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## **SUPPORTING SUSTAINABLE AGRICULTURE THROUGH EXTENSION IN ASIA**

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*There are widespread concerns about the environmental impact of agricultural technologies and over the long-term sustainability of farming systems in Asia. Although the content of extension programmes includes sustainable technologies, extension approaches and methods in the public sector continue to reflect a technology transfer paradigm. In the frequent situations where mass media and extension materials contain relatively little information to help farmers to decide how to adjust their farming practices in the interests of long-term sustainability, national and donor policies can enhance the sustainability of agriculture by increasing the complementarity between extension providers and encouraging changes in extension approach, extension worker training and mass media treatment of agricultural and environmental issues.*

### **Policy conclusions**

- Extension programmes should encourage local development or adaptation of technologies; address the needs of specific categories of client; support farmers' organisations and farmer-to-farmer extension; and influence collective as well as individual behaviour.
- Diversity of extension provision, from agencies in the public, private, NGO and academic sectors, gives clients greater choice of sources of information to support the long-term sustainability of their farming.
- Extension worker competence can be improved by training which addresses learning objectives specifically related to sustainability, and by introducing management practices which support continued learning and professional development.
- Mass media coverage, and the relevance of content to rural audiences, can be improved at relatively low cost. Radio should be used specifically to promote farmer-to-farmer communication.
- Extension materials should be designed to offer options and problem solving strategies, facilitate decision-making and technology adaptation, and contain

more explicit treatment of sustainability in relation to technical content.

## Introduction

Agricultural extension is the conscious provision of information and communication support to rural users of renewable natural resources. It involves offering advice, helping farmers analyse problems and identify opportunities, sharing information, supporting group formation and facilitating collective action.

Extension is done not only by extension agencies but also by farmers, scientists, commercial companies and mass media organisations. Traditionally extension has been linked with production objectives. More recently, food security, improved nutrition, equity and poverty alleviation have become part of the agenda of organisations providing extension services.

The demise of the Training and Visit system of agricultural extension in Asia has coincided with growing concern in the region over negative environmental effects of some elements of agricultural technology. High potential areas, which have registered impressive productivity gains, experience problems from excessive or poorly drained irrigation, leading to salination, waterlogging and depletion of groundwater reserves, with added concerns over the consequences of indiscriminate or inappropriate use of agrochemicals. In the drier, rainfed areas, problems are related more to the effect of expanding populations farming at greater intensity or in inappropriate areas, and include deforestation, soil erosion and decline in soil fertility. The analysis below of how extension agencies can address environmental and sustainability issues is based on a two year study in Bangladesh, central Philippines, and Karnataka and Tamil Nadu in south India (Garforth et al., 1997).

## Extension approaches and sustainable agriculture

Box 1 suggests how extension organisations which are moving from production to a wider set of sustainability and environmental objectives may need to change their extension approach.

An enterprise focus on the whole farm and its natural and human resources is more likely to contribute to sustainable livelihoods and production systems than one which concentrates on a single commodity or which deals with crops but leaves livestock (and forestry/agro-forestry and fisheries) extension to different organisations.

A targeting of extension resources on clientele whose livelihoods are most threatened by environmental degradation - or whose current land use practices pose most threat to sustainability - may be called for. This might typically include those farming on rainfed uplands, female headed households, and the resource poor generally. On the other hand, where environmental problems affect all categories of household in a

community or area (for example, in a watershed), targeting by location rather than farm or household characteristics or socio-economic status may be needed.

Means of influence over RNR users' behaviour range from the extreme of enforcement by legislation, through persuasion, advice, provision of information and training, to engagement in participatory problem-solving.

Sustainable farming and natural resource management is relatively knowledge intensive' requiring the application of general ecological principles to a specific situation. Joint problem solving with clients, leading to an enhanced ability to identify and solve problems, will be an appropriate way of influencing their future behaviour.

Extension objectives can range from the effective transfer of technology to the building up of strong rural organisations which can exert influence over future research and policy agendas, and also take and enforce collective decisions over natural resource management. A shift towards the latter will promote more sustainable agricultural development.

Most extension agencies have concentrated on influencing clients' decisions in respect of land and other resources at the individual household scale. Many of the environmental problems which affect small-scale farmers, however, can only be solved through collective decisions and action. Extension personnel may need to spend more time supporting collective decision-making and facilitating follow-up action.

Direction refers to the main flows of planning and technical information between extension agency and clients. The sustainability agenda calls for local participatory planning, and a willingness by extension agencies to learn from farmers' experiences, knowledge and technology.

For scope of service and payment, the requirements of sustainability are less clear. If a particular environmental benefit is regarded as a public good, there would be arguments for providing extension support free of charge: but if the benefit is to the long-term viability of the individual farm, it would be appropriate to expect the client to bear at least some of the cost. On the other hand, action by vulnerable resource-poor households who can afford neither the short-term costs of implementing more sustainable farming practices nor the cost of extension support may require both a free service and the provision of some material inputs.

**Box 1. Changes that may be needed in an extension approach in order to address sustainability issues effectively**

DIMENSION		A	B	C	D	E	
Enterprise focus	commodity			*	@		whole farm

<b>Clientele</b>	<b>target category</b>		@	@	*		<b>all households</b>
<b>Means of influence</b>	<b>enforcement</b>			*	@		<b>problem solving</b>
<b>Extension objectives</b>	<b>technology transfer</b>	*	@	@			<b>organisation</b>
<b>Scale of influence</b>	<b>individual</b>	*	@	@			<b>group community</b>
<b>Scope of service</b>	<b>information only</b>		*				<b>material inputs also</b>
<b>Payment for service</b>	<b>clients pay</b>					*	<b>free service</b>
<b>Direction of information flow</b>	<b>top-down</b>	*	@	@	@		<b>bottom up</b>

## Environmental and agricultural policies

Governments in the region face conflicting pressures: the need simultaneously to increase production of food and other RNR outputs, keep food prices within the reach of urban consumers and address environmental concerns. Policy on input subsidies is a case in point: subsidies help to keep the cost of production and food prices low but encourage levels of input use which may be economically and environmentally unsustainable.

Production objectives still predominate. Where subsidies have been reduced or removed, the driving force has been a move towards liberalisation of markets and removal of distortions in trade rather than to encourage a more environmentally appropriate use of agricultural inputs.

## Farmer and extension worker perceptions

Environmental issues have a higher profile among extension workers and farmers in India and the Philippines than in Bangladesh, where land is scarce, farms are small and food security is a major concern. However, extension workers and farmers in all three countries agree that the most pressing environmental problems are climate change and uncertainty, decreasing water supplies and deforestation. Farmers are also concerned about things which impinge on them more immediately, such as excessive weed growth (and the scarcity or high cost of labour to deal with it), encroachment of non-agricultural land uses and increasing levels of salinity in soils and water.

The majority of farmers in all areas except Tamil Nadu experience problems over soil fertility and/or maintaining productivity levels. Most see the use of inorganic fertilisers as an essential requirement to increase or maintain productivity.

This view is shared by most extension workers. At the same time, there is widespread awareness of the importance of organic matter, and acceptance in India and the Philippines that chemical fertilisers can damage the soil.

## Sustainable technologies

It is possible to establish, with a reasonable degree of consensus, ecological, economic and social criteria to assess whether a technology is likely to contribute to the sustainability of agriculture in a particular area. The more precisely one specifies a technology, however, the more difficult it is to make judgements about its sustainability except within a specific context.

Farmers have long been modifying somewhat rigid extension recommendations in response to a range of concerns. However, apparent farmer inclination towards sustainability is often driven more by financial than environmental motives. For example, policy changes to reduce or remove fertiliser subsidy may stimulate a search for alternative ways of maintaining soil nutrient status. On the other hand, where the prices of inputs remain artificially low - as with free electricity to pump groundwater in south India - farmers tend to continue using them at rates which cannot be sustained indefinitely. At the same time, technologies which might commend themselves on ecological grounds can be uneconomic, particularly for small-scale farming households. The rising cost of manure in India and Bangladesh - a reflection both of increased demand and reduced supply - is a stark example. This makes organic alternatives to mineral fertiliser more attractive and feasible to richer farmers, who have better access to manure and can more easily afford to accept reduced income during a transition from one to the other, than to the resource poor.

Some ecologically beneficial local practices are being abandoned - green manuring and use of leaf litter in the Indian study areas, for example - because of declining per capita land availability and the loss of common access resources.

## Extension approaches and provision

Extension approaches in the study areas are in some respects changing in ways which can promote or enhance sustainability, though not necessarily with that as an objective. For example, the public sector's move towards decentralisation and local level extension planning in Bangladesh has been driven by a policy decision that extension should be demand- (or client-) led which in turn was based on the perception that research-driven technology transfer had proved insufficiently effective. On the other hand, the commitment of many NGOs to participatory modes of extension and to the facilitation of farmer-to-farmer extension does stem in part from a recognition that sustainable livelihood systems must be rooted in locally adapted and tested technologies.

The growing diversity of extension services offers greater overall coverage, with different sectors complementing one another by meeting different needs or covering different population groups. Complementary roles are also seen in the technology development process. Environmentally appropriate technologies which are now being widely promoted by extension services have often been developed or introduced initially in the context of a local, often intensively resourced, programme of an NGO or university provider.

The main way in which extension organisations have taken on board environmental concerns is in the content of extension programmes, and particularly in the type and range of technologies on which advice, information, training or other forms of support are offered. Except in a few innovative programmes - for example the FAO-supported IPM programme - extension methods remain much as before, with a heavy reliance on demonstrations to convince farmers that they could benefit from an introduced or modified technology. Extension workers' attitudes do not yet support a shift from one-way, top-down approaches, towards participatory problem solving.

## Extension worker training

Extension workers from government services have a greater understanding of the scientific basis of sustainable technologies' than staff of academic, NGO or commercial operations.

Those working for NGOs and academic institutions, on the other hand, are more aware of the social issues involved in adoption of the technologies. There is scope for sharing of expertise and perspectives, either through joint training activities, or by the different sectors working together in complementary roles within an extension programme.

NGO extension staff are also more aware than others of the potential income benefits of farm technologies, and of the financial implications of their adoption. This reflects NGOs' concern for livelihoods and their greater familiarity with the priorities and constraints of resource poor rural households. But it may also reflect the lack of emphasis in formal extension worker training on the economics of small-scale agriculture. For instance, little or no consideration is given to variability and risk, matters which the resource poor have to take very seriously when considering a change in farming practice.

### Box 2. Extension approaches to support sustainable agriculture

Extension approaches should:

- Embody a whole farm or farming system orientation with individual clients, and an interdisciplinary orientation when supporting collective RNR management.
- Use collaborative problem-solving as the dominant mode of influence on clients' behaviour.
- Use extension resources to support the development of independent client organisations.
- Work increasingly to influence and facilitate planning, decisions and action at group and community levels.
- Incorporate bottom-up and interactive processes for extension planning and technology development.
- Encourage learning which will enable clients to manage with minimal extension support in the future and to identify critical points at which support is needed.

Extension personnel need both to build up a broad understanding of ecological systems and processes relevant to the areas in which they work, and to develop skills in the assembly and interpretation of local information and in supporting local decision making by individual farmers and groups. Extension worker training curricula are increasingly being rewritten to give stronger emphasis to sustainability and environmental issues. There is some evidence of a move towards more learner-centred and participatory approaches to training, which are essential if extension workers are to develop the attitudes and skills necessary for client-centred, participatory extension practice.

## Knowledge and information

Farmers appear to use more traditional knowledge in India than the Philippines, perhaps because areas in India which have not been caught up in the green revolution have long been settled by people who have inherited knowledge about the area, whereas in the Philippines many of the rainfed and most vulnerable areas are inhabited by immigrant farmers. This requires a more supportive extension role to help upland farmers develop appropriate farming systems.

Where agricultural information systems are dominated by government research and extension organisations, the resource poor who are often more in need than others of information on sustainable and low external input technologies are least likely to gain access to it. This was seen particularly in Tamil Nadu (Lawrence, 1996), where the channels of information accessible to the resource poor delivered information on new varieties and fertiliser recommendations, while the richer farmers had access to information on a much wider range of technologies through subscription journals and newspapers. This skewed availability of information is reinforced by informal communication networks which do not generally cross socio-economic boundaries. The challenge for information providers external to the local social system is to enable key actors in all local networks to access information which may be relevant to network members.

There is relatively little information available through the mass media to help farmers decide how to improve the sustainability of their farming practice. Mass media organisations in the study areas do not actively seek out relevant technical information, or take account of farmers' views and their solutions to local problems and situations. The mass media can be a powerful tool for exchange of views and sharing of information within a rural population, but are seldom used in this way. In both print and broadcast mass media, there is little attempt to involve the users in the design and production of media content, an essential step if information is to become more relevant, useful and accessible to farmers.

## Organisational change

A major development is the decentralisation of decision-making, planning and management within the main public sector extension services. While in principle this should enable local extension teams to respond to the environmental issues which face their clients, and to involve them more directly in establishing priorities for extension support, it is also creating some new tensions. This is partly because reorganisation is being accompanied by a reduction in funding and/or personnel. An added dimension in the Philippines is the lack of clarity in the Local Government Code of the division of responsibilities between municipal, provincial, regional and national bodies for functions which were formerly carried out by extension staff of the Ministry of Agriculture. The most promising progress is seen where specific attention is given to the development of new procedures, backed up by in-service training, which embody bottom-up planning, accountability to clients and a direct link between locally identified priorities and agricultural research programmes.

## Policy implications

There are significant public good dimensions in this area, both in the formal, market failure, sense that a service or good will not be provided by the market if the potential purchasers or clients cannot keep the benefit to themselves, and in the sense that it is in the general public interest that farming be carried out in a sustainable manner.

Governments therefore have a legitimate role in framing agricultural extension policy, monitoring provision by the various agencies which offer extension services, and in funding (but not necessarily managing) extension activities which promote sustainable farming practices.

### Box 3. Extension worker training for sustainable agriculture: areas for action

Learning objectives should include:

- Specific technical knowledge and competence in respect of sustainable technologies - at the level of principles underlying categories of technology and the range of possible adaptations and permutations of components which may be appropriate to farmers' varying circumstances.
- Competence in using, and selecting from, a range of extension methods.
- Ability to comprehend farmers' practices in terms of systems and ecological processes.
- Attitudes and interpersonal skills which will facilitate farmer experimentation and farmer-to-farmer extension. Training (teaching and learning) methods help trainees to internalise particular strategies and patterns of learning which they will use in their professional practice. They also influence the methods extension personnel use in their interaction with clients. Extension workers who are expected to encourage farmers to adapt technologies to their own farm and local environment should be encouraged to learn about sustainable technologies through direct observation and experimentation. If sustainable agricultural development requires extension workers to engage farmers in dialogue, respect farmers' knowledge and recognise the social and economic dimensions of technology, their own training should incorporate methods which embody these principles.
- Management practices to support future professional development include supervision, appraisal (linked to reward systems and career development) and the use of short-term project teams.

Extension only makes sense if it responds to the information and support needs of RNR users. The language and thought patterns of message delivery' are too restrictive to promote sustainable farming practice and land use. A balance is needed, in extension planning and technology development, between top-down and bottom-up processes. The dominant communication model underlying relationships between extension agencies and RNR users should be based on interaction and convergence, not the linear transfer of information or messages.

Some degree of coordination and cooperation between extension providers, particularly at local level, should be encouraged. This can include agreements between agencies to work in different geographical areas or with different categories of clients, to provide specialist services within each other's programmes, and to share information about locally adapted or developed technologies.

National extension policy, and donor support, should promote changes in extension approaches which will enhance sustainability rather than merely increase efficiency of contact with clients and the relevance of top-down technology development and information delivery (Box 2).

Staff comprise the most expensive and valuable resource of extension agencies. Implementing new extension approaches has profound implications for training and professional development, particularly for front line staff in direct contact with clients but also for those who support and manage them. This is an area where donors can have a major impact. Support to training institutions and to the training of extension personnel is investment in human capital which will be available to support sustainable agricultural development whatever future changes take place in extension policy. Action is needed in relation to learning objectives, training methods, and management practices which will facilitate continued learning and professional development (Box 3).

Mass media can be used more creatively than at present to support RNR users' decision-making - through increased coverage of environmental and sustainability issues, improved relevance of content to specific audiences, and use of programme formats which facilitate horizontal communication between users. Similarly, print and other extension material can support sustainable RNR use more effectively if their form and content are tailored to the needs and characteristics of audiences, offer options and facilitate decision making, encourage the adaptation of technology to local circumstances, provide a more explicit treatment of sustainability in relation to the technical content, and give information on the economic and financial implications of any recommended technologies, including the uncertainties and known risks involved.

Decentralisation within extension services, and devolution within public administration of powers over the allocation of public funds to support local agricultural (and other) development, are important moves towards the evolution of client-driven processes. They will not guarantee them, however. Processes must be developed, tested, monitored and adapted, and staff development programmes implemented to ensure their effective use.

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