and neglects the limitations, especially the potential short-sightedness and sectionality associated with it. They also claim that farmers are involved in the research process, but that access to involvement tends to be class-related. Greater contribution of farmers to the research process is not likely to redress the class imbalance (see Gray, 1992).

What Kloppenburg does remind us of, however, is that extension knowledge is a particular form of knowledge, which, as a form of pro-agribusiness ideology, is in urgent need of revamping. The challenge would appear to be to alter the mode and context of extension -- from an elitist 'trickle-down' approach to the facilitation of group interaction and problem solving at the local level (see Flora, 1992; Lawrence et al., 1992; Vanclay, 1992a; Röling, 1992b). In this way the rejection of farmers' attitudes and farming styles as 'irrational' is less likely to occur. This would facilitate the extension of environmentally sound practices, and would result in the subsequent improvement in land and water management.

CONCLUSION

When examining adoption of innovations from the farmers' perspective, the non adoption of much new technology, especially many of the environmental innovations, is rational. In addition to technical reasons for non adoption, the reasons given by farmers for not adopting can be classified into several broad headings which provide a rational basis — under farmers' premises — for non adoption. Other aspects of farmer resistance to change which form part of farming subcultures and farming styles must be considered to be legitimate aspects of human behaviour, and not as deficiencies in the behaviour or attitudes of those farmers.

Given this perspective, and the fundamental nature of the differences between commercial and environmental innovations, the promotion of environmental management in agriculture by agricultural extension agencies will be problematic. This is especially problematic given the severity of environmental degradation in Australia and therefore the apparent necessity, an environmental imperative, for action by extension agencies.

Nevertheless, it is clear that (Australian) extension agencies have been using traditional models and concepts of extension which are based on an inappropriate model of adoption, which fail to deal satisfactorily with environmental issues. Although some extension agencies have attempted to change the basis of extension (as in the adoption of Landcare and other group extension approaches), agricultural research groups still persist with the condescending notion that recalcitrant farmers fail to do what is best for them and for the environment. Such patronising attitudes displayed by agricultural research groups, and occasionally by extension agents, are the result of a failure to appreciate the issues at the farm level.

Given the environmental imperative, agricultural extension must be considered a policy instrument, but it is also likely that because the greatest potential for change in environmental management appears to be change of the farming subculture or style of farming, that group extension and other approaches that promote shared learning such as contained within Agricultural Knowledge and Information System approaches, will be most appropriate.

Many of farmers' criticisms of environmental management practices, but also of commercial innovations, rest on the inappropriateness of those practices. This clearly

suggests that agricultural research is out of touch with farmers, and extension agencies which naively promote the products of agricultural research are failing in their duty to service all farmers, a duty made more important with the environmental imperative.

Further social research into the processes that facilitate adoption, especially of environmentally sustainable techniques and strategies, needs to be undertaken. New extension models which incorporate farmer concerns need to be developed. We may even see, as agricultural science and extension are reconstructed, the 'laggards' of the past become the innovators of the future (see Flora, 1992), at least in terms of environmental management. The task is not to speed up the transfer of knowledge that is already known (that will contain the biases of traditional science), it is to overcome the partial ideological nature of existing thinking in agricultural science (see Kloppenburg, 1992).

This task will not be easy. Consideration also needs to be given to the wider structural issues affecting farmers and which farmers themselves may not be aware (Buttel et al., 1990; Lawrence, 1987; Lawrence and Vanclay, 1992; Lawrence and Vanclay, 1994; Vanclay, 1992a; Vanclay and Lawrence, 1993). Finally, extension practices which seek to achieve involvement of farmers but which fail to address these structural issues and fail to deal adequately with group processes (see Chamala and Mortiss, 1990), farmer subculture (Vanclay, 1992a), the influence of rural elites (Gray, 1991a; Gray, 1992) and the power of agrarian ideology (Gray, 1991b) will ultimately founder.

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PAPER 6:

Important Aspects of Traditional Extension

Frank Vanclay

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Abstract

In Australia, and many other countries, extension agencies are moving away from traditional models of extension and adopting group extension approaches (Landcare in Australia¹), and are embracing some of the concepts of bottom-up extension. At the same time, financial constraint due to government economic rationalist policies, has meant that the new methods of extension are being adopted more because of their potential efficiency in terms of the agency's agenda and budget, rather than because of their effectiveness in promoting adoption of new technology and management among farmers generally. Agencies are also segmenting their client base, and addressing themselves more to the so-called 'top-end' commercially oriented farmers who readily accept the advice of the agencies and are innovative with respect to new technologies and management styles. Many extension activities are being privatised, or subject to 'user-pays' charges. This paper argues that the environmental crisis brings with it an environmental imperative that gives extension agencies renewed importance in assisting farmers. Furthermore, it is argued that while the criticisms of traditional extension are generally accepted, the fundamental basis of extension was that it was a free service to all farmers, and the importance of this in terms of environmental problems has been overlooked by the critics of extension.

see Campbell (1989, 1990, 1991a, 1991b, 1992a, 1992b, 1992c), Campbell and Junor (1992), Chamala and Mortiss (1990), Lockie (1993), Oates and Campbell (1992), Roberts (1990), Woodhill (1991).

INTRODUCTION

Traditional publicly funded agricultural extension has been severely criticised in recent times (Buttel et al., 1990; Kloppenburg, 1991; Vanclay and Lawrence, in press) and support for such extension is virtually non-existant. Furthermore, agricultural extension itself is in a period of crises: a financial crisis where governments are reducing funding to extension agencies; an effectiveness crisis in that extension does not appear to be successful in promoting adoption particularly of environmental innovations; a legitimation crisis in that farmers do not believe that extension agencies are useful; and a theoretical or paradigmatic crisis in that, particularly in the USA and Australia, but less so in Europe, the rejection of traditional models of extension and of adoption behaviour has left a theoretical void as there are not sufficiently well developed theories that are widely accepted to take their place. While in Australia there is an ideological commitment to group extension, and to some extent bottom-up models of extension, by extension agencies and extensionists, this is largely a matter of faith and not on the basis of an objective analysis of the effectiveness of these models. These crises of extension are simultaneous and interdependent.

At the same time as there has been a growing realisation that traditional extension methods have not been sufficiently effective in promoting adoption of new management practices and technologies, particularly those relating to environmental concerns, there has been an increasing need for extension because of accumulating environmental problems (Lawrence and Vanclay, 1992). Furthermore, the terms of trade for agriculture are such that farm incomes are falling, and net farm income after depreciation may often be negative — thus farmers can ill-afford to invest in new technology, or take risks with unknown techniques. Further still, government economic policies require constraints on public spending, and a prevailing air of economic rationalism and 'user-pays' philosophies means that government support for agriculture and for agricultural extension activities is declining.

The response of extension agencies to this crisis in agriculture is to adopt one of, or elements of, three strategies: to segment their client base and deal only with so-called top-end farmers; to move towards a group extension process partly embracing a bottom-up approach; or by adopting a private sector philosophy and moving towards user pays services.

These new strategies also have their problems, and before traditional extension methods, theory, and structures are abandoned, ignored or subverted, it is necessary to reconsider

what aspects of traditional extension ought be retained by extension as extension moves into the next century.

THE FAILURE OF TRADITIONAL EXTENSION

Traditional extension methods have only had limited success in promoting the widespread adoption of new management practices and technology. The characteristics of technologies that were readily adopted have been widely studied and identified. In general, technologies that were: add-on; commensurate with other farm activities; clearly profitable; did not require substantial capital (financial and intellectual) outlay; involved little risk; did not require a major change to farm management; were simple; could be adopted in parts; were widely and uniformly supported by extension agencies, other farmers and farm literature; did not reduce farm flexibility; and so on, were more likely to be adopted (Vanclay, 1992a, 1992d; Buttel et al., 1990). Many production oriented practices clearly fitted the description of innovations likely to be adopted. Conservation practices, however, tend to be very different and are less likely to be adopted. Such adoption or non-adoption according to these criteria is rational (Vanclay, 1992a; Vanclay and Lawrence, in press). However, these factors do not explain the full extent of the reasons of non adoption.

Traditionally, extension has been an individual activity, with individual extension officers attempting to change the behaviour of individual farmers. Farming subculture meant that there was reluctance to the idea of change, and only maverick entrepreneurial or innovative farmers were prepared to take a chance with new technology (Vanclay, 1992a). Although real differences between extension officers and farmers may be slight (Earle et al., 1981), real and imagined differences were exacerbated within the subculture of both groups, and consequent stereotyping of each other led to negative attitudes not conducive to the respect required for effective extension. Amongst extension services, a patronising attitude towards farmers existed and continues to exist. This attitude accords no respect for the knowledge and experience farmers possess. Further, within this polarised duality, farmers too do not understand the role of extension and of agricultural research, and tend to see extension advice as not practical. In such an environment of mutual distrust, there is little productive interchange of ideas.

With no social science training, extension officers are ill prepared for their job. Typically they have no understanding of farmer decision making processes. They also have a reified notion about how science is done, and of their own role. Extension officers

assume that farmer decision making, their own, and that of scientists, is based on a logical calculation of risks, costs and benefits. Not only is there is no provision within this view that there might be varying weightings put to different components in the equation (decision making process) by different groups, there is a complete refusal to accept that farmer decision making — and their own — may be based on more nebulous processes such as what is subculturally acceptable (although not necessarily a conscious process) and what 'feels right'. I believe that farmer decision making is largely on the basis on what they believe is 'good farm management' within the framework they have adopted for themselves – what might otherwise be called farming styles.

There is a personal psychological dimension to farmer resistance as well. Farmers are much older than extension officers. They have had many extension officers telling them other things in the past. Each time the extension officer has promised, that the practice being promoted was all that was required to be effective farmer. Farmers are therefore justified in being a little sceptical of what individual extension officers promote.

The patronising nature of traditional extension partly accounts for why traditional extension methods have not been successful in enticing farmers to adopt new technology and management practices. However, the failure of adoption was also due to farmer assessment that the new technology and management practices were not practical, appropriate or desirable.

In Australia, surveys of farmer concerns about agricultural extension, reveal that the second most important concern is the lack of practicality of the advice being provided, after declining funding. It is important to note, that although farmers may be quite critical of extension services, they are still strongly in favour of keeping them.

THE IMPORTANCE OF AN ENVIRONMENTAL IMPERATIVE

Non-adoption of commercial innovations was inconsequential. Perhaps it meant that individual farmers would be financially disadvantaged, but since adoption was regarded as an individual decision, the consequences of non-adoption were largely individual. At the aggregate level, governments were keen to promote new practices because of the national benefits to be gained from enhanced production. If the goal of extension is to maximise national production, strategies that determine the optimal efficiency of extension effort are acceptable, although there still be may equity concerns.

Environmental concerns, however, add a new dimension to this consideration. The effects of non-adoption of environmental practices are borne not only by an individual farmer but more so by other people: other farmers, downstream users; people who share the catchment; and future generations. Since agricultural land is, ultimately, a non-replenishable resource — one that is being continually diminished by urban expansion — the whole nation suffers as the resource base declines through environmental degradation and through loss of agricultural land to non-farm use.

Salinity is a major problem affecting land users and downstream water users. Increasing soil acidity reduces the productive potential of the land in the future. Erosion leads to a loss of the productive resource and downstream, and downwind, siltation problems. Nutrient decline and soil structure decline lead to irreversible damage to the resource. Erosion and the leaching of excessively applied fertilisers and pesticides lead to water quality problems, particularly eutrophication of waterways and toxic blue-green algae blooms. Overgrazing and the activities of introduced species such as rabbits, goats, and donkeys lead to accelerated erosion. Activities of other feral animals, particularly cats, have a major effect on wildlife reserves.

All these causes of land degradation have long term effects affecting the whole community. Consequently, while extension agencies could be somewhat ambivalent about farmers who did not adopt production related innovations, environmental issues pose a new problem. Non-adopting farmers are not so much threatening their own livelihood, but are affecting the livelihood of the whole of Australia in the future. Thus, governments, agricultural extension agencies and the whole community have an increased responsibility to ensure that widespread adoption of environmental management practices does occur.

THE CRISIS IN AGRICULTURE

Not only is agricultural extension in crisis, agriculture, itself, is in crisis, particularly in Australia and other agriculture dependent economies. Farmers are experiencing reducing terms of trade, in the form of a cost price squeeze, in which most of their input costs are steadily rising in real terms, while the value of their production decreases in accordance with global over-production (Lawrence, 1987; Lawrence and Vanclay, 1992, 1994).

The Australian government's response to economic situation in agriculture was to make the situation even worse for individual farmers by dismantling the trade barriers and eliminating the subsidies that to some extent had protected Australian farmers from the vagaries of the world economy. Competing against farmers of other nations on a so-called 'level playing field' — even though most other nations' farmers are protected by their governments — is supposed to make Australian agriculture more efficient and productive. It is doubtful whether it has been successful in doing this, and it is not certain that it will increase productivity or efficiency in the future. Nevertheless, farmers are experiencing considerably reduced income, and the average net income of Australian farmers in most commodities has been negative. That means that on paper, after deducting all actual costs and allowable expenses for depreciation, they have made a net loss (Lawrence and Vanclay, 1994).

Together with interest rate fluctuations that occurred during the mid to late 1980s, and land speculation that led to fluctuating land values, many farmers became over-committed, with debts far exceeding their realisable assets, and with decreasing commodity prices their ability to service those debts. This situation was also partly due to the careless lending policies of the major banks, partly because of surplus finance capital, but also because of intense competition brought about by government deregulation of the banking industry (Lawrence and Vanclay, 1994).

There has been structural adjustment in Australian agriculture, promoted by a government structural adjustment program designed to assist efficient farmers to remain in agriculture and non-efficient farmers to exit agriculture. It is unlikely that the scheme has been as effective as desired. In general terms, it has penalised young farmers with large debts, or those who expanded before interest rates peaked, and/or who paid artificially high prices for land. In both cases, the very farmers who are likely to be more productive farmers and who responded to the government's call for a more efficient agriculture. Marginal farmers, those who are less productive, survived this crisis because of their adoption of survival strategies, and because of their greater equity in their farm (both because of their age and also of their lack of expansion or purchase of new capital equipment). Consequently, the disappearing middle thesis is again supported.

Another strategy of the government that has had a detrimental impact on farmers has been the privatisation of state monopoly commodity marketing boards. The alleged purpose of this action was to allow differentiation of grades of produce and to allow high quality producers gain full advantage of their better product. Premiums for quality produce were paid by the marketing boards, but it was considered that there would be more differentiation under a deregulated privatised system. Under a new system, it was argued that farmers would be more attune to the market and would respond more

effectively to market demands. A further reason was an economic rationalist naive notion that free enterprise is more efficient than public sector agencies.

Such an economic rationalist philosophy shows a complete misunderstanding of the nature of farmers' interests and abilities. Furthermore, far from being cheaper for farmers, the percentage payment to the marketing agent is now more than what was being charged by the state marketing body. In addition, there is no guarantee that a private commodity agent will handle all the bulk produce harvested by the farmer. Farmers now have to make a variety of decisions based on when to sell their product, usually based on future trading. All in all, it means that farmers must invest considerably more time in the marketing of the produce than they ever had before. In some cases, farmers are illequipped for the social and technical skills they need to undertake this analysis.

All together this crisis in agriculture means that farmers have no disposable income, and are very uncertain about their future. Their adoption of a survival strategy, to minimise input costs, to see them through this crisis, means that adoption of environmental management practices is extremely unlikely. Furthermore, their total concentration is on ensuring their survival, and new management practices and new ideas take second place.

Nonetheless, farmer surveys consistently reveal that farmers are environmentally aware and concerned, and that they have a stewardship ethic (Vanclay, 1992a). Failure to adopt is often because farmers don't personally see themselves at risk, or because they believe the solutions being promoted are impractical. A reliance on voluntary action in this situation will not lead to increased adoption of environmental management practices. If the environmental imperative is to be taken seriously, extension agencies need to take deliberate and considered action.

WHAT IS TRADITIONAL EXTENSION

The position to be put in this paper is that the new approaches in extension are inadequate in dealing with the environmental crisis and that despite the criticisms of traditional extension, aspects of traditional extension may be more useful in dealing with environmental issues. Furthermore, the environmental imperative gives a renewed call to extension agencies to consider seriously their action. In order to argue this point, especially in the light of criticism of traditional extension, some common agreement about what constitutes traditional extension needs to be made.

The criticisms of traditional extension have dwelt on the concept of traditional extension being a scientific research based, largely top-down process about the transfer of information and ideas, based on social-psychological model of individual decision making and economic or formal rationality of actors (Buttel et al., 1990; Vanclay and Lawrence, in press).

While I accept that this is the nature of extension in the past and have criticised the limitations of this position (Vanclay, 1992d; Vanclay and Lawrence, in press), to me, the essential feature of traditional extension was that it was a government provided free service to all farmers. Although it may have failed to service all farmers this was not a fault of the fundamental concept but of the way it was operationalised.

MAJOR DEFICIENCIES OF EXTENSION PRACTICES IN THE PAST

There are five major criticisms that can be levelled at extension agencies (cf Buttel et al., 1990; Vanclay, 1992d; Vanclay and Lawrence, in press).

First, extension agencies have uncritically, even unquestionably, accepted the products of agricultural science research (innovations) as improvements (Fliegel and van Es, 1983) and have taken 'a promotional posture toward technological change' (Buttel et al., 1990:46-7). Extension has identified its task to promote new information and management practices to farmers without considering the appropriateness of this technology to farmers. Kloppenburg (1991) argues that extension has become the handmaiden of the scientific-industrial agribusiness complex in that it accepted that all farming problems could be overcome by the continued application of conventional science. Even when it was perceived that science had caused the problems, the solution was more science.

Secondly, this uncritical acceptance by extension has resulted in considerable social (Hightower, 1973; Röling et al., 1976; Goss, 1979; Hadwiger, 1982; Lowe et al., 1990) and ecological (Stockdale, 1977; Clark and Lowe, 1992) impacts as a result of the technological change fostered by extension. The adoption/diffusion model itself ignores many of the important social issues such as the unequal distribution of impacts and benefits of the technology (Goss, 1979; Röling et al., 1976). The service provided by the extension agencies reaches, differentially, the better educated and more economically powerful farmers.

Thirdly, the adoption diffusion model only applies to production innovations and not to the adoption of conservation technology. Despite establishing that the correlates of adoption for environmental innovation are different from those for commercial innovation (Pampel and van Es, 1977; Taylor and Miller, 1978), extension has not, until recently, criticized the fundamental basis of its existence or its commitment to the adoption diffusion model. A serious implication of this failure to perceive this difference is suggested by Buttel et al. (1990) who claim that by this approach, rural sociology (as a discipline) supports, in a narrow way, voluntarist (non-regulatory) approaches to resource management and cannot support alternative positions such as regulatory approaches simply because the model assumes that adoption will always eventually occur.

Fourthly, farmers' local 'indigenous technical knowledge' has been marginalized, trivialized, subordinated and ignored by the 'techno-strategic discourse' that has dominated agriculture (Kloppenburg, 1991). Traditional extension has assumed that farmers had nothing to contribute to the discussion about what was needed in agricultural technical development. Given the hegemony of technocratic discourse, those adopting were seen as 'innovators' and held in high regard, while those not adopting (and/or rejecting) new technologies were labelled as 'laggards' and viewed disparagingly. In this way the knowledge and skills of the latter group were marginalized and discredited.

Finally, the social, political and cultural context of agriculture and of adoption behaviour has been ignored. Adoption is seen as an individual decision based on formal rationality, while the structure of agriculture itself is taken to be independent of any social or political context.

In addition to these five general criticisms it is apparent that the classical adoption/diffusion model has other faults. Adoption does not always occur according to the predicted distribution. In practice, the shape of the cumulative adoption curve, or the frequency/time curve varies considerably (Buttel et al., 1990). Adoption does not necessarily follow the suggested stages from awareness through knowledge, trial and adoption. Particularly with environmental innovations, it is not always possible to trial the new technologies since the new technologies tend to be indivisible and therefore cannot be adopted in part. Farmers are therefore, not surprisingly, cautious about committing themselves to complete adoption of management practices that they have not trialed. The classical model assumes that awareness and knowledge will always filter through to all sections of the farming community -- but this is not necessarily the case.

Even with a concerted awareness-raising campaign, knowledge of an innovation does not permeate to all groups. Farmers utilize a range of information sources and different farmers have different information sources. Furthermore, awareness and knowledge do not always lead to adoption. In some cases, particularly with environmental innovations, awareness and knowledge may be held by farmers, but because of other factors affecting the decision making process, adoption does not occur. In the traditional model of extension these are known as the barriers to adoption. Sometimes the knowledge basis necessary for adoption is held by farmers but rejected by them -- often for good reason -- because the knowledge basis defies the farmers' notion of common sense and historical experience (see Barr and Cary, 1992, Cary and Barr, 1992).

CHANGES TAKING PLACE TO EXTENSION

Agricultural extension is in a period of crisis which can be identified as having several forms:

- a financial crisis where governments are reducing funding to extension agencies;
- an effectiveness crisis in that extension does not appear to be successful in promoting adoption particularly of environmental innovations;
- a legitimation crisis in that farmers do not believe that extension agencies are useful;
- a theoretical or paradigmatic crisis in that, particularly in the USA and Australia, but less so in Europe, the rejection of traditional models of extension and of adoption behaviour has left a theoretical void as there are not sufficiently well developed theories that are widely accepted to take their place.

This crisis is manifested not only in reduced extension services to farmers, but also in the reduced funding to landgrant universities in the USA, the closure or reduction in the size of university departments of extension and rural sociology, or the change of name of these departments as they try to gain a new identity.

In response to these crises in extension, particularly as a result of the financial crisis, extension agencies are adopting one of, or elements of, three strategies: client segmentation, privatisation, and the adoption of group extension and bottom-up approaches.

Problems With The Segmentation Approach

One strategy being employed by extension agencies suffering from reduced funding is to segment their client base. Extension agencies are all too aware of their limited success in promoting the adoption of new technology. They believe that so-called top-end farmers are better farmers, and that these farmers are the farmers who tend to adopt new technology. They consider that they achieve maximum benefit from their scarce financial resources by concentrating on those farmers whom they believe will adopt new ideas.

Segmentation is not a strategy of targeting. Targeting accepts that there are different client groups that have different interests, and that extension needs to address each group individually. Segmentation is a principle that only top-end farmers need be considered. Extension agencies feel that they are further justified in this approach by using an 80/20 (or 70/30) split; ie 80 percent of the output is produced by the top 20 percent of farmers using 80 percent of the land. These figures are probably not correct, but the general concept is most likely true.

However, while it is generally accepted that top-end farmers are more likely to be adopters, of commercial innovations at least, this may be because extension services have not adequately addressed the needs of the non-adopters. Under traditional models of extension, extension agencies often only dealt with top-end farmers for a wide variety of self-satisfying reasons (see Röling, 1988). Such a strategy was legitimatized by the belief that new ideas would eventual trickle-down or diffuse to all sections of the farming community, 'even while you sleep' (Röling, 1988). While such a view may have been naive and self-serving, at least there was still the assumption that eventually all farmers would benefit. Under the segmentation approach, there is no longer such a belief, extension specifically addresses itself solely to top-end farmers.

The strategy of segmentation is arguably acceptable when concern is about the promotion of commercial innovations, although it is not clear why the general public should pay for extension which will increase the economic efficiency of the already wealthy top-end farmers. However, when the concern is about environmental management practices, adoption needs to be universal. Because it will not necessarily be obvious to farmers that they have environmental problems, and because the solutions may not be known to farmers, traditional extension is required to reach all farmers.

This is especially the case because extension agencies believe bottom-end farmers to be worse environmental managers than top-end farmers (pers. com. and anecdotal). I do not

believe that this has been adequately established, and furthermore sociological explanations could easily suggest an alternative opposite hypothesis. Bottom-end farmers have a farming-as-a-way-of-life orientation, while top-end farmers have a commercial orientation to farming. Each group is likely only to be interested in conservation only to the extent it is compatible with their orientation. Since many conservation practices are not economical for individual farmers, it is unlikely that top-end farmers will be greatly interested. In Australia, many of the environmental problems have been caused by farmers adopting new high value crops such as sunflowers and cotton, which are much more environmentally damaging than traditional cereal crops. However, farmers who have non-commercial reasons for remaining in farming, are also unlikely to adopt environmental management practices unless they are certain of their importance (Rickson et al., 1987; Vanclay, 1992a). Without extension, many farmers may fail to appreciate the extent, nature and solutions of environmental problems. Bottom-end farmers tend to have the worst land, land that is most prone to erosion, and land that may well be in the recharge zones responsible for causing salinity. Because of the generalised nature of environmental problems, particularly salinity, a concern even for top-end farmers requires a concern about the activities of all farmers in a catchment.

Segmentation of the client base and its justification consequently leads to the ignoring of a large percentage of farmers and this may lead to a sacrificing of the environment.

Problems With The User Pays Approach

Another method adopted by extension agencies is to embrace a user-pays approach to the provision of services. Importantly, user-pays approaches are not extension since it is about providing a commercial service, not about expanding the knowledge base of people. Such strategies lead inevitably to a conflict of interest between the provision of commercial services for income generation for the agency, and between the social objective of encouraging adoption of environmental management practices.

A user-pays approach will implicitly become a segmentation strategy since extension agencies adopting this strategy are more likely to align with top-end farmers who are more likely to make use of their services. This will occur for a variety of reasons. Firstly, farmers will only make use of services that they feel are necessary. The issue of concern is that with many environmental problems, farmers are unlikely to realise that they have a problem. Furthermore, farmers who are suffering from declining incomes see this situation as a temporary, not a permanent situation. Australian farmers are used to

income drops for short periods, due to fluctuating prices, climatic events such as floods and droughts, or plagues of pest species such as rabbits and locusts. In times of low income, Australian farmers adopt survival modes, usually involving reduced inputs. Thus Australian farmers are likely to forego the use of consultants, or the advice of extension agencies if they have to pay for it, in order to reduce their capital expenditure. Furthermore, while farmers generally are in favour of maintaining extension services, they do not necessarily believe everything they are told by the agencies (Vanclay, 1992a; Cary and Barr, 1992; Barr and Cary, 1992). It is my supposition that user pays extension would mean that a great majority of Australian farmers would not utilise the services offered, and to the extent that extension agencies are able to assist in the prevention of land degradation and other environmental problems, this would not occur.

By charging for information, farmers change their attitude towards it. It is quite likely that farmers will cease to share information and ideas that they have individually had to pay for. Where such information relates to issues of national significance, such as environmental issues, the much slower diffusion of the ideas would hamper effective environmental management.

A final concern with user pays approaches is that extension agents lose contact with farmers. This occurs even when the user pays charges are only levied against the production side of extension. Such loss of contact reduces the agency's ability to involve the farmer in environmental matters, as well as alienates individual extension officers from farmers.

There is an ethical dimension to the issue of user pays charges for environmental management. Many environmental problems are generalised, not localised in their benefits. In fact, for some environmental issues, such as salinity, the farmers responsible for causing the problems (creating the accessions to the watertable) are often not those experiencing the problems (experiencing the discharge). Thus in a privatised system of paying for environmental innovations, farmers are unlikely to adopt, ie pay for, those management practices and extension advice unless they personally are experiencing a problem and the benefits are largely local. Furthermore, salinity is not caused by the current management actions of individual farmers, but by the history of landuse, often encouraged by governmental policy decisions requiring the clearing of land. Other environmental problems such as weed control, rabbit control and even erosion control is large catchments are of a similar group nature, and group approaches are desirable.

User pays approaches, at least (partial) cost recovery procedures may be appropriate in situations where an extension agency provides an individual service to an individual farmer that might equally be provided by a commercial consultant, such as the development of farm plans, crop rotations schedules, disease diagnoses, advice about yield improvement, soil testing, advice about fertiliser requirements, and maybe about the implementation of structural works such as contour banks and grassed waterways (although these have a lesser importance in conservation nowadays).

Problems With The Group Extension Approach

Another strategy being adopted by extension agencies is to move towards group extension instead of individual extension. In this strategy, financial constraint is masked by rhetoric about a commitment to self-actualisation, farmer empowerment, and farmer responsibility for setting agendas and finding solutions to their own problems. To some extent, there often does exist some commitment to bottom-up philosophy, although the prevailing force is cost effectiveness rather than because bottom-up extension is truly seen as the most appropriate way to achieve the objective of improving farmer management.

If the motivation for extension agencies to adopt this approach is financial constraint, rather than a commitment to this methodology, group extension and bottom-up approaches are not likely to have sufficient dynamicism and resources to respond adequately to the needs of farmers, even though properly resourced, they may be an effective means of agricultural extension. In Australia, group extension approaches have led to an increased need for individual extension (Department of Primary Industries and Energy), because of their effectiveness in motivating change amongst farmers.

The major problem with this approach is that it relies on farmers to be aware of their own problems. This is not necessarily the case with many environmental problems. Farmers themselves may not be aware of the extent of the environmental problems affecting their land, since many of these processes are invisible and insidious, and farmers may not have any knowledge about how to deal with these problems. Surveys of farmers frequently reveal that although they believe certain environmental problems are serious, they do not personally feel that they have a problem (Rickson et al., 1987; Vanclay, 1992a).

To the extent that group extension is a cynical exercise by government agencies to reduce extension expenditure, further problems will develop. Group extension could increase the demands on extension services for individual extension, since group activities and the heightened awareness brought on by a shared learning experience could result in greater information seeking than was previously the case. This has occurred in Australia (Department of Primary Industries and Energy, 1992). Failure to respond to those needs will result in lost enthusiasm and a waning of farmers' commitment to group extension.

There is also some confusion about what constitutes bottom-up extension. To some, bottom-up extension is any process that involves consideration of farmer concerns. To others, this is not bottom-up extension, since the agency is still firmly in control of the agenda. Complete bottom-up extension is a process that empowers and facilitates farmers to use their own skills to determine what problems affect them (ie to set their own agendas) and to enable farmers to solve their own problems by facilitating the exchange of information and ideas. In this process, the role of extension agents is not extension (since the very word extension implies a top-down process, at least an agency directed process), but of facilitation.

In this complete concept of bottom-up extension, farmers must be free to make mistakes, to falsely diagnose their problems (that is to have differing opinion to the facilitators). In this system, reliance on farmers' local knowledge to solve problems that are new to their experience, such as many environmental problems, is unlikely to be successful. One of the major features of many environmental problems is their insidious nature such that farmers are often not even inclined to recognise them as occurring except after extension damage has been done. While it is possible that many traditional problems may be solved with new extension methods such as bottom-up extension, new problems, particularly environmental problems, are best dealt with traditional extension.

A further problem with group extension, particularly the complete concept of bottom-up extension, is that the groups themselves potentially become manipulated by the social dynamics and vested interests with the groups (Gray, 1992; Leeuwis, 1993a,b; Lockie, 1993; Röling, 1990; Vanclay, 1992a). Quite likely, the more wealthy, more articulate farmers will come to dominate the groups, and therefore the new extension process, the very same farmers who dominated traditional extension.

It may be possible that the use of group extension and other techniques as part of an educational program of top-down extension would be an effective method. The use of

facilitators to encourage solutions to come from within the groups to give the appearance of bottom-up approaches, and thus for farmers to have a greater commitment to the solutions may also be effective. This is somewhere between the completely top-down extension approach, and the completely committed bottom approach, and is somewhat akin to the Dutch notion of extension - voorlichting - holding the light in front of the farmer so that they may find the path for themselves (Röling, 1988).

BENEFITS OF TRADITIONAL EXTENSION

There are two major features of traditional extension that make it fundamentally different to modern extension practices. These are a philosophy that is based on social equity, and, partly because of this equity, the potential to better respond to environmental issues.

Social equity is an important consideration for extension, although increasingly extensionists do not believe so, because agriculture was structured by social, political, cultural, and historical policies. Political and social considerations were often responsible for establishing minimum and maximum farm size, for limiting and promoting farm expansion (by direct regulation, interest rate policies, policies that affect land prices), for encouraging the growth of certain types of crops by subsidisation and market price manipulation.

The farmers being structurally adjusted out of agriculture because of their marginal status, are in many cases not marginal because of their own inability to farm, but because of government policies that determine the size of their farm, the crops that they grow, the prices that their crops achieve, the competitiveness they experience in the market, etc. Those marginal farmers that are being structurally adjusted out of agriculture are those farmers who were firstly structured to be marginal farmers.

Given this perspective, and the social role played by agriculture, equity considerations become increasingly important. However, equity considerations achieve their most importance in considerations of environmental issues. Environmental issues in agriculture, particularly land degradation, gives renewed obligation by the state to intervene. While the extension agencies need not be concerned about non-adoption of commercial innovations, because non-adoption harmed no-one other than individual farmer, except perhaps the export revenue that would be achieve by increased productivity, environmental problems create a situation where extension agencies are obligated, in the interests of the wider public to intervene. I call this an environmental

imperative. Strategies that mean that many farmers are not serviced by extension agencies may mean an increase in environmental problems.

However, extension agencies need to exercise some caution. Many of the environmental problems that have occurred today, have occurred in spite of — some would say because of — farmers' adoption — not non adoption — of the practices that were being promoted in the past. Furthermore, it is possible that marginal farmers, with their increased commitment to farming as a way of life (embodying stewardship), and their lesser concern about commercial and formal rational approaches to farming may be less environmentally damaging than top-end farmers anyway.

FARMER OPINION SURVEYS

In Australia, rapid rural appraisals have been undertaken by individuals committed to bottom-up approaches. Their reports have indicated profound criticism of extension by farmers and these individuals have used these claims to call for the dismantling of extension agencies. However, quantitative sample based surveys have also shown considerable criticism of extension services by farmers, but also a great concern about the potential abolition of extension. According to these surveys, farmers want traditional extension to be maintained even though they have criticisms of it.

CONCLUSION

Traditional extension, especially as it has been practiced by extension agencies in the past, has many faults. There is no doubt that there is no justifiable reason while public funding should continue to support an extension service that does not adequately address the needs of the majority of farmers, and that is only a handmaiden of agribusiness interests. However, to the extent that there is an environmental crisis in agriculture and that creates an environmental imperative for decisive action, extension has a renewed reason for existence. The position being put here is that extension as was practiced was unsatisfactory because of problems in the extension process, however, the fundamental basis of traditional extension, that it was a free service provided to all farmers, has been overlooked by the critics of traditional extension in favour of the obvious characteristics of extension, that it was a patronising top-down service of little relevance.

The environmental crisis gives renewed importance to extension and to be made more relevant to the needs of farmers rather than ignoring them completely; it also requires more resources, not less. Through increased legitimation with farmers, and integration of their concerns, extension can be more effective.

Extension agencies need to appreciate that the failure of extension in terms of lack of adoption is due to the inadequacies of the extension services provided, and not to inadequacies of farmers. Any ignoring of any section of farmers is unethical in terms of the use of public funding, and short sighted in terms of the environmental context.

Care needs to be taken to ensure that the integration of farmers into extension does not mean:

- token representation by a small number of farmers, who invariably are not at all typical of all farmers (heterogeneity not homogeneity is a feature of agriculture)
- the marginalisation from effective participation of farmers who are involved by effecting excluding them from involvement; or
- the bureaucratisation of farmer representatives by the system so that they no longer represent the true needs of farmers, but the bureaucratic goals of the organisation.

Extension agents and rural sociologists have an important role in being the link between extension agencies and farmers. Above all they have obligation to ensure that extension services are for the benefit of, are accessible and useful to, all farmers.

The Sociology of the Australian Agricultural Environment Frank Vanclay

CONCLUSION: SYNTHESIS OF THE PRECEDING PAPERS

Frank Vanclay written for this PhD.

Despite GATT and other attempts to eliminate trade barriers which if successful would undoubtedly benefit Australia, the protectionist policies of the European Economic Community and the United States, together with the economic rationalist policies of the Australian government, have led to a *crisis in Australian agriculture*. This crisis is manifested in reduced incomes to Australian farmers, the majority of who have an after depreciation, net business loss of many thousands of dollars. The crisis is also manifested in decreasing political support for agriculture. The urban population never really supported agriculture anyway. Decreasing government support for agriculture, consistent with its economic rationalist polices in other sectors, has led to the dismantling of protection for Australian agricultural products, the elimination of subsidies, the reduction of government funding for agricultural research and extension services, and the abolition of monopoly marketing boards and guaranteed minimum price schemes (ie the wool floor price). Altogether there has been considerable upheaval in the agricultural sector which has caused enormous uncertainty and structural adjustment in Australian agriculture.

Many farmers have been forced out of agriculture either by banks foreclosing loans, or through government assistance programs to assist the exit of farmers out of agriculture (the Rural Adjustment Scheme). However, it has not always been the marginal farmers who have been forced out of agriculture. The most marginal farmers are often the ones who have no debt and who may have the best strategies for surviving in times of financial crisis, by adopting survivalist means of production in terms of minimising their input costs.

Declining wealth in agriculture, and the rationalisation of government and private sector services has led to a decline in the financial well being of rural towns. Thus starts a

downward spiral of reduction in services to rural peoples which ultimately affects rural people's social well being (Lawrence, 1987; Stone, 1992). All in all, the crisis in agriculture leads to a *rural crisis*. The rural crisis is especially problematic because, as suggested by the *Goldschmidt thesis*, the rural crisis will exist and intensify irrespective of the level of productivity or expansion in agriculture (Goldschmidt, 1947). In Australia, as in the United States, increases in agricultural production are associated with economic and social underdevelopment in rural areas as it leads to reduced employment and population in those areas (Lawrence, 1987; Lawrence, 1990).

Concurrent with this crisis in agriculture there has been a *crisis in agricultural* extension in Australia. This crisis in extension has four components: a fiscal crisis as a response to reduced government funding; an effectiveness crisis because it has been adduced that extension practices are not working with farmers failing to adopt many practices, particularly environmental management practices, that have been promoted; a legitimation crisis in that there have been negative comments of the extension services by farmers; and a theoretical crisis, because in Australian extension agencies, largely based on tradition extension thinking have had to reject this traditional model, but have not had a cohesive, coherent and widely accepted other model.

At the same time as this crisis in agriculture and the crisis in extension, there has been a growing *environmental crisis* in Australian agriculture. Many different forms of land degradation are occurring with increasing severity. The extent and scale of these environmental problems are on an unprecedented scale.

The severity of the environmental crisis leads to an *environmental imperative*, a need for effective action to solve the problem of environmental degradation.

Australian agricultural extension agencies have responded to reduced government funding in three ways: by segmentation of the client base and only dealing with top-end farmers, by privatisation and the adoption of user-pays fees for services, and by the adoption of group extension approaches and bottom-up philosophies that reduce the cost of extension services and make farmers responsible for their own problems. While these strategies may or may not be politically acceptable and/or socially desirable, none of these strategies is appropriate for dealing with environmental problems, that is, in the context of an environmental imperative.

In order to protect the environment, the Australian government needs to give renewed consideration to the issue of government intervention. At the moment, Australian

governments are totally committed to the philosophy of economic rationalism, which leads to their abandonment of their responsibility for direct intervention in the economy, which is needed in order to protect society and the environment from the non-market externalities of the production processes.

Other policies, consistent with economic rationalism, have enhanced the entry of multinational corporations into Australian agriculture and into the Australian economy generally. The deregulation of the banking industry, the airlines, the abolition of the monopoly marketing boards, only very limited control on levels of foreign ownership, privatisation and deregulation of telecommunications and the mass media, and so on, have facilitated the entry of transnational corporations into the Australian economy. In agriculture, both upstream and downstream sectors have high levels of foreign ownership. The food processing industries, the manufacturers, distributors and retailers of agricultural inputs and equipment, and the distributors and retailers of agricultural commodities are largely foreign owned. Australia's largest stock and station agents (ie agricultural commodity brokers), Elders (the full name has changed many times, but it has always been Elders something), an icon of Australian agriculture and business, is now owned by ConAgra (a US based multinational). Other Australian icons, including Vegemite, Coon cheese, Akubra hats, Rosella jam, Arnott's biscuits, RM Williams quality country wear, most Australian beers, and many others are all owned by foreign interests. Few Australians would actually be aware of this.

Strategies of the government to enhance the position of the Australian economy and of Australian agriculture have had the opposite of the desired effect. Rather than improve the position of the Australian economy, they have facilitated the entry of foreign national capital, made the Australian economy more dependent on the world market, and linked Australian farmers into global agribusiness. A continuation of these strategies by successive Australian governments can only worsen the situation.

Australia is in the semi-periphery, and together with other nations of the semi-periphery, the process of *peripheralisation of the semi-periphery* can be observed. The position of the Australian economy is so bad that Higgott (1987) claimed that if Australia had been a Spanish speaking nation in Central or South America, it would have been visited by the International Monetary Fund.

Part of this peripheralisation process occurs through agricultural imperialism, a form of environmental imperialism, with the centre nations exporting environmentally unfriendly, low value agricultural production to the periphery and semi-periphery, while

maintaining high value agricultural production and more environmentally friendly agriculture in the centre. Such a strategy not only causes environmental degradation in the periphery and semi-periphery, but restricts the economic potential of those countries as well, as it limits them to the production of low value commodities. Any nation that attempts to enact environmental regulation beyond that which the multinational corporations are prepared to accept will find that the multinational corporation relocate. Molnar (pers. com.) calls this jurisdiction shopping. Thus peripheral and semiperipheral nations, with no economic power, and which are reliant on export earnings, and cannot afford to cross-subsidise are at the mercy of the multi-national corporations. This aspect of *globalisation* can occur in the centre as well, as witnessed by the transfer of the tuna fishery away from the United States to South America, and then later to Asia, in response to US regulations about the use of the purse-seine method in tuna fishing (in which large numbers of dolphins are also caught) (Bonanno and Constance, 1993; Constance et al., 1993). The difference here, though, being that the United States could afford to lose that industry. In the periphery that luxury does not exist. As Bonanno (pers. com.) reports of the wife of a tuna fisherman in Venezuela, 'We are losing our livelihoods to save Flipper'.

In fact, the continuation of production of high value agricultural production in the centre (pork and dairy in the Netherlands) is directly dependent on the production of cheap bulk feed in the periphery (cassava and what ever other bulk protein can be produced and transported cheaply), and therefore is part of the economic exploitation of the periphery.

In Australia (the semi-periphery), beef feedlotting is being undertaken and is expanding, but such activity is highly polluting, and since the feedlots tend to be owned by foreign interests, any profit derived from such value adding activity is exported overseas. Australia is left with the pollution, and with changing labour relations within agriculture as farmers consistently loose autonomy over production decisions on the farm as they are economically forced to enter contractual agreements with feedlot operators and other agribusiness interests.

The financial situation of Australian farmers means that there are very big economic incentives for farmers to exploit the environment, and the characteristics of the environmental problems that farmers are experiencing means that there is very little financial incentive for farmers to adopt more environmentally friendly management practices.

However, in addition to financial barriers to adoption of environmental management practices, there are many other reasons why farmers do not adopt these practices. Many of these reasons can be regarded as being rational or logical from the farmers' point of view.

Fortunately for Australia's environment, farmers are not economically rational actors. No-one is strictly economically rational. Everybody has many non-economic goals and objectives in life including the fulfilment of various social values. The satisfaction of those values, goals and objectives is rational in the sense that it increases individual well-being. Weber refers to this value based rationality as *substantive rationality*, while he refers to economic rationality as *formal rationality*. Thus, while the above political economic analysis sets the general context of the situation of Australian farmers and environmental management, it is not the full story. To understand the full story requires an understanding of how farmers live and make decisions on their own farm with respect to environmental management.

In the Netherlands, Jan Douwe van der Ploeg has reintroduced the concept of farming styles. I have been promoting what is largely the same concept in Australia using the more conventional sociological term, farming subculture. In the United States, there has been much discussion about the orientation of farmers towards farming as a way of life (Yeoman farmers) and commercially oriented farmers (Yankee farmers). All of these approaches accept that it is part of human nature that groups of people develop certain behavioural practices, ways of thinking, and value judgements that are common to that group. In farming subcultures, the subculture of farmers will include behavioural norms about farm management and about environmental management. These can be described as styles of farming.

In Australia, agricultural extension services have been responsible for promoting environmental management for the greater part of this century, and environmental management has been of equal priority as the promotion of production innovations. The two tasks have not always been complementary and this has led to contradictions and tensions within the extension services and between the extension services and farmers. Nevertheless, the combining of the two tasks in the one extension agency is probably a more appropriate and successful strategy than splitting the tasks between agencies. This is now occurring in Australia under the rubric of sustainable agriculture.

The fact that environmental management has historically been a task of extension agencies in Australia means that the environmental crisis in Australia must be partly the

result of the failure of the extension services. However, these extension services attempt to blame farmers for non-adoption of environmental management practices. A more reasoned analysis reveals that the environmental crisis has occurred in spite of (possibly even because of) farmers' adoption - not non-adoption - of the practices that were promoted by the extension agencies.

This presents a paradox for extension. The whole of agricultural extension theory and methodology is predicated on, traditionally, introducing new innovations, and more recently, on seeking the compliance of all farmers with environmental management regulations. Thus, much of the concern of extension services preoccupied with environmental management is with the 'deviant' farmers (the 'laggards' of the new era) who fail to adopt the appropriate environmental management practices. But, the environmental crisis has occurred in Australia as the outcome of the whole agricultural system, and is not the result of a few deviant farmers. Continuing the current trajectory of industrial agriculture, therefore, can only worsen the environmental crisis in agriculture.

Agricultural extension has come under considerable criticism especially for its reliance on, and the limitations of, the top-down, unilinear model of transfer of technology. Extension has also been criticised for uncritically promoting the products of agricultural science research, for being the handmaidens of agribusiness, for marginalising farmers' local knowledge, and for being patronising to farmers. Some people have used these criticisms of extension to argue that extension services ought to be disbanded and that instead, farmers ought to be facilitated to solve their own problems. This is partly the rhetoric of Landcare in Australia.

Despite this rhetoric, it is quite likely that Australian government support for Landcare is predicated on Landcare being cheaper than traditional extension activities (while the government is still seen to be doing something). The added benefit for government, is that because farmers are responsible for determining their own agenda, and for solving their own problems, farmers can always be blamed for any remaining problems, and thus the government can argue, the government has no responsibility for environmental degradation in agriculture.

While farmers are very critical of traditional extension services, they are also very supportive of these services. Farmers' complaints that the advice given is not practical enough, that the recommendations are not cost effective, that the information given is occasionally wrong, that extension officers do not spend enough time in the field, or that

they help certain farmers more than other farmers (usually rich farmers over poor farmers), and so on, do not provide evidence that farmers do not want these services to exist, they are only evidence that farmers have certain concerns about the delivery and implementation of extension services. Farmer surveys consistently reveal considerable concern about the reduction of funding to extension services and about the reduction in services.

Farmer support for traditional extension (on-farm visits, field days and literature) does not restrict their support for new approaches to extension such as group extension. Australian farmers are very supportive of Landcare, for example. There are many benefits to Landcare, but Landcare should not be seen as an alternative to traditional extension, rather as a complementary technique. Landcare has increased farmers' awareness of certain issues, especially environmental issues, and this has led to an increased utilisation of traditional extension services. In any situation where Landcare increases farmers' motivation for information and awareness about environmental problems, but farmers are still reliant on traditional extension services to implement environmental management practices, and those services are not provided, than Landcare will only serve to alienate and frustrate farmers. Furthermore, if appropriate safeguards required in all voluntary associations are not implemented within Landcare groups to ensure the long term survival of Landcare, then Landcare may only be a short lived experiment.

Given the above analysis, there exists a complex problem: an environmental crisis of unprecedented proportion; an economic situation in which farmers and the government have limited resources to invest in environmental management; and a government committed to economic rationalist de-regulationist ideology, the result of which is a reduction in agricultural extension services. Continued environmental degradation can be the only outcome of this situation. This thesis has sought to explain this situation but has fallen short of providing any solutions. It is not likely that any solution exists without a major change in government philosophy. It is impossible to see how a continued commitment to deregulation and to completely market-based approaches, together with the mass entry of foreign multinational capital and control in the Australian economy, and in the context of this discussion into agriculture, which is facilitated by this philosophy, can do anything else but hamper environmental management and contribute to continuing and exacerbating environmental degradation in agriculture.

It must be acknowledged that, especially in Australia, agriculture is socially and politically constructed. The structure of Australian agriculture has been totally

determined by government policies that have determined: which areas where available for agriculture; the size of holdings; the types of crops that can be grown; the amount of expansion that can take place, and so on. Given this situation it follows that the farmers who are currently being structured out of agriculture are not marginal because of their inability to farm, but were structured to be marginal in the first place. Social and environmental considerations mean that a greater concern for the welfare of farmers is needed. This can only be achieved by reversing government policy and commitment to economic rationalism.

The Sociology of the Australian Agricultural Environment Frank Vanclay

FINALE:

An attempt to locate my own position within Extension Science and Rural Sociology theory

Frank Vanclay written for this PhD.

INTRODUCTION

The papers in this PhD have covered a broad range of levels from macro political economy to farmer decision making processes and farming subculture (farming styles). While a critical sociological perspective, albeit with a personal flavour, has been maintained throughout, the thesis has not consistently adhered to a single identifiable ideological or theoretical position, largely because of the varying levels of analysis. I consider that the structure of agriculture is shaped by external forces such as government policy, political economic factors relating to market prices, and the entry of multinational corporations. I have argued that agricultural extension agencies have uncritically promoted industrial agribusiness and have delivered farmers into their web of control. However, I also accept that within the limits imposed by these external forces, many other factors contribute to heterogeneity amongst farmers and to farmer decision making processes. In terms of understanding environmental management in agriculture, it is not simply enough to examine the external factors, some account of the internal factors relating to farmer decision making also need to be considered.

The influence of transnational agribusiness is evident in many forms, particularly as described in Papers 1 and 2, and this power is increasing. Structural adjustment, in the form of the exit of farmers out of agriculture, a reduction in the total number of farmers and labourers in agriculture, and an increasing average size of farm, is occurring. The analysis presented, however, is not simply about the role of transnational agribusiness, it is also about the role of the state and of supra-state agencies (EC, NAFTA and GATT), and about other global processes in the world, and their combined effect on the structure of agriculture, especially in Australia. All of these influences, which are external to agriculture have been having massive impacts on agriculture. These impacts are easily

observed and measured and as such are empirically undeniable facts. An understanding of these processes, therefore, is essential to any sociology of agriculture. It has also been demonstrated how these structural influences on agriculture also affect the environment and farmers' ability to effectively manage the environment. However, these are not the only influences or factors that affect the structure of agriculture, the diversity within agriculture, environmental management within agriculture, or the ability of marginal farmers to persist (Bonanno, 1987; Leeuwis, 1989; Mooney, 1987).

The analysis presented in this thesis is original, at least in Australia, especially its attempt to cover both the macro political economy dimensions and aspects relating to individual farmer decision making to provide a comprehensive sociology of the environmental issues in agriculture in Australia. Because of this unique focus, the paucity of social environmental research in Australia¹, and a desire to respond directly to the debate in Australia, the analysis presented in this thesis is rather independent of key aspects of the theoretical debate taking place in Europe, especially, for example, in Wageningen. It is appropriate, therefore, to connect the analysis in this thesis with key aspects of rural sociology and agricultural extension theory in Europe.

The book, Agriculture, Environment and Society, edited by Lawrence, Vanclay and Furze (1992), could be regarded as the first book to introduce sociological analyses into the debate about agriculture and the environment in Australia. Lawrence's (1987) earlier book, Capitalism and the Countryside, dealt with structural issues in agriculture. There are very few (ie less than 10) Australian rural sociologists (as defined by membership in an organisation with an interest in rural, agrarian or environmental sociology). There are a number of centres for research into these issues, but they each have their own flavour. The most sociologically oriented centre would have to be my own institution, the Centre for Rural Social Research at Charles Sturt University in Wagga Wagga (primarily critical sociological and political economic approaches, but with a large number of members with varying positions). Other centres are smaller and do not adopt an explicit sociological approach, and include (not in any particular order); the University of Western Sydney - Hawkesbury (Sydney) (farmer first, participative action research, systems agriculture, social ecology); the Institute for Applied Environmental Research and Division of Environmental Sciences at Griffith University (Brisbane) (interdisciplinary environmental studies); the Centre for Resource and Environmental Studies at the Australian National University (Canberra) (resource economics); the new extension research centre at Gatton College of the University of Queensland and that university's Department of Agriculture (Gatton and Brisbane) (participative action research and traditional extension); and the School of Agriculture and Forestry at the University of Melbourne (social psychological analysis of extension science). With the appointment of Geoff Lawrence as the Professor of Sociology at the University of Central Queensland, it is likely that that University will become influential as well. Hawkesbury has been particularly innovative within Australia and the world (see Röling, 1993b) and deserves special mention. The Hawkesbury approach is not sociological, however, and they are not particularly guided by sociological thinking, much, I would say, to their detriment. Their support for participative action research, soft systems analysis, bottom-up approaches, and local knowledge does put them somewhat at odds with the position adopted in this thesis (see Bawden, 1989; Martin, 1991; Martin et al., 1992; Packham et al., 1988; Packham et al., 1989; Russell et al., 1989; Woodhill, 1991).

WHAT IS EXTENSION SCIENCE

A combination of factors in society — such as the need to increase agricultural production, reduce land degradation, a concern about the health effects of tobacco or of high levels of alcohol consumption, the spread of Acquired Immune Deficiency Syndrome, and the dangers of drink driving, a concern to reduce (urban) people's energy consumption or environmental-related behaviours, a desire to promote awareness of certain social problems such as sexual harassment or domestic violence — have led to the perceived need for efforts to change people's behaviour through processes of communication (Röling, 1985, 1988). Thus 'extension' can be defined as: 'a professional communication intervention deployed by an institution to induce change in voluntary behaviours with a presumed public or collective utility' (Röling 1988, 49). This is what constitutes 'extension' — in the Netherlands, at least, where this activity is termed 'voorlichting', which is variously translated as extension, outreach, information, public relations, public awareness, advertising, or media liaison.

For the Dutch, it is obvious that these various activities have a common element and that they collectively would benefit from theoretical and practical insight. Such insight is provided by an academic social scientific discipline they term 'voorlichtingskunde'. An English translation of the precise meaning of this term is difficult to provide because in English, 'extension science' has a much more constrained meaning than implied by the Dutch term. The Dutch term would include not only the English concept of extension science, but also aspects of the English concepts of communication studies, psychology, sociology, anthropology and development studies, all rolled up together into one more or less coherent academic social science discipline. This is why the Vakgroep Voorlichtingskunde has recently changed its English name from the 'Department of Extension Science' to the 'Department of Communication and Innovation Studies'.

The discipline and activity of voorlichtingskunde not only have an overarching theoretical position, they sometimes specifically addresses certain domains of inquiry, such as:

- agricultural extension (landbouwvoorlichting);
- health extension (gezondheidvoorlichting);
- information about government policies (politiekevoorlichting);
- consumer information (consumentenyoorlichting);
- · environmental awareness (milieuvoorlichting);
- energy conservation (voorlichting over energieverbruik);

- sex education (voorlichting op sexueelgebied), for example the promotion of safe sex (veilig vrijen);
- information about the dangers of tobacco and drugs (voorlichting over gevaren van roken en drugs);
- road safety education (verkeersvoorlichting);
- careers information (beroepsvoorlichting).

In addition, the media liaison activities of the different levels of government are undertaken by publicity offices called extension services (rijk, provincie, en gemeente voorlichtingsdiensten).

In English, the word 'extension' has many different meanings depending on the context of use. In academic circles in Australia, 'extension' means 'agricultural extension', and 'extension science' means the 'study of agricultural extension', and usually is constrained to the study of techniques and is very technical in orientation, and only found within Departments of Agriculture within the universities. The people who teach extension might also teach crop science or plant pathology. Extension is certainly not regarded as being a social science discipline. This has serious implications for the theoretical exposure and experiences that people researching extension have, and as a result of this, the training provided to the students of these people.

The different conceptualisation of extension in The Netherlands means that the theoretical positions developed are very different to that found in English speaking countries, particularly in Australia, which tends to be very atheoretical.

If one is to persist with the English terms, it is necessary to be clear on the meanings of these terms. Extension Science is 'the body of knowledge which accumulates experience and research findings with respect to extension, and borrows insights from other disciplines and fields of endeavour which seem pertinent to extension'. This discipline 'seeks to help extension professionals improve their work' (Röling, 1988: 20). Extension is what is done by extension professionals (extension agents, extension officers) who work for extension agencies, while extension practice is the range of techniques and practices used in the undertaking of extension activities.

Because extension science is the (academic) discipline and concerns theoretical and practical overviews in the field of extension, while extension practice is what is actually done, a huge gulf can exist between the theories and perspectives held by the theorists (extension scientists) and those held by the practitioners in the field (extension agents).

This is the case throughout the world. In Australia and other English speaking countries, however, because the discipline is conceived differently to the discipline in The Netherlands, the discipline itself is starved of theoretical insights. In The Netherlands, extension science involves many disciplines, and therefore agricultural extension science and practice have come to reflect the benefits of the knowledge of these other disciplines. The integration or use of extension practice in development studies and aid programs to non-western countries has meant that extension science has had to incorporate anthropology and development studies as well. This has had a significant impact of the discipline in The Netherlands.

THE CHANGING NATURE OF (AGRICULTURAL) EXTENSION SCIENCE

Agricultural extension science (in Europe) has undergone a considerable change in thinking about its orientation to farmers (Röling, 1988; Leeuwis, 1993b). The first concern for extension was: 'how do we get farmers to adopt new technology', with extension science focussing on the theories and techniques of the diffusion of innovations and on adoption behaviour, ie the adoption diffusion model, also called the diffusion of innovations model (eg Rogers, 1962; Rogers and Shoemaker, 1971; Rogers, 1983). In the Netherlands, this tradition was explicated by van den Ban (1963) (Röling, 1988).

The failure of extension (ie slow rates of adoption of new technologies, and social inequalities as a result to differential adoption rates) that occurred under this model led to the questions: 'why don't farmers do as they are told' and 'why don't farmers adopt the new technologies'. The perceived solutions to these problems were found in traditional extension thinking by better targeting of extension efforts both to the specific audience and fine-tuning of the message, market research, greater client interaction, and increased effectiveness of extension agencies (van den Ban and Hawkins, 1988; Kotler, 1975) (see Röling, 1988; Röling and Engel, 1990, 1991; Leeuwis, 1993b; Vanclay and Lawrence, in press). However, the orientation was still on the top-down transfer of technology from scientific research to farmer via the extension agency, with agricultural extension being defined, rather naively, as help for farmers (van den Ban and Hawkins, 1988). This is still largely the position of the extension agencies in Australia and I suspect in the United States also. The text book of van den Ban and Hawkins (1988) was, up to 1993 at least, the most commonly used extension textbook in Australia, and not (only) because Stuart Hawkins is an Australian.

A more reasoned and less partisan analysis of the barriers to adoption inevitably leads to a discussion about farmer rationality and reveals that non-adoption is logical from the farmers' point of view given the constraints farmers operate under (Vanclay and Lawrence, in press). In other words, non-adoption may have been due to rural people's opportunities and not to personal individual resistance to change. When the structural opportunities existed for adoption, adoption occurred at great pace, far more rapidly than anthropologists would have predicted (Röling, 1988).

The other important point is that when adoption did occur it was because it either was appropriate to the people adopting the innovations, or because it was adapted in order to be appropriate and to fit in with the local style of farming and local farming subculture. *Adaption* not *adoption* was the actuality of the process of the transfer of technology, but the extension agencies failed to appreciate this, and extension science has only recently begun to address this aspect of the process.

More recently, in Europe, extension scientists have begun to question the applicability of the messages that were being promoted by extension agencies and have started to consider the many factors that contribute to the appropriateness of these messages. Extension was now not seen simply a matter of interactions between agencies and clients, as in the past, it involved many participants and required very broad understanding of the various systems in which farmers operated. Extension science (in Europe), therefore, developed into a complex discipline also focussing on both the *context* in which communication takes place and the *content* of what is being communicated (Leeuwis, 1993b; Röling, 1988). From being concerned about the transfer of technology, extension science (if not extension practice) is now concerned with rural people's 'sense making' activities (Röling, 1992b).

THE THEORETICAL PERSPECTIVES IN AGRICULTURAL EXTENSION SCIENCE

Extension science can be conceived as having a number of theoretical positions. It is difficult to determine the number because the positions are not mutually exclusive and exist at different levels of analysis. Some are not central to extension practice but relate to very specific issues, others are borrowed from other disciplines and are useful in understanding aspects of extension. In general, however, it is appropriate to consider that agricultural extension science consists of three major or core theoretical positions:—Transfer of Technology (ToT), Agricultural Knowledge and Information Systems

(AKIS), and Policy Instrument (PI) approaches — and several important, yet peripheral, related positions that are borrowed from other disciplines. I will specifically identify the following positions as being noteworthy: farming systems research, indigenous technical knowledge approaches, farming styles, and the actor perspective.

The transfer of technology (ToT) model is premised on the model of the diffusion of innovations and the linear transfer of technology, and is common to traditional extension thinking. Few extension scientists would currently accept or subscribe to this position, although it would be widely held amongst extension practitioners in extension agencies. This does not mean that extension scientists believe that the adoption of new innovations does not occur, or that extension agencies ought not be involved in attempts to transfer technology, but rather that the theoretical position that has developed surrounding the transfer of technology is not very useful in understanding all aspects of the process. Diffusion of knowledge and adoption of innovations still takes place, but for different reasons than those posited under the technology transfer model.

The Policy Instrument (PI) perspective which sees agricultural extension activities as one of many policy instruments of the government which must be carefully coordinated was developed by Cees van Woerkum with most references being in Dutch, and those works in English not being particularly good articulations of the position (eg van Woerkum, 1989, 1991, 1992; van Woerkum and van Meegeren, 1990, 1991; te Molder and van Woerkum, 1992). This perspective is not restricted to agriculture and can be regarded as a communication science perspective.

The Agricultural Knowledge and Information Systems (AKIS) perspective was developed by Niels Röling (eg Röling, 1985, 1988, 1992a; Röling and Engel, 1990; Engel, 1990) and considers that farmers operate in complex social and physical systems involving many actors, and therefore an understanding of these systems requires a consideration of the interactions between the actors and agencies in these systems. This position concentrates on the knowledge and information that operates in these systems, and particularly on the linkages between aspects of the systems.

There is a fairly fundamental difference in how these latter two positions conceive of the role of extension agencies. In the AKIS perspective, extension has 'a facilitating function in processes of joint social learning, and thereby in the development of higher quality collective agency' (Leeuwis, 1993b: 56), while in the PI perspective, extension is conceptualised as a legitimate persuasive and coercive tool of governments which needs to be carefully coordinated with other policy instruments, policies and communication

(or extension) strategies to achieve an effective result. Such a functionalist view of extension is most obvious in van Woerkum's call for the Dutch government to establish 'a government agency, specifically equipped to act as a policy-supporting communication unit' (van Woerkum, 1989: 13) and which has 'a lot of expertise on (sic) communication strategies (van Woerkum, 1992: 46), what is, in effect, and in other words, a Department of Government Propaganda. The totalitarian Orwellian overtones in such a proposal are a little disconcerting.²

The AKIS perspective is implicitly multi-directional with respect to knowledge and information transfer, and is about promoting learning on all sides. The PI approach is top-down, with market research being used by the extension agency only in order to better target the message. The PI approach is more sophisticated than traditional extension, but is not fundamentally different in philosophy or ideology, whereas the philosophical or ideological base of the AKIS perspective is quite different to traditional extension.

The AKIS perspective, being based on development extension experiences in non-western countries, accepts that the client groups may often have considerable knowledge and experience, and may in fact have the answers to their own problems if the appropriate context for discussion of these problems occurs. The task of extension agencies then is to facilitate discussion of these issues. The position recognises that multiple actors and therefore cannot look at the extension agency client interaction in isolation from the complex social setting. Because of the recognition of multiple actors, there is no inherent validity to any one point of view; knowledge must be negotiated. They therefore adopt Checkland's (1981) soft systems methodology. It is also accepted that different actors have different levels of power and that in order to create an effective negotiation arena, farmers must be accorded with 'countervailing power' (Röling, 1988).

At the extreme, there are problems with both perspectives. The persuasive communication strategy of the PI approach rests on the total acceptance of the legitimacy of the government view of the world, and the complete denial that farmers generate knowledge (see van Woerkum, 1992). The position tends to exaggerate the effectiveness of extension in changing behaviour, and is overly mechanistic and simplistic in its understanding of the knowledge creation and transfer process.

I have been advised by several Dutch speaking people that van Woerkum's calls for such a unit are not as strong in his Dutch papers, and that his position in his Dutch papers is supported by many caveats to ensure the democratic basis of such a position, which might reduce my concerns about his position. Nevertheless, the proposals in his papers in English, taken literally, are of considerable concern.

Also at the extreme, AKIS approaches are internally inconsistent for extension: if farmers have so much knowledge already, why is it that they need help? From a critical perspective, AKIS approaches are naive, not because they fail to appreciate that different actors have different levels of power in the negotiating process and therefore in who sets the agenda (because they do recognise this point), but because they consider that such imbalances can be corrected by countervailing power, a concept which is not satisfactorily defined nor is the implementation of such a concept adequately described. Groups and group processes are likely to continue to manifest traditional power relationships (Vanclay, 1992a; Gray, 1992). Furthermore, because of the concentration on knowledge and information, and even with the emphasis on the linkages between components of the system, the position tends to ignore the structural environment in which farmers operate³.

If the difference between the two perspectives is in terms of coercion versus learning facilitation, and a mutually exclusive dichotomy is erected, then at any time extension is used for planned intervention or for persuasive communication such as in extension agencies promoting the adoption of environmentally sound management practices, then a PI position must be taken. This is not particularly satisfactory because the other aspects of the PI position are not necessarily appealing, and there is much merit in aspects of the AKIS perspective. However, AKIS and PI perspectives should be conceived as being polar opposite ideal types along a continuum, rather than as mutually exclusive dichotomous categories.

It is clear that agricultural extension agencies are in the business of changing behaviour. Even Röling (1988) accepts that extension fulfils a social purpose and is 'planned change'. Therefore, definitions that see extension simply as help for farmers (eg van den Ban and Hawkins, 1988) are either naive or deliberately misleading about the functional or instrumental value of extension. Leeuwis (1993: 59) considers that these definitions are naive, but that they "have been quite helpful in mystifying this clearly instrumental aspect" of extension.

It should be noted that such an extreme view of the AKIS position is not Röling's position. Röling (1993c, pers com) accepts that AKIS take place within a policy context. Röling considers that in most situations too much attention is paid to the policy context and not enough to the knowledge and information systems that operate, thus more attention needs to be focussed at the AKIS. Such a position does not mean that the policy context, or the structural situation, is not also important. Röling also argues that AKIS will only work well when there is a shared problem appreciation and a commitment to common goals. However, he argues that farmers' concern for the future of farming and the environment is likely to create a recognition of an interdependence that will form the basis of such a shared problem appreciation.

Extension will always be coercive if it is undertaken by the state. It is better to appreciate that point and negotiate about the content of the message than to naively assume that extension is not coercive. Even voluntary associations or non-government organisations which are engaged in extension have hidden agendas, which sometimes may conflict with the client groups' agendas. At the very least, all associations and organisations want to survive, and in a true bottom-up AKIS concept, this survival notion conflicts with the position that the client group should be facilitated so that it becomes self-reliant and no longer dependent on the organisation.

I have argued that the environmental crisis within agriculture creates an environmental imperative giving extension agencies a new mandate for action to attempt to change farmers' environmental management strategies. Furthermore, the nature of the environmental problems and the social and political construction of agriculture means that governments have an obligation to assist farmers to undertake a change to new management practices. I also argue that some environmental problems have not been previously experienced by farmers, that the signs and symptoms of these problems can easily be falsely attributed to other problems, and that there is nothing inherently special about the experience or background of farmers that will mean that they have a substantial amount to contribute to new knowledge about these problems. It is appropriate therefore that scientific research agencies consider the causes and potential solutions to these problems and seek assistance in promoting the use of new management practices amongst farmers.

Overall, I accept that there is a responsibility to assist in the change of farmers' behaviour. I also accept that such behaviour change is a difficult task, and will require a blend of approaches, a mixture of policy instruments, potentially including persuasive communication, media campaigns, subsidies, incentives and cross-compliance mechanisms, as well as direct regulation. The achievement of this task will require careful coordination of instruments, as well as coordination with other policy objectives of the government. This is very much the PI perspective.

However, I accept that facilitating farmers to develop an increased awareness about environmental management and success in changing their behaviour, will be more likely to occur if they are personally committed to such change and feel that they have 'ownership' of the problem and the solution. Thus understanding the knowledge and information systems that farmers operate in, and appreciating the difficulties in which farmers operate, not only in order to better target the message, but also to show genuine concern for the social well-being of this group of people, may well result in greater

compliance than other methods. In other words, AKIS approaches and related methodologies are some of the policy instruments available to government and extension agencies in the promotion of effective environmental management.

This position is a little different to the usual AKIS position which would not have such a specific agenda in relation to the role of facilitation. In AKIS approaches, the usual procedure or view is to facilitate a discussion that leads to a situation of a desirable outcome under circumstances where the outcome is not preconceived. Such a position is premised on the notion that farmers have worthwhile knowledge and potential solutions to contribute to the debate. This is a desirable and ethically and ideologically sound position. However, it is not a position that is totally applicable in the case of environmental management in Australia.

The environmental problems facing Australian farmers are problems that are largely outside of farmers' experience, and in many cases, farmers deny the existence of these problems. Consequently, farmers have no specific knowledge that relates to these problems and no specific solutions to these problems. Agricultural scientists have undertaken research and developed new management practices that reduce land degradation which need to be adopted by farmers. The role of extension agencies concerned with environmental management is to promote the use of these practices. By utilising group facilitation approaches, and by subtle manipulation of the issues that are discussed and the information that is provided to the group, group facilitators can 'engineer' a discussion in such a way that farmers arrive at the desired outcome. Such a procedure, because it involves farmers, and the solutions are perceived as deriving from farmers (although the discussion has been staged to force the identification of the solution), is likely to have most success in voluntary compliance.

As a sociologist, I am very concerned about blindly promoting government policy, about what van Woerkum (1989: 13) called 'a policy-supporting communication unit'. I would not want my support for PI to be construed as uncritical acceptance of the products of agricultural scientific research, nor would I want extension agencies to be handmaidens of multi-national corporations. But I am also concerned about the naivete of the AKIS perspective. Somewhere between the extremes of both positions is a happy medium.

INDIGENOUS TECHNICAL KNOWLEDGE

This position recognises that local inhabitants — in the context of this discussion, farmers, but the concept is not restricted to agriculture — have knowledge, insights and adaptive skills which are based on personal experience, and on knowledge accumulated in the culture. Such knowledge and experience is variously called 'indigenous technical knowledge', 'indigenous knowledge', or 'local knowledge' (see Chambers, 1983, 1993; Chambers, Pacey and Thrupp, 1989; Richards, 1985; Thrupp, 1989; Warren, Brokensha and Slikkerveer, 1991)

The position developed as a recognition of the failure of the Green Revolution to be useful to farmers in all agricultural ecosystems, and in an attempt to deal with the social inequalities induced by the Green Revolution (Reijntjes, Haverkort and Waters-Bayer, 1992). The Green Revolution worked reasonably well for wealthier farmers in regions with well-developed infrastructure, which were suitable for irrigation, and which were fairly homogeneous (such as parts of Asia), but did not work for small farmers in rainfed areas especially in Africa (Brouwers, 1993; Lipton and Longhurst, 1989). The Green Revolution was premised on the ignorance of rural people, on the perceived simplicity, lack of inherent value and lack of productivity of exiting agricultural practices. However, as more research is undertaken, it is increasingly acknowledged that indigenous peoples in many parts of the world are very skilful in choosing optimum crops, locations for cropping, and optimal crop rotations and have a vast store of knowledge relevant to their local situation (Brouwers, 1993). This knowledge may not necessarily be in the form of western concepts of knowledge, but is tied up with various aspects of the local culture (Thrupp, 1989).

There are fundamental differences between the orientation of agriculture in western and non-western countries. It is not true to suggest that all farmers in industrial nations are in the business of industrial agriculture, but industrial agriculture can be characterised as an obsession with productivity as the only measure of performance. In Dutch agriculture, many farmers are concerned with maximising gross sales rather than maximising net profit (Leeuwis, 1993b). Farmers in industrial nations have a range of concerns including personal lifestyle (working hard, but not too hard), manner of farming, passing the farm onto their children in a better condition than they received it (what sociologists call stewardship), which all form part of what I call the farming subculture, and van der Ploeg calls styles of farming (see below).

Indigenous agriculture, is not simply concerned with yield, but with achieving an optimal solution to a range of concerns relating to things that are of importance in the context of agriculture within those cultures and ecosystems. Brouwers (1993; based largely on Dommen, 1988) describes them as follows:

- 1. an ability to work with the environment rather than attempting to override it;
- 2. a deliberate utilisation of diversity of micro-environments;
- the purposeful selection throughout the production period of crops planted and cultivation practices used and the integration of livestock into the system as a means of maintaining soil fertility;
- 4. the deliberate staggering of outputs in space and time; and
- the use of crop combinations which give a higher return per person per hour during the major labour bottleneck period and which give a more dependable result in variable rainfall.

Thus 'traditional' farming systems are complex, functionally integrate different resources and farming techniques, and act to maintain stability and productivity, while conserving the natural resource base (Reijntjes et al., 1992, cited by Brouwers, 1993). Such farming systems demand as much skill from the farmers as in industrial agricultural systems such as glasshouse horticulture (Brouwers, 1993).

Integration or articulation of indigenous knowledge and scientific knowledge is desirable in order to modify technology to make it more useful to farmers, and to utilise farmers' knowledge, experience and experimental capacity in the design of the technology. Such a process which combines farmers with commercial and scientific organisations is called Participative Technology Development (Chambers and Jiggins, 1986; Haverkort, van der Kamp and Waters-Bayer, 1991; Jiggins and de Zeeuw, 1992).

There are a number of problems with the concept of indigenous technical knowledge and the usefulness of such a concept. A major problem that is recognised within the position, is that of the potential marginalisation of the local knowledge as the knowledge is extracted, explicated and empirically tested by western science. Because such knowledge does not consist of discrete packets of information but is integrated into complex cultural systems of language, behaviour, rituals, ceremonies and myths (Brokensha, Warren and Werner, 1980), there is a problem that attempts at scientification (ie extracting and abstracting the knowledge) will result in a discarding of the social basis from which the knowledge was drawn. Furthermore, in scientific pragmatic terms, there is a danger that

this process will not pay sufficient regard to the extremely complex subtleties and nuances of such cultural practices (knowledge) (Brouwers, 1993; Thrupp, 1989).

This has also led to an ethical and legal concern about the ownership rights of such knowledge. If a group of people did have knowledge that led to the scientific discovery of a cure for cancer or AIDS, for example, that information would be extremely financially rewarding to the company that developed that pharmaceutical drug. What should be the compensation to the people that had the knowledge in the first place? This is particularly important, because one significant reason for the pressure by western nations on non-western countries to maintain ecological diversity, particularly the rainforests and mangroves in Africa and South America, is based on the concept that there may be a potential cure for these and other diseases. Thus western concern about western diseases⁴ is putting constraints on the development options of non-western countries.

The major criticisms of the concept of Indigenous Technical Knowledge from outside the perspective relate not so much to the fairly obvious consideration that rural people have knowledge that should not be ignored, but to what the implications of this position are. If it is accepted that rural people have local knowledge, how does this change extension or development practice.

First, the position tends to romanticise and glamourise non-western cultures, which leads to the naive assumption that local people know everything and do not need help. Such a position fails to appreciate the difficulties that these people experience, particularly under circumstances of changing environments, sometimes due to population pressure (which often has less to do with population pressure per se, but to the structural conditions under which resources are distributed) and other times due to changing social relations or cultural and agricultural practices as a result of development intervention or political intervention in the past. The problem is that traditional societies no longer exist. As a result of interaction with western nations, through colonialisation, the activities of slave traders, missionaries, political and military concerns, as well as the well-intentioned and not so well intentioned, extension efforts of development agencies, the culture and physical environment of these people have been significantly altered. This does not mean that their knowledge is wrong, but it is quite likely that their knowledge has not adapted to the changing environment.

⁴ Cancer is a western disease even if AIDS is not. However, it is doubtful whether people in non-western countries could afford AIDS cures even if they were available.

It needs to be accepted, as Brouwers (1993) does, that such knowledge, to the extent that it does exist, is not uniformly distributed in the community, and that the knowledge is not consistent. Proof of this is that 'experiences of agro-ecological (mis)fortunes are not always shared within the community' (Brouwers, 1993: 6).

Proponents of the position adopt a very functionalist⁵ and environmentally deterministic view (see Harris, 1968, 1975, 1977) of culture. Such a position sees culture as being determined by the environment in which it exists, and that all aspects of the culture have some functional or rational quality. Very few anthropologists and sociologists would accept such a position. The school of cultural anthropology (see Keesing, 1976) sees culture as being largely independent of such a direct relationship between cultural practices and the environment, and would not accept the immediate or obvious functionality (or disfunctionality) of cultural practices, but rather accepts that cultures manifest many behaviours and practices that may be completely independent of any functional relationship with the environment. Such a position does not mean that some cultural practices do not have a functional quality in environmental terms, that cultural practices do not contribute to social stability or have other cultural and social value, or that cultures must adapt to the environment in which they exist, but it does accord greater freedom to cultures to develop a more diverse range of practices. Consequently, many cultural practices may have nothing do to with environmental functionality whatsoever.

Finally, although I accept that rural people in non-western countries may have knowledge which may be valuable in their own environment, and possibly may be useful in other environments as well, it is not likely that the concept of indigenous technical knowledge will be of much use in western cultures. There have been attempts to import the concept and the philosophical basis which surrounds it into an understanding of agriculture in western countries, at least in Australia, again to argue that farmers do not need help and that extension ought not be telling farmers what to do. Such a position is dangerous because I do not believe that the farmers in Australia have a traditional culturally developed knowledge in the way that rural people in non-western cultures do.

It is unavoidable but the terms 'functionalist' and 'functionalism' each have different but related meanings within this thesis. Functionalism refers to a sociological perspective that sees aspects of culture as performing a useful function within society: thus social classes or gender inequality, for example, are desirable because, according to the perspective, they contribute to social stability and to other social goals. In the context of the use of the term in this section, 'functional' and 'functionalist' refer to the view that cultural practices have immediate practical survival value within the society. The problem can occur in the interpretation of these words where cultural practices may have no survival value (in terms of environmental sustainability or food production) and therefore have no functional value, but nevertheless play a very important part (ie play a function) within the culture in terms of social stability and thus are functional from a sociological functionalist perspective.

There have not been generations of Australian farmers to develop a sophisticated knowledge of the Australian environment and to develop a culturally significant indigenous farming system. In contrast, Australian farmers have been responsible, albeit with structural assistance, for the massive land degradation that has occurred.

Of course, farmers have knowledge and intelligence, and my not accepting the concept of indigenous technical knowledge as being valid for western (at least for Australian) farmers, does not mean that extension ought to be patronising or not accord the knowledge and intelligence of farmers with any respect. It is far better for extension agencies to work with the knowledge and intelligence that farmers do have to help in developing satisfactory solutions to environmental and other problems than to attempt to force them to change against their will. It is also conceivable that extension agencies might learn something from farmers. However, I do not believe, particularly in relation to environmental problems such as salinity and acidity, which farmers have not necessarily previously experienced, and do not necessarily accept that they do experience (because of the insidious nature of the process), that farmers have any special knowledge or contribution to make with respect to the solution of these problems. Of course farmers will have a lot to offer in terms of the fine-tuning of practices and in terms of implementation of the practices that may help reduce environmental degradation.

There are many examples of development assistance to non-western societies where the extension agency and the local culture were very removed from each other, and where the applicability of the message or the technology was very debatable. In those circumstances, any consideration of local culture greatly assists in improving the extension message, or in adapting the technology to suit local conditions. Very crude techniques such as Rapid Rural Appraisal (RRA) or Participatory Rural Appraisal (PRA) can be used to quickly gain an impression of the local culture to assist in the transfer of technology.

In western countries, however, such as Australia, extension agencies are not so removed from farmers, extension officers quite possibly have a farming background themselves, where the extension officers relate reasonably well to most farmers, and where the extension message is, for the most part, accessible to most farmers, and the techniques being advocated are not fundamentally removed from farmers' experience. In Australia, there is a great deal of support by farmers for extension agencies, and despite certain specific criticisms made by farmers and extension scientists (such as myself) about Australian agricultural extension agencies, it must be accepted that extension agencies are reasonably effective and accepted by farmers. In such cases, the use of crude

techniques, such as RRA and PRA, are not likely to provide additional helpful information, and because such techniques are potentially biased by the researchers' own ideologically position, can actually be harmful. This does not mean that extension agencies (in Australia) can not be improved, or that there are not significant differences between farmers and extension agencies, or problems with extension practices. It does mean that a concept which may be useful in understanding development in non-western countries, maybe of less relevance in western countries, especially when addresses certain issues that are outside the experience of the people affected.

A position that recognises the validity of indigenous technical knowledge and uses this knowledge in order to develop and test new agricultural technologies with client groups is 'farming systems research'. The position accepts that farmers operate in a complex physical environment involving many different physical systems. Under this philosophy, extension, to be effective and to deliver innovations that are likely to be useful to target groups, must respond to all the physical systems in which farmers are based. The position tends to be locally based and agro-biologically dominated. Much useful research that adapts innovations to local conditions has been undertaken (see Jiggins, 1982; Jones and Wallace, 1986; Shaner, Philipp and Schmehl, 1982). The position is an improvement on the technology transfer model, in that there is a bi-directional way flow of information, but does not question the fundamental concept of extension, does not appreciate, or at least is not concerned about, the power imbalance that exists between different parties, and ignores the structural situation in which farmers operate.

THE EPISTEMOLOGICAL BASIS OF KNOWLEDGE

One of the fundamental issues central to all scientific inquiry, and certainly important in an understanding of indigenous or local knowledge, is the basis on which knowledge is founded. Within the sociology of science, two theoretical positions are usually identified, positivism and constructivism, although within anthropological perspectives, cultural relativism is referred to in place of constructivism. Positivism refers to the view that science can discover the truth or facts about the world. Constructivism is the position that all understandings of the world -- physical scientific, social scientific and lay knowledge -- are socially constructed and are the result of politically, socially and normatively defined contexts in which the knowledge or understanding is developed.

Constructivist positions do not usually question whether the world does actually have implicit natural laws (this is usually taken for granted), the position only argues that it is

not possible to construct a knowledge of the world that is free of social construction. Here constructivists adopt two arguments. On the one hand, they argue that there is no way of knowing what is objective knowledge, and that knowledge generated by scientific procedures is no more empirically valid than knowledge generated by other processes such as witchcraft (see Feyerabend, 1975). On the other hand, it is argued that even if scientific research is accepted as being a more robust procedure than other methods of inquiry, the social and political influences surrounding the conduct of research means that knowledge so produced is not socially and politically neutral. I completely endorse the latter position and find it very hard to accept the relativist properties of the former argument. Very few philosophers of science (epistemologists) would accept such as position as well (see any epistemological textbook, but a good starting place is Chalmers, 1976). Ultimately, I would adopt a 'transcendental realist' position (Bhaskar, 1978, 1989), which argues, inter alia, that the application of robust methods generates knowledge which may or may not be ultimately true, but while it is believed to be true, then it might as well be acted on as if it is true. Such a position is constructivist in that it argues that scientists create knowledge and create conditions for the study of causal processes, and recognises the existence of social and political control over science. It does not imply that premises or paradigms ought not be questioned periodically. In general, however, I consider this whole debate to be an inherently philosophical and epistemological issue of some complexity and I suggest that high level debate on this topic best be left to philosophers, although I do believe that all scientists ought to receive more training in epistemology.

The two positions, positivism and constructivism, are diametrically opposed, and with such a dichotomy the untenability of positivism and the obvious manipulation of knowledge clearly forces constructivism as the appropriate choice. The problem becomes more complex, though, when a continuum rather than a dichotomy is posited. Where does one site oneself on a continuum?

If lay knowledge is considered, it will immediately be accepted that such knowledge is socially defined and related to the cultural, social, political, normative and physical environment in which the people with that knowledge exist. If it is true that the knowledge of lay people is socially constructed, is it also true of the knowledge of scientists and of scientific knowledge?

But this is well established within the philosophy of science. Thomas Kuhn, who is now famous, but who really did no more than synthesise ideas that had been in existence for some time, had established in 1962 that scientific facts were nothing more than a

consensus of opinion. In fact, the term 'fact' is shunned by epistemologists, as it refers more to the value laden status, or social standing, of a scientific hypothesis than to any epistemological meaning. Furthermore, in fact, many so-called facts accepted in the past have been proved not to be facts by more contemporary research, and it is quite likely that many currently accepted facts will in the future also be proved not to be facts. The term 'fact' is not an epistemological term and should not be used. Instead, as the philosophical tradition of epistemology through Popper and Kuhn and many others establishes, scientific hypotheses are developed by a social and methodological process, the results of which gain a certain value or status in the scientific research community.

Lakatos (1970) gets the credit in epistemological circles for being the first to argue that scientific research was politically and socially manipulated by control over the direction of research⁶. But this view was also not unique. All scientists intuitively know that scientific research priorities are and were social and politically manipulated. One only needs to consider the direction of research during the Second World War, for example. The nuclear physicists developing the atomic bomb knew that their research was politically motivated (see Bronowski, 1973).

Within the sociology of science, it is also well accepted that scientific knowledge is socially constructed, not only in terms of political funding of research, but the way in which scientists actually do their work, the short-cuts they take, the fraud that takes place, the reification of uncertain ideas, the data cleaning that takes place, and the social control over publication, and so on (see Knorr-Cetina, 1981; Latour, 1987).

While positivism probably does characterise the way some scientists perceive the value of their work and how they perceive science to be done (see Knorr-Cetina, 1981), it is not the position of the epistemologists, and the sociological analysis of science is probably based on an ill-informed and reified view of what science is about. The fallibility of science rather than the certainty of science has been the scientific method since Popper (1959, 1963). Popper most certainly did not approve of complacency in relation to the acceptance of basic truths. He argued for routine testing of all hypothesis accepted as being true, and of course, under Popperian epistemology, science only progressed by the falsification of hypotheses, thus every scientific experiment etc had to be established to do the maximum possible to disprove the hypothesis (see Chalmers, 1976). This is how statistical analysis is applied. The null hypothesis is only rejected when there is sufficient

This is not the central aspect point Lakatos was making. Lakatos was responding to his concern about the apparent irrationality of Kuhn's position and was attempting to maintain and improve the Popperian falsification 'paradigm'. Despite Lakatos' criticism of Kuhn's position, aspects of Lakatos' position, especially relating to his concept of the inner and outer core of beliefs, are quite Kuhnian.

statistical evidence to reject such a hypothesis. In the case of failure to reject the null hypothesis, the conclusion is that there was no evidence to reject the null hypothesis.

An interesting aspect of the Popperian epistemology is that science then has two activities, inductivism in the creation of hypotheses, and deductivism in the testing of scientific hypothesis. While considerable rigour must be applied in the deductivist aspect of the procedure, such rigour is not so important at the inductivist stage. As it happens, many currently accepted facts (socially accepted scientific hypotheses that are yet to be disproved) were conceived by scientists under extremely serendipitous circumstances.⁷ The serendipitous nature should not be exaggerated, the scientists working on these problems had been thinking about these issues for some time before they finally made their discoveries. Not matter how much of a genius scientists may be, their discoveries or inventions are still a product of the cultural situation in which they live.

Unfortunately, many scientists have not had basic training in epistemology. Partly as a result of this, and partly because of the pressures scientists work under, the practice of science is very different from the rhetoric of science. Science also plays a social role in society in terms of adjudicating on various matters, and scientists' opinions are used to sway public opinion. Thus, there emerges three types of science: science as an epistemological framework, science as a social institution, and science as subcultural practice. While (some) scientists consider that they operate only in the realm of science as a scientific method, the reality is of course that much of their work is science as a social institution and science as a subcultural practice. Thus, as much scientific knowledge is created in the staff tearoom as in the laboratory (Knorr-Cetina, 1981).

When sociologists criticise the positivist aspects of science, and other undesirable features of science, they are not, at least they should not be, criticising science as an epistemological framework; they are criticising science as a social institution and science as a cultural practice.

However, I would agree with the sociologists of science and argue that the philosophers of science (and the sociologists of science) have a naive and narrow view of science. An elaboration of Kuhn's position may serve to argue this point.

⁷ There are many examples. The ones frequently given are the discovery of the difference in the concepts of mass and weight by Archimedes in the bath tub, 'Eureka I have it'. It should be noted that Archimedes was responding to political control: the king commissioned Archimedes to determine whether all the gold that was given to the goldsmith was included in the crown being made by, and that he was not being defrauded. Other examples include the discovery of the 'ring' nature of certain molecules which was allegedly made by a scientist under the influence of an hallucinogenic illegal substance. It is rumoured that Einstein had periods of great inspiration riding on his bicycle.

The important feature of Kuhn's position was the dichotomy between the period of normal science and adherence to a scientific paradigm (when existing theories appear to be satisfactory in explaining events) and the period of revolutionary science when there is a conflict between scientific paradigms (when existing theories are not adequate to explain events and new theories need to be created).

Long (1990) regards Kuhn to be a positivist. I reject that view and suggest that not only was Kuhn not a positivist, but the original constructivist. However, Kuhn does have a very simplistic concept of what science is about, and a very mechanistic notion about natural processes. Kuhn did not specifically address the social sciences except to say that the social sciences were proto-scientific because of the lack of a dominant paradigm. Thus for Kuhn, for the social sciences to become truly scientific required the eventual development of and a commitment to a single paradigm.

Social scientific knowledge is more problematic. The existence of schools of thought or perspectives, means that there is no common agreement and it is doubtful whether there is a paradigm of knowledge in the Kuhnian sense. Another problem for social researchers, unlike their physical science counterparts, is that the subjects (objects) of study in the social sciences are not passive, they are also in the business of understanding, interpreting and changing the world in which they live. Thus there is an interaction between the researchers and the researched. Giddens (1976) refers to this as the 'double hermeneutic', which, despite being an elaborate term, is not a particularly original concept having been discussed by Cicourel (1964) some years earlier. This issue is of fundamental concern in anthropology and in participant observation, and still is widely debated (eg Bourdieu, 1990; Geertz, 1973; 1983).

A further problem is that the whole conceptualisation of science and of paradigms is based on a rather naive view and misunderstanding of science. Science is not only in the business of producing 'facts' (simplistic scientific hypotheses, simple statements of being), it is also in the business of providing a conceptual understanding that links facts together in a coherent way. In the social sciences, in statistical terms, because of the complexity of social systems, the many variables that are involved, and the large amount of random variance, there will always be disagreement, and room for disagreement, between social scientists. In more sociological terms, different social scientists will concentrate on different levels of analysis, on different aspects of the system, and will therefore produce different explanatory theories, which, for me at least, are not necessarily competing alternatives, but complementary and provide a rich diversity of sources to develop an

understanding. In philosophical terms, science and epistemology do not have the weapons, the techniques, to adequately assess competing claims of general theories. Science has no way of testing evolution (as a general theory), for example. The reductionist response of the physical sciences is to dwell at the level of basic first principles. Thus, speciation of individual species can be observed; competitive selection and mutual exclusion can be observed; socio-biological accounts can be made which provide a compelling explanation of altruistic behaviour which is consistent with the theory of evolution; statements can be made about the fossil record, and comparative embryology can provide examples that are consistent with evolutionary theory.

It is likely that Kuhn overstates the uni-paradigmatic nature of the physical sciences as well. Fierce debates rage in the physical sciences about various issues relating to macro interpretation of the understanding of various facts, rather than about the facts themselves. Stephen Jay Gould's (1982) theory of punctuated equilibrium, for example, is not widely accepted in biological science circles.

Despite my strong support for certain aspects of constructivist views about science and knowledge, I find it difficult to accept complete constructivist or relativist interpretations of the world. Many common sense notions of the world are wrong (see Robertson, 1987) and are the cause, or at least contribute to, much unnecessary grief and suffering, including racism, sexism, ageism and discrimination against people labelled as deviant. This dilemma is shared by many anthropologists who are 'forced' to accept cultural relativist position with regard to the internal consistency of cultural explanations (ie there is a disciplinary bias towards this theoretical position), but who still lean towards accepting a universal conception of universal rationality (for example, Jarvie, 1984).

However, I do accept the desirability of cultural relativist positions in order to understand other cultures, and I also accept that social knowledge is socially constructed. Furthermore, I accept that the products of science are social creations.

In the context of environmental degradation, the theories of many farmers concerning the causes and solutions of land degradation vary considerably from the conventional scientific view. It can be shown that the knowledge about the causes and solutions of land degradation held be some of these farmers are wrong, because land degradation continues to occur on their own farm.

Knowledge is a socially constructed explanation. Science is not the only way to generate knowledge. And because of the social construction of scientific knowledge, and the

power of science as a social institution, it is likely that the way people relate to scientific knowledge is in the same way that they relate to other forms of knowledge such as religious knowledge, cultural knowledge, common sense knowledge. Thus, it is likely that there is no cognitive difference in the way the various forms of knowledge are processed by people. This also means that the public can generate scientific knowledge. There is no such thing as valid knowledge, the correctness of knowledge is social acceptance. Thus, other forms of knowledge creation can generate meaningful knowledge which will be useful to the society.

Ultimately, however, at the philosophical level, there has to be an adjudication of knowledge, and I can only accept, along with most philosophers, that there is an appropriate epistemological, methodological and scientific procedure that ought to be followed to produce knowledge that is most likely to most resemble external reality. This does not mean that other forms of knowledge should be suppressed, rather, along with scientific knowledge -- because it too is the product of a social institution and subcultural process -- should be treated with caution. Local knowledge should not be subordinated, and scientific knowledge should not be reified.

SOFT SYSTEMS THINKING

Within extension science, there is considerable support for soft systems thinking. A system 'can be defined as an arrangement of parts (elements, components, subsystems) which interact to achieve some common purpose' (see Röling, 1988: 186-188; Hurtubise, 1984). Systems approaches to problem solving involve taking a broad view, including all parts of the problem, and concentrating on interactions between different parts of the problem (Checkland, 1981). 'Hard' and 'soft' refers to how the functions and organisation of the system are perceived. Hard systems are conceptualised as having unproblematic and transparent functions, causes and purposes, while soft system approaches recognise that systems are social constructions with normative boundaries. Soft system theorists also do not attribute purpose to entities but only to the individuals who make up these entities. The actors participating in these systems have different viewpoints and the task of the system is negotiation of the different viewpoints.

Soft systems also differ from hard systems in that in hard systems thinking, social systems (ie organisations) are assumed to be goal seeking, thus organisations should be rationally managed to achieve that objective (Checkland, 1985). By contrast, soft systems theorists consider that 'human activity systems' must be considered as complex

entities in which people have different worldviews (weltanschuungen) (Checkland and Davies, 1986) and therefore have different interpretations of the problems that exist, the goals that ought to be achieved, and the boundaries of the system itself (Leeuwis, 1993b). In response to the complexity of these systems, soft systems theorists have developed soft systems methodologies (Checkland, 1981; Engel et al., 1992) in order to reach consensus between stakeholders in a system.

Checkland's soft system methodology was developed in a commercial business environment in order to assist in the development of organisational policy. Such a setting is far more simple than the environment of real world issues. Corporate executives who must determine corporate policy may have different opinions, but are largely from one subculture.

Soft system methodologies are useful under certain circumstances, but the assumptions governing their use are likely to make the concept of minimal use as an extension strategy, despite the enthusiasm they receive from some extension scientists.

The primary assumptions required for soft systems methodologies to work effectively are:

- there must be a certain commonality or homogeneity amongst participants, at least a high level of mutual understanding, if not common subcultural and class location;
- participants must have equal access to information about the issue and equal resources to research the issue further should they so wish;
- participants must be willing to negotiate and must contribute in a positive manner to the debate. This means that they must bear no animosity towards other participants;
- participants must be committed to the process and willing to negotiate their position;
 they must not have immutable intransigent positions (this does not mean that they necessarily must not be more committed to certain positions than others);
- participants do not need to have the same level of power in society or the
 organisation, but they must act in the negotiation process as if they did have equal
 power;
- the process must be conducted in a pleasant environment free of time constraints or other pressure to come to a rapid decision.

These requirements are very stringent and not at all like real world situations. With any major issue to be debated, the participants are going to have vastly different backgrounds which will make it difficult to understand each other's worldview. In the context of an important issue, it is likely that participants will have developed strong feelings about the

matter, may already have intransigent positions, and may well have developed hostility towards people holding different opinions. It is unlikely that a situation can be created in which power does not affect the debate. Participants are not likely to have equal power at negotiating, access to information or resources to access information. Key stakeholders may have been deliberately (or accidentally) excluded from the debate. However, power relationships are not only overt, they are also embodied in social roles, and consequently are part of social exchange. Social concepts such as charisma and prestige will obviously affect the negotiations, but so will issues such as experience, ability to articulate one's thoughts (both in terms of cognitive abstraction and elocution), social skills, and issues relating to ingrained attitudes. In all likelihood, people belonging to many different socially groups would be disadvantaged in these situations, including but not exclusively and not necessarily in all cases, women, old people, young people, migrants, indigenous people, non-professional people, people who are labelled as being deviant in one form or another, and so on. Attempts at 'countervailing power' (Röling, 1988) and other such naive suggestions to overcome this problem, while laudable, are unlikely to resolve the power imbalance because of the extent it is ingrained in our social roles. Thus, it is very unlikely that a shared learning experience can take place in an open and harmonic atmosphere and that a mutually agreeable, more or less rational, outcome can be achieved in most cases.

Another problem is that negotiated outcomes are often not satisfactory to any of the participants, certainly to participants who held particular positions prior to negotiation, and especially when the negotiated position involved a diluting of a proposal, as is usually the case. Thus if radical action is required, the negotiating process may well mean that the solution, even if acceptable to the people involved actually fails to deal with the problem.

Jackson (1985, 1991), Ulrich (1988) and Leeuwis (1993b) have all criticised soft systems approaches for failing to acknowledge that power structures affect the debate and that stakeholders do not have equal say in the discussion, nor equal access to resources. Jackson (1985: 144) suggests that the application of soft systems methodologies can easily lead to a reinforcement of the status quo:

Soft systems thinking cannot pose a real threat to the social structures which support the Weltanschauung with which it works. It can tinker at the ideological level but it is likely simply to ensure the continued survival by adaptation, of existing social elites (Thomas and Lockett, 1979; Jackson, 1982). This is not at all what the designers of the soft systems methodologies intended. Nevertheless, there is some evidence that it is what is achieved by these approaches. Churchman, Ackoff and Checkland are baffled that their

methodologies when applied to the real world tend to lead to conservative or, at best, reformist recommendations for change. Examples of such bafflements can be found in Churchman, 1971;228; Ackoff, 1979; and Checkland, 1981: 15. (Jackson, 1985: 144 quoted by Leeuwis, 1993b: 41).

Because of the difficulty of satisfying the conditions under which soft systems methodologies could work effectively, I am very less certain about the ability of them to be useful. At worst, those people with most power can manipulate the process not only to achieve their own personal objectives, while at the same time deceiving other participants into believing that they did participate in a shared learning situation. Such a process can also be used both to suppress dissension and to divulge responsibility for decisions in case of future backlash or problems.

From an environmental point of view, negotiated outcomes that are compromises of original proposals may not satisfactory -- farmers must adopt more environmentally sound farming practices. Farmers need to be facilitated to do that, and involvement of farmers in extension strategies to enhance farmer adoption of environmentally sound management practices would be desirable. However, such involvement does not necessarily mean that a complicated framework such as a soft systems methodology is required, nor does it mean token representation by a small number of farmers. I believe that people who are committed to the usefulness of soft systems methodologies have an ideological view about the political correctness of such a position, but have failed to demonstrate the superiority of the method over other participative mechanisms.

As a consequence of the problems with soft systems thinking, a third type of system thinking, 'critical systems thinking', has been developed, based largely on the ideas of Habermas (see Jackson, 1985, 1991; Ulrich, 1988; Fuenmayor and López-Garay, 1991; Lyytinen and Klein, 1985).

Habermas considers that an 'ideal speech situation' can be developed in which undistorted communication can take place (Habermas, 1981). In an ideal speech situation, the participants are able and willing to respect and have empathy for each other's positions, and a willingness to scrutinise their own and others' logical premises. In such a situation, conflicts of interest are resolved simply by the force of rational argument, thus the outcome is based on rational logic and not on negotiated compromise, or strategic action. Habermas accepts that decisions or outcomes arrived at by this communication rationality procedure does not imply that they are objectively correct in any epistemological sense, but he considers them to be the most desirable form of resolving conflict. However, because such decisions are based on a shared consensus of what is true and therefore are consistent with constructivist notions, communicative rationality has a normative validity rather than an empirical validity (Ulrich, 1988).

There are a number of problems with this approach. Firstly, it not likely that Habermas' 'ideal speech situation' can actually be created, implemented and maintained. The position requires a rather sanguine view of human nature as it assumes that individuals will not take a self-interested position and that communicative rationality will not deteriorate into strategic rationality (cognitive instrumental rationality). This is slightly surprising because the logical (enlightened self interested) position for individuals would be a position of strategic rationality, not of communicative rationality. Habermas does not propose any solution to the contradiction of assuming that individuals are rational individual actors operating only on at the level of communicative rationality and not on the basis of strategic rationality. An aspect of Habermas' position required to substantiate the position of communicative rationality and the 'ideal speech situation' is that there is a complete denial (ignorance) of the role of culture in individual behaviour. The sociological/anthropological position recognises the primacy of culture and that all behaviour is determined (the range of choices is determined, individuals have freedom between constrained options) by the cultural and subcultural position of individuals.

I have to say that it is a philosophers' naive response to a social problem of much greater complexity.

Finally, it is not the actions of individuals that count, but the accumulated effects of the actions and processes that are operating in the social system. Whether structures exist as objective entities, 'behind the back of the actor' (Leeuwis, 1993a: 293), or whether they exist as a continuously reproduced set of social interactions, as in Giddens' (1984) theory of structuration, is largely irrelevant. The net effect is that macro processes can not simply be understood in terms of the actions of individuals.

It is not the university lecturer who marks student assignments in an order to give the students constructive feedback who is individually responsible, nor are all lecturers collectively responsible, for universities undertaking a conservative role in society in controlling the entry of individuals into the professions. No amount of micro-theory about pedagogy alters the macro process that universities function to reproduce class relations in society.

Critical systems thinking, and Habermas, have little to offer structural (neo-Marxist, conflict perspectives), or structurational (Giddens, 1984) interpretations of the world.

ACTOR PERSPECTIVE

The actor perspective developed by Norman Long (1968, 1977, 1984, 1989, 1990; Long and Long, 1992; Long and van der Ploeg, 1988, 1989), a logical extension of the sociological perspective of symbolic interactionalism (Long, 1990), is concerned to explain 'differential adaptations or responses to the same or similar [structural] circumstances' (Long, 1989: 222). It argues that cultural variations and organisational differences are the result of the different ways actors respond to problematic situations and interactions with other actors. Such actors, in a rural context, are not only farmers and their families, but all people and institutions that have interactions within the rural domain. The position accepts that actors are 'knowing, active subjects' who problematise situations, process information and develop strategies to deal with other actors, whether they are individuals or institutions, and regardless of their level of power (Long, 1989: 222). The position considers structure to be important, but not deterministic (see Long, 1988).

Long utilises Giddens' (1979, 1984, 1987) concept of 'agency' which attributes individual actors with:

the capacity to process social experience and to devise ways of coping with life ... Within the limits of existing information, uncertainty and other constraints (eg physical, normative and politico-economic), social actors are "knowledgable" and "capable". They attempt to solve problems, learn how to intervene in the flow of social events around them, and monitor continuously their own actions, observing how others react to their behaviour and taking note of various contingent circumstances (Giddens, 1984: 1-16; cited by Long, 1989: 223).

The important feature of the concept of agency is that it does not refer to actors' intentions, but refers to the inherent 'capability of the individual to "make a difference" to a pre-existing state of affairs or course of events. This implies that all actors (agents) exercise some kind of "power", even those who are in highly subordinated positions' (Giddens, 1984: 14, cited by Long, 1989: 223). Thus all people, including those who are subordinated, can influence (the activities of) those that subordinate them, and thus are involved in the construction of their own social worlds.

Social structures are seen as having both constraining and enabling potential for social behaviour. Furthermore, structure cannot be comprehended without accounting for agency.

In following the routines of my day-to-day life I help reproduce social institutions that I played no part in bringing into being. They are more than merely the environment of my action since ... they enter constitutively into what it is I do as an agent. Similarly, my actions constitute and reconstitute the institutional conditions of actions of others, just as their actions do mine. ... My activities are thus embedded within, and are constitutive elements of, structured properties of institutions stretching well beyond myself in time and space (Giddens, 1987: 11; cited by Long, 1989: 223-224).

The actor perspective assumes that actors are capable of formulating decisions and acting on these decisions, and of innovating and experimenting with new forms of behaviour. All this can occur even in situations where the social space of actors is severely restricted. The fundamental notion of the actor perspective is that individuals can always make choices, however limited, between different courses of action, as well as having some process to judge or evaluate the appropriateness of their actions.

Hindess (1986) argues that the reaching of decisions requires the use of 'discursive means'. Types of discourse vary and form part of the available stock of knowledge and resources available to all actors. Thus actors have a choice of discourses, as well as 'a repertoire of different life styles, cultural forms and rationalities' which can be utilised 'in their search for order and meaning' (Long, 1989: 224).

Because 'the strategies and cultural constructions employed by individuals ... [are selected] from a stock of available discourses (verbal and non-verbal) that are to some degree shared with other individuals, contemporaries and even predecessors ... the individual is ... transmuted metaphorically into the social actor, thus signifying that "actor" (like the person in a play) is a social construction rather than simply a synonym for the individual person or human being' (Long, 1989: 225).

Long (1989: 225) argues that the principal elements of the concept of agency, knowledgeability and capability, 'must be culturally translated if they are to be fully meaningful. ... Cultural expressions of agency vary and reflect different philosophies regarding the capacity of the individual to influence actions and outcomes' (see also Strathern, 1985).

The term 'actor' and the concept of 'agency' can be applied to various institutions, such as government departments, corporations, specific social groups, etc, providing that they 'have means of reaching and formulating decisions and of acting on at least some of them' (Hindess, 1986: 115; cited by Long, 1989: 225). These concepts should not be applied to

social collectivities or agglomerates that have no discernible manner of formulating or implementing decisions, such as social classes.

Long (1989) anticipates the two criticisms levelled at the actor perspective: that it is based on methodological individualism, and that it ignores the influence of the macro structural setting. Long goes to great lengths to establish that actor oriented analysis is not based on methodological individualism pointing out that individuals make decisions contingent upon the social conduct of others, and their behaviour is also affected by more diffuse external institutions, structures and cultural factors that transcend the immediate social setting experienced by the actor in question. Such influence on the actor is not only the result of direct interaction, or through the activities of entities like the mass media, but is based on the collective cultural history, such as implied by Bourdieu's (1981) notion of 'habitus' or 'embodied history' (Long, 1989, 1990).

In response to the criticism that the actor perspective concentrates on the detail of social life at the expense of structural analysis, the argument is more complex and not satisfactorily resolved (for me at least). Long (1989) first utilises Collins' (1981) argument that all sociology should only concentrate on analysis of micro-situations because otherwise sociology is at a risk of reifying macro concepts. However, Long then rejects this view by using Giddens (1981) concept of 'emergent structures' (emergent forms) to argue that there are certain macro structures whose actions are not fully explicable or describable in terms of micro events. Ultimately, Long (1989, 1990; Long and Long, 1992) adopts a position he calls interface studies, which means that both macro and micro sociological analyses need to be undertaken, with attention given to how the two levels of analysis can be integrated. The interface is a methodological device for analysing critical points of discontinuity, accommodation and negotiation processes and emergent social forms. Thus while Long accepts the macro influences, the actor perspective concentrates on actors (which includes institutions and well as individuals), on how these actors respond to macro processes, and on the contextualising aspects of discourse and authority structures.

I'm not convinced that Long has adequately answered this criticism. Nevertheless, the primary defence that the actor perspective can muster is that within the actor perspective there is always hope, because there is the view that actors always have the capacity to make a difference and can exercise choices no matter how limited the range of choices available. In contrast, critical sociology is terribly depressing, because the logical outcome of such a position taken to its logical extreme is that there is nothing that can be done, and we are all at the mercy of multinational corporations, the core (if not the

centre nations), the upper classes, and hegemonic masculinity (see Connell, 1987). The actor perspective focuses at the practical level on what can be done to make a difference — on intervention practices rather than on intervention models and theoretical positions (see Long and van der Ploeg, 1989).

I would still argue that the position runs the risk of concentrating too much on the limited action that individuals can make. At a theoretical level at least, it is important to accept, appreciate and understand the structural processes. However, at the practical level, particularly where intervention is proposed, it is perhaps more important to endorse the actor position (see Long and van der Ploeg, 1989).

The other criticism I have of the actor perspective is that it exaggerates the rationality of individuals. I adopt a more cultural anthropological, cultural relativist, notion of the behaviour of people, which accepts that behaviour makes sense (is logical) within a particular culture, but this does not mean that it has functional rationality in an environmental deterministic sense. In Weberian terms, I would argue that cultural behaviour is means based rationality not ends based rationality. Thus the actor perspective assumes that when individuals do make decisions about behaviour, particularly under circumstances of duress, that they can make logical ends based rational decisions that can make a difference8. I disagree. I would argue that the decisions of individuals must be consistent with their cultural perspective and not necessarily related to an ends based rational analysis of the appropriate decision. As Long admits, culture is constraining as well as empowering. People cannot decide to undertake behaviour that is outside of their cultural framework, irrespective of what is permitted by the structural situation. Long agrees, the choices actors can make are part of the cultural repertoire. Here Long is confused and contradictory. Cultures can only have developed responses that will be useful in situations that the culture has experienced before. Thus a culture experiencing rapid change such a brought about by a rapidly deteriorating environment or by an increased level of contact with other cultures (as in colonialisation), or a new environment in the case of relocated peoples, may not have appropriate behavioural responses within the cultural repertoire. Turnbull's (1972) study of the Ik in their new

⁸ Long (pers. com.) disagrees with my interpretation of the actor perspective on this matter. He states that he does not endorse western economic or institutional rationality concepts and that rationality must be culturally specific. Thus he rejects my claim that the actor perspective implies ends based rationality. I accept this but argue that I was not implying that the act of decision making was based on ends based rationality, but that the position regards the outcome as having objectively rational properties. The actor perspective assumes that actors can and do make choices, the outcome of which can improve their situation. I would argue that the choices actors make, although consistent with their subcultural location, may not improve their situation and may well worsen it.

environment is a tragic tale of the dysfunctional, or at least inadequate, aspects of culture when faced with a new environment, especially a degraded environment.

The actor perspective is not opposed to macro analysis, but it chooses to concentrate on actor responses rather than on the macro processes themselves. Obviously, both issues are important, and so the actor perspective does not attempt to be <u>the</u> sociological explanation, rather it provides <u>an</u> explanation forming part of social understanding, and as such is totally consistent along side more structural analyses.

Finally, the actor perspective is not a comprehensive theoretical position, nor does it pretend to be. It does not prescribe a complete theoretical and methodological approach and does not serve as a theoretical worldview, rather it provides an orientation. I personally think this is a good thing, but it does not play the same role that other sociological theoretical positions or perspectives do. Obviously within the position there are certain guidelines. There is a concentration on the world view of actors. The position accepts the legitimacy and rationality of individual action. There is a preference for qualitative research methodologies, particularly ethnographies of life experience. Furthermore, having developed out of development anthropology (non-western sociology), there is other cultural and theoretical baggage. Nevertheless, a researcher having accepted that an actor perspective will be used, does not have a totality of theoretical and methodological positions prescribed.

In conclusion, I think that the Actor Perspective is an important position in development studies particularly with its concentration on what is possible. However, because it is not an overarching theoretical framework, it should not become the dominant paradigm for social science (nor does it seek to). Perhaps the most important feature of the actor perspective is the idea that one can only understand structure through lived experience and thus the approach to structural analysis should also be ethnographic studies of the life situation.

My own research as described in the papers presented in this thesis could be described as interface research (Long, 1989, 1990; Long and Long, 1992) because of its concentration on both macrostructural processes and on the response of (interaction or interface between) actors (in my case, farmers and agricultural extension agencies) and the macro processes. However, the research was not consciously written with this perspective or an actor perspective in mind, and I'm not sure what difference it would have made had I been aware of Long's actor perspective at the time. It is likely that my

emphasis is more towards fully understanding the macro processes at play than simply concentrating at the actor level.

FARMING STYLES AND FARMING SUBCULTURES

A more constrained and therefore a potentially more coherent theoretical and methodological position that has developed out of the actor perspective is the concept of styles of farming, or farming styles, developed by Jan Douwe van der Ploeg (1986, 1989, 1990, 1993; Leeuwis, 1989, 1993b). The farming styles approach is simply the actor perspective applied to an analysis of agrarian change, stressing how farmers themselves shape the patterns of agrarian development (Long and van der Ploeg, in press).

Although their choices are often limited by a lack of critical resources, they should not be seen as the passive recipients of victims of planned change, nor as so routinized that they simply follow laid-down rules or conventions. Like other actors, farmers devise ways of dealing with problematic situations and creatively bring together resources (material and non-material -- especially practical knowledge derived from past experience) in an effort to resolve these (Long and van der Ploeg, in press).

The key characteristic of this approach is to understand heterogeneity in agriculture. 'The assumption [is] that different farmers (or categories of farmer) define and operationalize their objectives and farm management practices on the basis of different criteria, interests, experiences and perspectives', and in the process develop specific conceptualisations of how their farm should be organised, developed and managed. The total composition of these individual strategies of management result in the 'impressive heterogeneity of agriculture, which can be analysed into specific styles of farming' (Long, 1988; Long and van der Ploeg, in press).

Farming style refers to a cultural repertoire, a composite of normative and strategic ideas about how farming should be done. A style involves a specific way of organizing the farm enterprise: farmer practice and development are shaped in part by cultural repertoire, which in turn are tested, affirmed and if necessary adjusted through practice. Therefore a style of farming is a concrete form of praxis, a particular unity of thinking and doing, of theory and practice (van der Ploeg, 1993: 241).

The farming styles approach developed because of the failure of other theoretical frameworks to explain satisfactorily the existence of diversity in otherwise homogenous regions, ie those facing similar structural factors. Long and van der Ploeg (in press)

argue that 'the articulation of the farm with the politico-economic environment cannot be understood within the framework of methodological individualism or social atomism, nor within a structuralist framework'.

While the concept of farming styles, although on face value is somewhat similar to my own concept of farming subculture, it differs significantly in many respects. Not only is the farming styles position explicitly based on the actor perspective, it almost rejects analysis of macro processes altogether. The farming styles approach, and the actor perspective generally, attributes much more ability to farmers to act individually and rationally than does the farming subculture concept. The farming subculture approach, like the farming styles approach, sees that farmers develop their own conceptual basis about how their farm ought to be managed, however, the farming styles approach sees this largely as an individual strategy, albeit within a cultural setting, while the farming subculture approach sees such a process being less individual and more collectively based.

Both positions see agriculture as a social practice, not as a technical practice, that takes place within a socially and politically created setting. However, my personal position, although not essential to my concept of farming subculture, is that an analysis of the structural processes is also important, van der Ploeg would appear not to agree. Whereas van der Ploeg (1993: 242) agrees with Timmer (1949: 22) that: "the countryside forms as it were a stage upon which, for the world, a very important play is performed; this play is called agriculture, and the head role is played by the farmer", I would argue that the stage and plot are set by the macro political and social environment.

Furthermore, van der Ploeg might agree with Hofstee's (1946) conclusion when Hofstee poses the rhetorical question

"Is agriculture", he asked, only " ... a more or less successful adjustment of the farm to circumstances?" or "Is it ... only the pressure to adjust the farm to given circumstances that is responsible for the richness of form of agricultural life in our country?" (Hofstee, 1946). His answer was in the negative: "full account must increasingly be given of the nature and being of life in its fullest sense of the social group in which the production process takes place" (van der Ploeg, 1993: 243).

The farming styles approach continuously stresses the empirical rationality of farmers' actions and implicitly accepts the significance and relevance of local culture and local knowledge, which van der Ploeg (1989) calls *art de la localité*. However, van der Ploeg argues that local knowledge has a different cognitive structure than scientific knowledge

to farmers, a cognitive structure that they relate to in a more direct way (Leeuwis, 1993b).

The farming subculture approach does not necessarily accept that farmers' knowledge is objectively or empirically rational, rather it accepts that such knowledge and the behaviour and management activities that occur as a result of such behaviour can be maladaptive, in both an economic sense and an environmental sense, as is witnessed by the failure of farmers to continue to survive in a changing political situation, and by continuing environmental degradation on farms. I would not accept that there is any difference in the cognitive structure of different forms of knowledge or in how these different forms of knowledge are processed.

Despite arguing that farmer behaviour may be maladaptive, the farming subculture approach accepts that compliance with subcultural behaviour is legitimate. All people in all situations comply to a certain extent with the subcultural expectations of the subcultures they are a part of - thus scientists comply with a scientists' subculture, extension workers comply with an extension subculture, academics comply with an academic subculture. Furthermore, the farming subculture approach while accepting that subcultural behaviour may not be environmentally or economically adaptive, and therefore not necessarily objectively rational, accepts that most behavioural practices within the subculture are logical, understandable, and rational within the worldview of the farmers in that subculture.

The implication of the differences between these two positions for extension is considerable. In the farming styles approach, there is the populist view that there is no reason to have extension, farmers have knowledge and experience that is valuable, and extension services are unlikely to be able to teach farmers anything of any value, rather, extension would serve a negative role in attempting to change farm management practices to something not consistent with their existing style. Extension would be, at best, irrelevant, at worst, an instrument of subordination and domination. I would image that the farming styles position would see the position of extension to be at the 'at best' end of the spectrum.

Under the farming subculture view, extension determines its role by the ability of the extension service to respond to the needs of farmers, and to the effectiveness of the extension service to change farm management practices, especially those that lead to environmental degradation. At best, extension would be a valuable source of information

to farmers in conjunction with other sources of information and their own experience; at worst, extension would be irrelevant, ignored by farmers, and a waste of public funds.

Thus my position clearly sees an important role for extension services. However, I have criticised extension services for being at the 'at worst' scenario: for failing to adequately address the need of farmers; for failing to appreciate the worldviews of all farmers; for failing to appreciate and respond to the diversity that exists; and for delivering only an agribusiness industrial agriculture message. The linkage between extension agencies and agribusiness, especially with agrochemical companies, should never occur as it taints the image of extension with an agribusiness message (see Lockie and Vanclay, 1992; Lockie et al., 1993; Vanclay and Lockie, 1993). Commercial sponsorship of extension is increasing: many extension agencies, and specific activities of extension agencies are accepting commercial sponsorships, as witnessed by agrochemical sponsorship of the recent Australian extension conference. I believe (and I believe that farmers' believe) that extension agencies are loosing credibility by their use of this financial strategy.

There are some contradictions in van der Ploeg's position.

Presumably van der Ploeg accepts that structural adjustment (the exit of farmers out of agriculture as a result of changes in the politico-economic situation) is occurring: this is, after all, an empirically undeniable fact. It is difficult for an actor perspective or a farming styles position to argue how structural adjustment can occur without resorting to macro arguments, especially if the rationality and validity of local knowledge and practice is accepted.

Despite this structural adjustment, van der Ploeg believes that diversity is increasing not decreasing (according to Leeuwis, 1993b). This is an interesting assertion, one that would be an interesting hypothesis to test, but one that probably is not researchable. A critical element in the testing of such a hypothesis would be the precise definition of a style of farming. Another problem would be how to identify the styles of farming that existed historically. Thus post hoc studies would not be valid, although an ex ante study may be valid. Moreover, the results of one ex ante study would not necessarily be generalisable, as they might be related more to the unique features of that case.

I accept that as industrialised agriculture has emerged and develops further, new styles of farming have also emerged. Any new technology that has been introduced that requires

⁹ See the Proceedings of the Australia Pacific Extension Conference, Surfers Paradise, October 1993, Brisbane: Queensland Department of Primary Industries.

fundamental changes in farm management may also require, or lead to, a new farming style. However farming styles is a loose concept and is more of a heuristic device than an objective reality. Of course, as with any conceptualisation or typology, farmers can be placed into categories irrespective of how appropriate these categories are. Because I believe that farmers *adapt* rather than *adopt* new ideas, the total number of variations of farming will be equal to the total number of farmers. Thus if the total number of farmers is decreasing, the total number of farming variations is also decreasing.

Of course it is inappropriate to consider that there is a farming style for every individual, a farming style being a grouping of similar but not identical farmers, but I remain to be convinced how the number of farming styles can be increasing while the number of farmers is decreasing.

I am not satisfied with van der Ploeg's methodology for studying farming styles. Despite the best attempts at classification of farmers into these groupings, it is likely that farming styles cannot be uniquely determined so that every farmer can be easily identified or self identify with the appropriate style.

There are several reasons for why this cannot occur. Firstly, it is likely that farmers do not consciously adopt particular farming styles, but develop a style and/or into a style over time. Because they are not conscious of their style, they do not necessarily identify with a portrait of a style when it is presented to them (see Leeuwis, 1993b). It is also likely, particularly in industrialised countries where there is a mass scale of communication, local communication will be minimal and farmers will not have a common and unique language to describe various styles of farming.

Van der Ploeg tends to see farming styles only in terms of market orientation, which Leeuwis (1993b) finds rather limiting, and inconsistent with the concept of ethnotaxonomy. The farming subculture approach allows for diversity according to all forms of social, cultural, economic, or agronomic practices.

Van der Ploeg reifies his concept of farming styles, which he posits as an empirical objective entity not just as a theoretical heuristic concept. However, I have been unable to find an 'operational definition' or a precise method for implementing the concept. Van der Ploeg (1990) and others (Leeuwis, 1989, 1993b) who have attempted to test empirically the concept have not satisfactorily established the legitimacy of their classifications. Van der Ploeg claims that such classifications are an ethno-taxonomy, but I would argue, as Leeuwis (1993b) does, they are not a true ethno-taxonomy. The

classification may have more validity (ie the relationship between the concept to reality) and qualitative appeal than conventional classifications of farmers based on socio-economic position, but they are not the ethno-classifications van der Ploeg claims they are.

In conclusion, van der Ploeg has an important contribution in terms of increasing the awareness of the existence of, and of identifying the different styles of, the different manners of farming adopted by farmers. These different management philosophies need to be considered in any sociology of agriculture and in any agricultural extension program. They also explain how diversity in agriculture is created, exists, and will continue to exist, despite the influence of powerful macro political and economic processes. However, I cannot accept other aspects central to van der Ploeg's conceptualisation of farming styles, preferring my own conceptualisation of the farming subculture.

LEEUWIS, GIDDENS AND THE THEORY OF STRUCTURATION

Giddens' (1984) theory of structuration also attempts to bridge the schisms of macro and micro, actor and structure, and structuralist and interpretivist frameworks. Giddens suggests that the social sciences ought to focus analysis on social practices rather than on individual experience or on social structure. Giddens does not accept that social structure exists as an empirical or objective entity, but rather that social systems, as reproduced by social practices, exhibit structural properties. Structure therefore, according to Giddens, is manifested in social systems in the form of the 'reproduced relations between actors or collectivities, organised as regular social practices' (Giddens, 1984: 25). Social practices are recursive, that is, they are continually recreated by social actors, and thus structure exists as recursively organised sets of 'rules and resources, or sets of transformation relations, organised as properties of social systems' (Giddens, 1984: 25; adapted from Leeuwis, 1993a: 293).

Leeuwis (1993a) criticises and adapts Giddens' theory to make it more consistent with a constructivist position. Leeuwis (1993a: 296) argues that Giddens' framework is more useful than Habermas' position, because it accepts that communication is implicit in every social interaction, and because 'the production of meaning (and therefore the production of information) is *inherently* connected with the operation of power and normative sanctions'. It also provides, which the actor perspective lacks, an explanation about how structure exists, and how actors are involved in reproducing structure.

Leeuwis (1993a) also provides a very convincing argument why extension scientists should read Giddens instead of Habermas. Leeuwis argues that his adaptation of Giddens' theory is useful to the AKIS perspective in order to broaden its scope in dealing with communication and information in a more integral way. The theory is also useful to the Policy Instrument perspective to encourage the transcending of 'the rather narrow focus on the individual, the mechanistic conceptualisation of communication and the deterministic implications of outdated social psychology models' (Leeuwis, 1993a: 300). Finally, Leeuwis (1993a: 300-301) argues that Giddens provides advice for extension agencies.

Professional communicators [should] aim at capitalizing on what Giddens calls the 'double hermeneutic' of the social sciences. Thus, we should not look at extension as having a 'neutral' facilitating function for developing higher quality collective agency (as is the case in the KIS perspective), or as an attempt to persuade individuals to change and/or adopt particular behaviours on the basis of rational argumentation (as implicit to the PI perspective). Given the close interconnections between social structure, knowledge and power, it is better to look at extension activities as active and inherently political communicative interventions by which professional communicators aim at the production and/or reproduction of particular structural properties in society.

CONCLUSION: TOWARDS AN OVERVIEW OF A NEW COHERENT THEORETICAL POSITION THAT INTEGRATES THESE PERSPECTIVES

Like Wendell Berry (1977, 1981, 1990) and Rivera (1991), I do not believe that agriculture means 'agriscience', nor does it mean 'agribusiness', but, I would not agree that it simply means 'cultivation of the land'. Agriculture means much more than that. Farmers' land management practices have a social, cultural, historical, political, economic, and environmental basis. This implies that the 'cultivation of the land' is more than a technical activity, more than a cultural activity, and more than a response to structural situations. It is a composite activity of enormous social significance to those engaged in it.

This finale to this thesis has demonstrated problems in the thinking of many of the philosophies and sociological theories about agriculture. The earlier chapters in this thesis have laid the basis of a new theoretical framework to conceptualise agriculture.

Two things are predominant in this analysis: macro processes can not be ignored, and the subcultural activities of farmers must also be considered.

Habermas (1973) challenges researchers, scientists and academics to cater for three functions in their efforts at praxis:

- 1. the provision of critical social theories;
- 2. the organisation of enlightenment, in order to socially validate the theories;
- 3. the selection of appropriate strategies.

I believe that I have gone a long way in responding to the first two challenges, and it is the gravity of these positions that makes it difficult to respond positively to the third challenge. The actor perspective perhaps responds too much to the third function and not sufficiently to the first two.

Although, I have criticisms of the actor perspective of Norman Long, these are perhaps not fundamental. The power of the actor perspective is its policy about the level of emphasis, and the 'interfaces' between macro and micro, structure and actor. Clearly, my position is similar in that a focus at the interface is required, but not excluding the legitimacy of more macro or more micro research.

From the analysis presented in this thesis, other things can be established. There is a need to recognise that farmers are knowledgable and intelligent and that they interpret information and technology in terms of their own understanding of the world. This does not mean that farmers are all-knowing, that some of their information or knowledge is not wrong (at least maladaptive), or that they do not need 'help'. However, it does mean that people working with farmers must work with them and not against them, that extension services must not be patronising or subordinating of farmers, nor should they attempt to marginalise or ignore farmers who don't agree with the extension message.

There is a need to recognise that farmers adopt new ideas, not because they have been transferred and disseminated or diffused, but because they are of value, in one form or another — not necessarily of economic value — to farmers. When ideas or technologies are not adopted, it is because the ideas or technologies were of no value, or did not fit with the needs and expectations of the farmers themselves. It is also important to appreciate that ideas and technologies that are adopted are also adapted by farmers as they use them in the development of their own farming strategy. Furthermore, farmers are also creative with respect to management practices and technological ideas.

There is a need to accept that farmers, like all people in society, are cultural beings who operate in social groups that manifest a subculture. The compliance with the subculture is not a conscious activity, individuals are socialised into the group subcultures. Such subcultural behaviour is legitimate human behaviour which all people are doing, whether they are scientists in the laboratory, academics in front of a class, extension officers in the field, or farmers on the farm.

Furthermore, we need to accept that no-one is economically rational. Individuals have a range of culturally defined values and all their behaviour is about attempting to satisfy the competing demands of different values. The rationality of behaviour needs to be considered in response to the values held by individuals. Thus farmers, in oversimplified overgeneralised terms, are not interested in profit maximisation: they are interested in making a good living, for a certain amount of work, in a certain style of farm management, that does not cause too much environmental damage, and that does not expose them to too severe risks, financial and physical. With extensive interviewing experience (qualitative and quantitative) of Australian farmers, I can say without any doubt, that the primary goal in life for Australian farmers is to hand the farm on to the next descendent (usually the eldest son) in a better condition than it was received from their parents.

Despite my very positive view about farmers, I also consider that there are serious issues to be considered. Australia is facing a serious environmental crisis of massive land degradation on a large scale. Thus there is an environmental imperative for action to prevent this problem continuing and/or worsening. This land degradation has occurred as a result of the everyday activities of all Australian farmers in aggregate. The management practices of Australian farmers are clearly not environmentally sustainable. Furthermore, because some of these environmental problems are occurring for the first time ever, or are at an unprecedented level of severity, there is nothing about the knowledge or experience of farmers that is particularly useful in dealing with these problems. Instead, farmers ignore these problems and refuse to accept that they are occurring on their own farms. The complexity of these environmental problems means that even if farmers did perceive these problems as occurring, there is little that farmers could do that would have a short term effect. The regional basis of the problems means that community based action for change is required.

The environmental problem in agriculture needs to be considered as a form of social dilemma (prisoners' dilemma, tragedy of the commons, free rider problem) (see Hardin, 1968; Olson, 1965; Vanclay, 1981). At the aggregate level, the farming practices of

farmers need to change, but at the individual farmer level, it does not make economically rational sense to change. Of course, these dilemmas do not adequately reflect the social nature of agriculture and ignore the subcultural aspects of farming. Nevertheless, society can not expect farmers to act against their own self interest in order to protect the environment for the future for all people.

Thus there is no time for complacency. New environmentally friendly management practices need to be developed in conjunction with farmers, and farmers need to be assisted in adopting these new management practices. There is a need for useful and applied agricultural research and a need for a persuasive type of extension that effectively operates to encourage farmers to adopt environmentally friendly practices. Such research needs to be done in conjunction with farmers to increase the usefulness, validity and effectiveness or the research and extension process.

Finally, we need to consider the economic situation of farmers. Farmers are not able to change management practices when they are financially stressed as a result of changes in the macro-processes affecting farmers. The crisis of agriculture in Australia is of an enormous magnitude, partly as a result of global processes over which Australian farmers and Australian governments have no control, and partly because of the responses of Australian governments in the name of 'economic rationalism' which are exacerbating the situation. If we are at all concerned about the future of the Australian agricultural environment, the Australian government needs to rethink drastically its policies in relation to structural adjustment, rationalisation of services, privatisation of agricultural agencies, funding of extension services, subsidies to farmers, and protectionism, as well as a whole array of related policies.

The environment is a non-renewable resource. The soil that is blown across to New Zealand can not be replaced. We need to give greater consideration to its protection.

Hopefully, a more rational and less ideologically committed debate can occur in Australia with governments and society recognising their obligations to farmers and to the environment so that the lifestyle and environment of all people now and in the future can be improved.

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The Sociology of the Australian Agricultural Environment Frank Vanclay

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Frank Vanclay is an Australian, born in 1960 in Brisbane, Australia, of dutch parents. He grew up mostly in Mackay, in North Queensland, before undertaking a Bachelor of Science degree in environmental studies at Griffith University, in Brisbane. It was through environmental studies that he was exposed to social scientific explanations of the world. These had great appeal to him, and in 1981, he completed an Honours degree in political science/sociology with a dissertation entitled, A Criticism of the NeoScarcity School of Political Ecology. In this dissertation, he examined the logical contradictions in the attempts of various environmental writers (in particular, Garret Hardin, William Ophuls and Robert Heilbroner) to argue the case for neo-Hobbesian, Leviathan style governments in the current period of perceived environmental crisis.

Following this, he worked as a research assistant and Project Officer in the Institute of Applied Social Research (the consulting arm of the School of Australian Environmental Studies at Griffith University), while undertaking additional studies at the University of Queensland (also in Brisbane) in sociology and psychology, particularly concentrating on social research methods and statistics. In 1986, he completed a Master of Social Science, with a dissertation on the Socio-Economic Barriers of Farmers' Adoption of Soil Conservation Technology, based on research amongst farmers on the Darling Downs, Queensland, Australia. As a Senior Research Assistant and Project Officer in the now Institute of Applied Environmental Research, he completed many research projects and consultancy reports on social environmental issues.

In 1986 he became a contract Senior Teaching Fellow, and then, in 1987, a contract Lecturer, in introductory sociology, environmental studies, and research methods, at Griffith University. During this time he continued to undertake many research projects as a fellow of the Institute of Applied Environmental Research.

In 1988, he became a freelance consultant, before taking up a short term position as Senior Research Fellow in the School of Agriculture and Forestry in the University of Melbourne, examining farmers' knowledge and awareness of soil salting, and the barriers to adoption of salinity control practices.

In 1989, he was back in Brisbane as a freelance consultant, before joining the Department of Psychiatry at the University of Queensland as a Senior Research Officer undertaking research into adolescent alcohol use. As a freelance consultant, he had contributed significantly to research into rehabilitation after stroke with the Department of Occupational Therapy at the University of Queensland.

In 1990, he joined the staff of the School of Humanities and Social Sciences, at Charles Sturt University, in Wagga Wagga, in inland New South Wales, as a Lecturer in sociology. He became a Key Researcher in the newly developing Centre for Rural Social Research, personally attracting considerable funding for research into the social aspects of agriculture and the environment. In early 1993 he was given tenure at Charles Sturt University, and was successful in his application for sabbatical in the latter half of 1993, when he went to Wageningen. This PhD, based on papers he had written since the time he was in Wagga Wagga, was submitted at the end of his sabbatical.

At Charles Sturt University he teaches, or has taught, introductory sociology, the sociology of health and medicine, the sociology of alcohol and other drugs, police and society, and social research methods. He hopes to teach rural and environmental sociology, social impact assessment, sociology of food and agriculture, and sociology of science.

He has a strong research interest in social impact assessment, and with his skills in research methods, statistics and computer data analysis he is involved in many projects requiring quantitative data analysis. He is a member of many professional associations, and has extensive involvement with The Australian Sociological Association, and the International Association for Impact Assessment.

Together with Geoffrey Lawrence and Brian Furze, he has edited Agriculture, Environment and Society (Melbourne: Macmillan 1992). At present he is editing a series of 'state of the art' key papers on the various forms of impact assessment on behalf of the International Association of Impact Assessment to be published in their journal, Impact Assessment, and separately as a book with a commercial publisher.

The Sociology of the Australian Agricultural Environment Frank Vanclay

SAMENVATTING

De Sociologie van het Australische Agrarische Milieu Frank Vanclay 1994

De Australische landbouw bevindt zich in een crisis; de agrarische handelsvoorwaarden verslechteren; veel boeren hebben negatieve inkomens en een omvangrijke structurele omvorming vindt plaats met een overheidsbeleid die de uitstoot van marginale boeren uit de landbouw ondersteunt . De Australische overheden hebben zich vastgebeten in de filosofie van het economisch rationalisme. Dit schept een politiek klimaat waarin er sprake is van verminderde steun voor overheidssubsidiëring van de landbouwsector, een reductie van het landbouwvoorlichtingsaanbod en een overheid die -in principeafwijzend staat tegenover een regulerende en op materiële prikkels gebaseerde benadering van milieumanagement. De veranderde omstandigheden landbouwvoorlichtingsdiensten genoopt om aanzienlijke veranderingen door te voeren. Deze crises in de landbouw en de landbouwvoorlichting vallen samen met een grotere behoefte aan effectieve landbouwvoorlichting vanwege de verergerde landdegradatie in Australië. Toenemende verzilting en verzuring, achteruitgang in bodemstructuur en bodemvruchtbaarheid, wind- en water-erosie, vernietiging van natuurlijke leefmilieus en fauna, invasies van houtige onkruiden in graasgebieden, en andere milieuproblemen, vinden plaats op een niet eerder voorgekomen schaal. De ernst van deze problemen schept een verplichting tot ingrijpen in de sfeer van milieumanagement.

Echter, het debat over milieuproblemen in de landbouw werd tot nu toe gedomineerd door technische discussies over de fysieke aspecten, oorzaken en oplossingen van deze problemen. Daarnaast hebben landbouwvoorlichtingsdiensten zich alleen geconcentreerd op het vergroten van de adoptie van milieumanagementpraktijken door boeren. Nooit is er aandacht geschonken aan de sociale fundering van de landbouw, de sociale, politieke en economische processen die de Australische landbouw hebben gevormd, of voor de sociale, politieke en economische wortels van de agrarische milieuproblematiek. Ondanks de crisis waarin zij zich bevinden, houden landbouwvoorlichtingsdiensten zich vast aan traditionele paradigma's ten aanzien van de adoptie van milieumanagement praktijken. Deze denkwijzen zijn ontoereikend om de complexiteit van agrarische milieuproblemen te begrijpen.

Dit proefschrift bestaat uit gepubliceerde artikelen die het thema milieumanagement vanuit een kritisch sociologisch perspectief benaderen. Dit perspectief is toegepast op drie analyseniveaus: internationaal, nationaal en regionaal. Het internationale niveau betreft een positionering van de Australische landbouweconomie in het kader van de mondiale politieke economie en de gevolgen van deze positie voor de Australische landbouw en het milieu. De analyse op het nationale niveau gaat in op de reacties van voorlichtingsdiensten ten aanzien van zowel milieumanagement als de veranderende politieke omstandigheden in Australië en de gevolgen van hun handelen voor milieumanagement in de praktijk. Tot slot wordt in dit proefschrift ingegaan op de rol die individuele boeren spelen in het agrarische milieubeheer en de manier waarop hun handelen door internationale en nationale processen wordt beïnvloed.

Kernwoorden: landbouwmilieu, landbouwvoorlichting, Australië, milieusociologie, rurale sociologie, agrarische sociologie, duurzame landbouw.