Integrated farming in the lowlands

Integrated farming in the humid lowlands brings to mind the image of small, intensive and diversified agricultural production systems. In this issue, we refer to humid lowland tropics as rainfed or irrigated farm lands that are flat or gently undulating, usually at an altitude near sea level (Durno et al, 1992). The production system which characterises lowland humid tropics in Asia is rainfed and irrigated rice, often in combination with fish, livestock, vegetable and tree crops. In the case of Africa or Latin America, lowland production systems are more varied and more difficult to characterise in general terms. But in either case, there is more than just rice.

Editorial

In many areas, the relative abundance of rainfall and the flat topography allows for the integration of fish production during part of the cropping cycle. The wide variation in the rainfall patterns of the lowlands leads to a great diversity in integrated farming systems. This diversity is also due to contrasting size of farms and tenure arrangements, proximity to markets, and access to credit, infrastructure and inputs. The different uses of scarce land resources, the wide crop and animal diversity, and many resource flows within the farm and beyond show the farmers' skill and creativity to make the most of this diversity.

Integration is more than diversification, it is far more complex. There are traditional forms of integration which farmers in countries like Indonesia, Vietnam or Rwanda have developed over many generations. There are also cases of "new" integration driven by newly introduced ideas and technologies. The case of fish ponds is an example where farmers learn to manage water, nutrients, crops and fish. More environmental pre-requisites need to be assessed before deciding to try it out. Also, learning to keep fish is much more difficult than handling a new crop variety.

High yields, low profit

This agroecology, however, is also associated with the significant but short-lived yield increases in rice production enabled by the Green Revolution of the 1970s. Rice yields of 5 t/ha and above under a monoculture, high-input production system have led to significant food increases, particularly in Asia. The results, however, have also caused many unwanted side-effects: increased pest incidence, environmental deterioration and health problems, increased socio-economic differences, decrease in nutrient recycling and loss of biodiversity. In recent years, for many small-scale farmers these outcomes have meant lower profits, even in high input situations. The debate between the high-input Green Revolution advocates and its critics has been particularly intense with regard to the humid lowlands because of their high production potential (Ceres, July-August, 1995).The Green Revolution essentially made the environment suitable to the technology. In other words irrigation was brought in for monoculture paddy rice with chemical inputs. That approach contrasts with the articles in this issue which describe efforts to combine technologies and practices to suit varying environments.

Among the unwanted effects, erosion of local knowledge and farmer decision making capacities are rarely mentioned. The Green Revolution was based on the transfer of technology model whereby technology developed by scientists, was packaged by extension services and transferred to farmers for adoption. It further led to a failure to recognise the significance of indigenous inventiveness (Richards, 1985). However, not only were farmers rarely involved in the development of the technological packages, but the introduction of these packages often led to the loss of local crop varieties and resource management knowledge. This means that when problems arise, the farmers are ill equipped to adjust their practices to face new problems.

Population pressure

Resource degradation in the lowlands is also the result of increased population pressure. The pressure towards intensification is acute, average farm size in Central Java is 0.6 ha (Van de Fliert & Wiyanto, p6) while in Bangladesh it is as low as 0.4 ha (Kamp, p20). Limited off-farm opportunities leave the majority of farm families with few options to increase household incomes. Traditional resource management practices, like collecting natural fish and crustaceans from canals and paddy fields, are threatened by intensification and pollution (Gregory & Guttman, p15). In some cases, the predicament of food insecurity is further aggravated by the lack of fuel resources. In Bangladesh animal manure is used for fuel thus breaking another source of on-farm recycling of nutrients (Kamp). The inevitable result is a degradation of the farm resources and a loss of household income and food security. Watershed deforestation also leads to unreliable water sources, salinisation and soil degradation. The excessive use of chemical input no longer solves increased pest problems. A combination of debt, migration and low market prices for produce (higher risks for monocropping farmers), leave rural communities with no buffer. Urban sprawl further aggravates the situation. The result is an erosion of the social fabric, the shared labour and group decision making traditions. In some instances, mechanisation had resulted in a redundancy of women's traditional skills and a reduction in their income. The question then is, are there solutions to these problems, or do we need to understand *the problems in a different manner? (Durno, et* al 1992)

Redefined problems?

The article by Elske van de Fliert and Wiyanto is a story from Indonesia on how one farmer has overcome the above pressures and learned to adjust, trusting his own judgement. The story of farmer Pak Yanto is inspiring because he acquired a capacity to adapt and guide his production system towards ecological and economic sustainability. The central role of the farmer is one of an expert, a skilled developer of integrated systems. After all, each farmer is a specialist capable of juggling the farm resources optimally to fit her or his own circumstances. This message is common to many articles in this issue. It is not surprising then that many of the authors describe experiences where farmers are closely involved in developing solutions. Their message is consistent: the diversified and integrated production systems described are adapted to local circumstances and are a cost effective alternative.

Ideas for integration

The experience gained in the Philippines with tilapia production stimulated the Cambodia experience described by Nandeesha et al. on page 17. Likewise, the idea of growing trees and legume crops on dikes in Bangladesh came originally from Indonesia (Kamp). These alternative systems have been developed through interaction with outside experiences. The interaction, however, has been productive when the outside technology is introduced respectfully. This means, allowing that the farmers themselves are able to integrate and adapt practices to their farms. The term "adoption" is no longer appropriate. This is no longer the way in which practitioners and farmers interact. Instead, we now find increasingly often reference to facilitation and joint learning.

A desirable role for outsider researchers or field workers supporting farmers is referred to as one of facilitation (Dowall, p13). In many cases, however, this role is difficult to attain. Field workers have no training in techniques to facilitate farmer-based experimentation. Moreover, those who have received training are often faced with working conditions where bottom-up planning, and learning with rural people lead to no professional rewards. Facilitation requires a new professionalism to allow rural workers to gain respect from performing their new role (Pretty & Chambers, 1993). It would appear from the articles in this newsletter, that such conditions are found predominantly within international projects,

Photo: MC Nandeesha

Farmers separate termites from the soil to feed them to their fish.

universities and NGOs.

The institutional dimension also refers to farmer organisations, especially where farmer-to-farmer extension is taking place. Dowall's article from Cambodia makes reference to farmer clubs as a mechanism for exchange of experiences. In these local organisations, the crucial role of women is highlighted, especially as 35% of households are headed by women.

Facilitating farmer experimentation, however, requires more than a supporting institutional setting. Concrete methods for learning with farmers are needed, tools to guide them in structuring and building on their existing decision-making experience (Hamilton, 1996). Such tools prove useful in terms of reducing risk. The experience by Gregory et al in Cambodia is an example where an assessment tool is in the making. This tool helps field workers and farmers identify the conditions which make it worthwhile to invest capital and labour in fish culture.

This new role for the outsider conveys a trust in farmers' capacities. Redefining roles, in this sense, is part of redefining problems. The reader will find that many of the articles demonstrate a redefined problem with promising solutions which are viable both in ecological and economic terms. Furthermore, there is reference in the story of farmer Pak Yanto, that an alternative production system which is viable in both economic and ecological terms, also provides farmers leverage to negotiate with landlords.

Economically viable

The search for economic viability within integrated, ecologically sound practices is a central theme in the articles from the Philippines (Velarde, p10), Bangladesh (Kamp), Cambodia (Dowall, Gregory, Nandeesha et al) and Malawi (Noble). Of these, the articles by Dowall and Velarde offer detailed household budgets with data on the return on labour. For instance, Dowall's data shows a US$ 5.60 return per labour day compared to farm labour wages of about US$ 1.60 per day in Kandal province, Cambodia. On the other hand, Velarde provides comparative data across three years of production. The production systems described are versatile in many ways, but most noticeable is the fact that often the produce -be it fish, rice or vegetable- can be used for self-consumption or, if prices are good, sold at a local market. Local markets also have the advantage that local consumers prefer the tastier local varieties, which happen to be more pest-resistant and command better prices. The use of multiple species of fish used in several of the papers also represent a mechanism for diversification. The Nandeesha et al article from Cambodia further exemplifies diversification by mentioning over 20 farm by-products and ingredients utilised to feed fish. Diversification also means finding creative uses for existing resources; this is the case from India described by Chinnamuthu where pigs are used to manage nut sedge.

Fish-driven alternatives

Several articles in this issue describe experiences where the cultivation of fish was introduced, or re-introduced, and became a focal point. In Van de Fliert and Wiyanto's Indonesia case this was possible because fingerlings could be sold for cash. In other words there was a short term, market-driven motivation. This is also the case in the article by Nandeesha et al. from Cambodia. In the Malawi example (Noble, p8) fish ponds are a focal point for improving natural resource management, namely water supply. In this situation the population pressure is coupled with the deterioration of traditional production systems. Therefore, the introduced idea had several advantages: reducing risk and flexible adaptation to conditions across different farms and during different years. The local adaptation in time and space is important. Farmers manage the different pond and crop integration differently every year and adjust to climatic variation. In dry years in Malawi farmers chose to grow vegetable crops in the nutrient-rich ponds where there is less moisture stress.

Gregory and Guttman describe how environmental degradation becomes a threshold for farmers to switch interest from collection of natural fish, to aquaculture. This shift is summarised by the authors as the difference between "uncertain management" and "management of uncertainty". The first case refers to the existing practice of harvesting of fish from the wild, and the difficulties encountered as the environment deteriorates. The second case refers to a flexible approach where farmers' capacities to adapt to changing conditions is part of their management practices.

Conclusion

A farmer-led pace of transformation towards integrated farming is a common theme to many articles in this issue. In this context, "sustainability" refers to the capacity of farmers to adapt to changing economic conditions and to respond to changing, often deteriorating, environments. There appears to be a trend away from the technology dissemination approach and a growing interest in enhancing farmers' decision making capacities. The Indonesia experience describes the impact of the farmer field school as a model for extension, particularly in terms of integrated pest management. The Nandeesha et al article mentions that farmers received guidelines on affordable options at a training centre.

Farmers were encouraged to keep records, not "adopt". Likewise, the Philippines experience described by Velarde mention training as key components. The complex production systems described are all adapted to site-specific agronomic, social and economic conditions. The expansion of such farming systems can only take place if rural communities are given the opportunity to shape their own integrated farming and decide if they should grow more than rice. ■

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