odi
Agricultural Research & Extension Network

AgREN

Network Paper No. 129

July 2003

IMPROVING WATERSHED MANAGEMENT IN DEVELOPING COUNTRIES: A FRAMEWORK FOR PRIORITISING SITES AND PRACTICES

Carlos Perez and Henry Tschinkel

This paper summarises observations based on previous assessments of watershed management projects in developing countries. These observations are based on a review of the activities of seven private and governmental organisations in Guatemala which were promoting watershed management before and after Hurricane Mitch struck Central America in 1998. Also included are short-term reviews of watershed management projects in Bangladesh, Bolivia, Costa Rica, Ecuador, Guatemala, Honduras, Niger, Peru, Thailand and Uganda. In all of these cases, the authors visited field sites, interviewed project personnel and participant farmers and reviewed project documents and other technical literature. To complement and contrast with their first-hand experience, the authors perused the international literature on watershed management. The paper proposes a framework to prioritise among the long list of possible watershed management activities, and sharpen the intervention focus on those few critical activities and locations capable of yielding a good, long-term payoff for resource users, their communities and the environment.

Research findings

Most watershed management projects implemented in the last 25 years in developing countries have tried to combine poverty alleviation and resource conservation goals, but neither of these goals has been satisfactorily accomplished.

- *'Working with the poor' has been commonly used as a criterion for selecting watershed management activities and sites. However it has not been a very useful guide for choosing sites and activities.*
- *A poverty alleviation approach tends to foster focusing on individual farmers' plots as the main planning units (rather than on the whole catchment area); working with the poorest segments of the population (rather than all the groups who benefit from and/or impact on the watershed); and assigning a disproportionately higher priority to some watershed management threats and corrective interventions which, although important for the poor, may not be the most important from an overall watershed management perspective.*
- *To have effective watershed management it is critical to explicitly adopt a conservation approach, i.e. to use conservation criteria to define the target area and population, the most locally appropriate poverty reduction activities, and scale of interventions.*

Policy implications

For the interventions to have a positive impact on watershed conditions, the authors propose several general principles:

- *Concentrate on contiguous sites defined by the threats to the landscape, chances of success and cost-effectiveness of the investment, where landscape and economic improvement will be self-evident.*
- *Include all stakeholders in watershed management rather than only the poor farmers in the target areas, as is the current practice among most development organisations.*
- *Select preventive rather than curative activities, and base them on land use capacity and income generating potential for maximum cost-effectiveness.*
- *Treat farmers, large and small, as informed clients to whom development organisations are accountable and who are capable of deciding what is good for them in the light of their resources, priorities and values.*

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The Agricultural Research and Extension Network is sponsored by the UK Department for International Development (DFID)
The opinions expressed in this paper do not necessarily reflect those of DFID.

ISBN 0 85003 676 3

Acknowledgements

We would like to thank all the organisations and individuals that facilitated field work in watersheds throughout the world. We are grateful to Sara Scherr, Hans Gregerson and an anonymous reviewer for their critical and thoughtful comments on an earlier version of the manuscript.

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Figures and tables

Acronyms and abbreviations

AGUDESA	*Asociacion Guatemalteca para el Desarrollo*
CIAT	International Center for Tropical Agriculture
FEAT	*Fondo Especial de Asistencia Técnica*
GIS	Geographical Information System
INAB	National Forest Institute (*Instituto Nacional de Bosques*)
NGO	Non-Governmental Organisation
NRM	Natural Resource Management
PBR	payment-by-results
PROASEL	Private Organisations for Sustainable Agriculture on Hillsides

IMPROVING WATERSHED MANAGEMENT IN DEVELOPING COUNTRIES: A FRAMEWORK FOR PRIORITISING SITES AND PRACTICES

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1 INTRODUCTION

In developing countries both non-government organisations (NGOs) and government development agencies have implemented watershed management projects for at least 25 years with the aim of increasing agricultural productivity and reducing poverty on hillsides in rural areas. In the last seven years or so, biodiversity conservation organisations have also set up a few watershed management projects as a way to intensify production and reduce farmer encroachment on neighbouring forested areas with high biological diversity.

Most of these projects have tried to combine the goals of resource management and poverty alleviation – seldom achieving either one, although both are valid and must be combined. After all, natural resource management is inexorably linked to issues of sustainable rural livelihoods (Carney, 1998). One cannot assume, however, that any approach to poverty alleviation supports effective and long-lasting natural resource management, or vice versa. Often poverty reduction and watershed management goals are combined in a simplistic manner. It is quite rare to find, for instance, projects where the natural resource management trade-offs implied in some poverty alleviation strategies are discussed and taken into account. Given that the pressures behind unsustainable patterns of development and natural resource management are multiple, the projects try to address as many constraints to the farmers' economy as possible, but often end up with a long list of dispersed activities and practices that do not necessarily come together and support each other. In Guatemala, for instance, one project simultaneously promoted 21 agricultural and ten forestry-related practices at farm level (Ecodesarrollo, 1996). Implementing that long list is excessively complicated, time-consuming and ultimately ineffective.

Many of the watershed management projects throughout the world have not taken into account land use capacity and its restoration and prevention potential. They have centred on activities that although important at the plot level do not add up to transformations at the landscape level (Critchley et al., 1994; Hudson, 1991). Additionally, they have been top-down, have not accommodated the interests of resource users nor motivated their interests, and have not incorporated all stakeholders nor learned from their feedback (Ecodesarrollo, 1996; Farrington and Lobo, 1997; Hinchcliffe et al., 1999; IDB, 1995; Kerr et al., 1996; McDonald and Brown, 2000; Morris, 1997; Perez and Tschinkel, 2000; Pretty and Shah, 1999; Tschinkel, 2001). They have been fixated on rigid technology solutions geared to replace instead of complement local conservation practices. With these approaches, projects have not been able to foster activities that strongly reinforce both economic development and long-term management of natural resources.

A major question is, therefore, how to select watershed management sites and activities in such a way that organisations can simultaneously address the social and economic goals for local inhabitants as well as the aims of watershed conservation and restoration. In other words, the issue is how to prioritise the many possible activities, and sharpen the intervention focus on those few critical activities and locations with good, long-term results for resource users, their communities and the environment. In the present paper we attempt to address these problems by proposing a systematic method of choosing practices and working sites in small watersheds.

This paper summarises observations derived from earlier assessments of watershed management projects, including USAID-funded projects in Guatemala (Perez and Tschinkel, 2000; Tschinkel, 2001), and short-term reviews of watershed management projects in Bangladesh, Bolivia, Costa Rica, Ecuador, Guatemala, Honduras, Niger, Peru, Thailand and Uganda carried out by Perez between 1989 and 1999. In all these cases, we visited field sites, interviewed project personnel and participant farmers and reviewed project documents and other technical literature. We have also taken into account evidence from the international literature on watershed management.

We have concentrated our review on projects in which government or non-government organisations aim to improve watershed conditions through interventions on the ground. We have not covered very massive watershed and integrated rural development projects such as some in India, China and other large countries. Although there is a great deal of diversity among the watershed management projects reviewed, in general terms they tend to be those trying to combat soil erosion in hillside areas, using mainly technical solutions to promote soil conservation. None of the projects use coerced soil conservation and in fact the vast majority explicitly profess adherence to participatory project management approaches. However, they tend to promote off-the-shelf technologies (physical barriers and reforestation are their preferred options) and show very little flexibility to change the technologies in response to inputs from farmers or the market. Their approach to watershed management is clearly agronomically and farm-production centred. Some projects emphasise water conservation to increase water quantity for domestic use and irrigation. Despite this, virtually none of the

projects we reviewed coordinated soil or water conservation with broader natural resource protection and planning efforts. They have no explicit goals to reduce water pollution, promote stream stabilisation using natural or other processes, or promote contiguous habitats to increase biological diversity of river fisheries and other aquatic life forms and wildlands. The vast majority of the projects are funded through grants from international donor organisations and provide support to less than 2000 farmers per project.

Our aim is to improve the decision-making process in watershed management. We assume that conducting watershed planning is not strictly an objective process, but also judgment- and value-based. The values of the individuals who are making decisions about the watershed will determine which conditions are in fact problems, and which problems and their impacts are more important than others. Farmers and research and/or development 'experts' will interpret data with values, rules and assumptions that often are not clearly defined. Hence, a requirement for sound assessment and planning is to make those values and rules explicit. Also, ultimately local citizens (farmers and other stakeholders) rather than experts should make watershed management decisions (Lovejoy et al., 2000).

For the interventions to have a positive impact on watershed conditions, we propose the following general principles:

- We advocate focusing on sites defined by the threats to the landscape, chances of success and cost-effectiveness of the investment, where landscape and economic improvement will be self-evident.
- We encourage including all stakeholders in watershed management rather than only the poor farmers in the target areas, as is the current practice among most development organisations.
- We promote selecting activities that are preventive rather than curative, and hence more cost-effective and long-lasting, on the basis of land use capacity and income-generating potential.
- We promote treating farmers large and small as informed clients to whom development organisations are accountable and who are capable of deciding what is good for them in the light of their resources, priorities and values.

Our framework parallels and complements existing watershed management economic assessment guidelines (Gregerson, et al., 1987).

2 FOCUS ON THE POTENTIAL FOR RESTORATION RATHER THAN ON POVERTY

The choice of working areas is one of the most important decisions a watershed management project is likely to make. The criteria used for selecting the sub-watersheds and working areas, however, often have very little to do with watershed conditions and more with historical factors such as opportunities that have developed or work already done in those areas by projects with economic development goals. The working area within a watershed has commonly been selected by focusing on sites where the social need is greatest. This has resulted in a deliberate and often explicit policy of promoting watershed management primarily among some of the poorest of the rural poor who tend to occupy thousands of small plots in areas with the poorest natural resources, particularly in the upper parts of watersheds.

Unfortunately, in most cases this policy has not brought about changes at the landscape level. 'Working with the poor' has not been a very useful guide for choosing watershed management sites and activities for at least three reasons:

First, development organisations tend to use individual farmers' plots as the main planning units and to be concerned with the individual farms rather than the whole watershed catchment area or even hillside. The practices they promote tend to be site-specific, isolated and dispersed, and are limited to soil management at the farm and common property level rather than including landscape management. They risk serving many farmers superficially, reducing the chances of subsequent spontaneous spread of the practices so that economic or environmental impacts are usually minimal. A concentration on poverty alleviation does not encourage development organisations to think in terms of economic or ecological 'systems' larger than farms, seriously undermining their capacity to contribute to sustainable, broad-based development and natural resource management.

Second, by focusing on the poor, development organisations have no incentives to design their activities in such a way that they are consistent with the fact that watershed management results from and is influenced by the interaction of a very diverse set of stakeholders. These include not only richer and poorer crop and livestock producers but also people whose livelihood depends on harvesting forestry and fishery resources, in the uplands, and town dwellers and political figures in the lowlands. To this one should add that these people often belong to different social, ethnic and linguistic groups with diverse economic, social and political power. All of them derive different benefits from the watershed resources. Their access to land and other resources covers the range from privately owned, to usufruct-right to common property. Despite this diversity, many development organisations define their mandate as helping poor farmers to improve their living conditions and tend to shy away from working with better-off farmers. Few implementing organisations work with watershed stakeholders other than the small farmers, even when in some watersheds large landowners including local government units control most of the land and use most of the water resources. If large areas in a watershed are to be covered, the large owners cannot be ignored. Changes in land management practices among a few better-off farmers may bring about more improvements in the watershed (from soil erosion control and efficient use of water for irrigation to biodiversity enhancement) than working with resource-

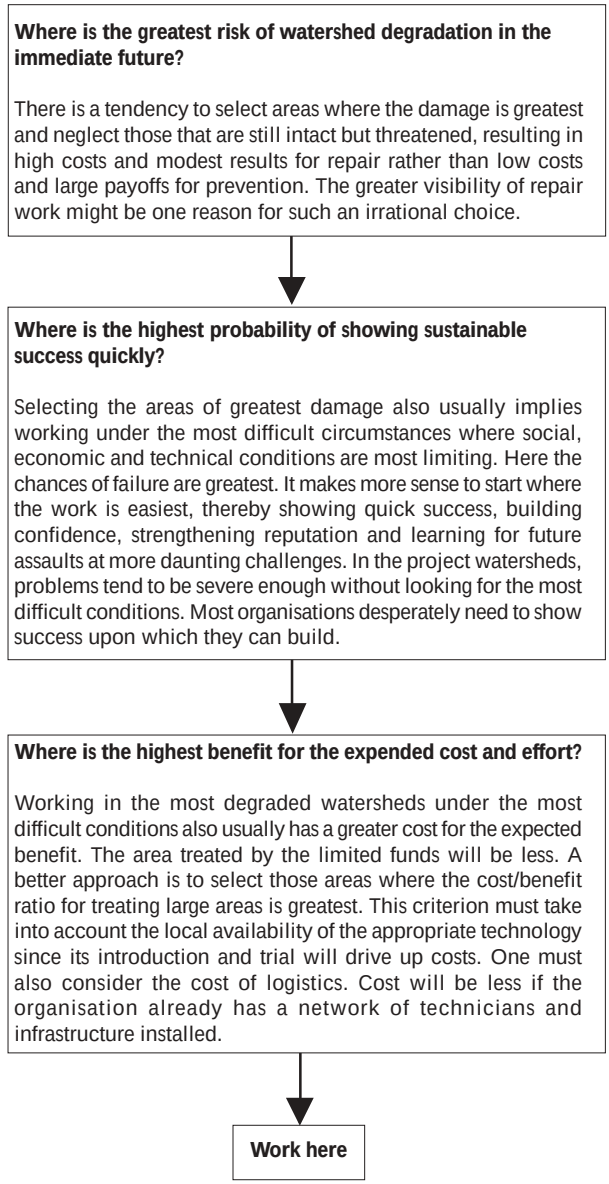
poor farmers alone. Additionally, many soil and water conservation technologies are likely to be viable only in the more intensive farming systems and are unlikely to be adopted by the resource-poorest households (Ellis-Jones and Mason, 1999).

Third, a focus on poor farmers contributes to assigning a disproportionately high priority to some watershed management threats and corrective interventions which are not the most important from an overall watershed management perspective. Concentrating on the poor farmers may contribute to neglecting the protection and management of the remaining forest cover, which in some watersheds may still be considerable. In some cases, protecting and/or reforesting uncultivated upper watershed areas may do more for overall watershed management than working in lower-elevation cultivated fields. This focus also neglects dealing with erosion and reduction in water quality and quantity that result from roadsides, footpaths, breakthroughs, livestock production, grazing lands, village life, landslides and morphoerosion in the landscape. Recent studies show that these are often more important contributors to soil erosion in developing countries than small-scale agricultural production (van Noordwijk et al., 1998; Wilson, 1995; Swallow et al., 2001; Tiffin and Gichuki, 2000).

In most cases, working with the poor is a necessary condition for effective watershed management but that alone is seldom sufficient. Development work and watershed management practices must change the local economy and landscape, not only improve a few dispersed plots. Targeting the poor and even ensuring their active involvement through participatory design and implementation of watershed management projects may address only one of the many factors involved in natural resource degradation. Development and watershed management organisations should focus on clusters of farmers who live and work around areas in the watershed with a high potential leverage, rather than working with any poor farmer regardless of his/her location in the watershed. Instead of concentrating efforts where there is poverty, the implementing organisations should work with all the major stakeholders and clearly target areas where there is greatest risk of watershed degradation, the highest probability of showing sustainable success quickly and of spontaneous proliferation of that success (Figure 1), plus the highest benefit for the cost and effort expended.

This is not a trade-off issue of whether to invest scarce outside resources in humanitarian efforts for the poor on marginal potential hillsides or to maintain a healthy, productive landscape. It is not a choice between people or trees/soils, or even benefiting upstream or downstream dwellers. It is rather a challenge of identifying the most critical limiting factors and the best leverage points to achieve both economic development and long-term management of natural resources. This is similar to the concept of addressing factors that limit plant growth: adding fertiliser to stimulate plant growth will have no effect if the limiting factor is water or disease.

Figure 1 Criteria for selecting sub-watersheds and working areas within them



Watershed management projects need to start with rapid but systematic analyses of the nature and roles of stakeholders in the watershed. These analyses will be critical to design interventions that address the threats to and opportunities for watershed management created by the stakeholders' conditions and goals.

One of the greatest challenges is to establish institutional mechanisms that coordinate and engage most stakeholders in coalitions for collective action in the uplands and lowlands, within a micro-watershed and even between watersheds (Ravnborg and Westermann, 2000; van Noordwijk et al., 2000). This is very difficult given that stakeholders have different (and often conflicting) visions and perspectives on what needs to be done, relative political weight, and interest and space to compromise (Johnson et al., 2001; Rhoades, 1998).

One example of how broad institutional coordination can support watershed management and sustainable livelihood goals is found in the 'Carchi Consortium' (Consorcio Carchi) in northern Ecuador. The consortium operates in the El Ángel River sub-watershed, which encompasses 23,000 inhabitants and some 55,000 ha, including the Ecological Reserve El Ángel (15,715 ha). The consortium was created in 1994 by many national and international research organisations operating in the watershed area to facilitate coordination of their individual research efforts and implementation of joint activities without losing institutional authority or autonomy. The inspiration came from the experience of the Cajamarca municipality (Peru) which organised local institutions so they could all support one common local natural resource management plan. Over time the Consortium made possible the creation of one common Geographical Information Systems (GIS), baseline survey on agriculture and natural resource management practices, bibliographic archives open to all researchers and local organisations, and highly coordinated biophysical and socioeconomic research. The main mechanism for inter-institutional dialogue and coordination was a series of monthly meetings in the area. In the Consortium's early phases researchers comprised 80% of the membership. In 1998, however, the Consortium decided to move towards involvement by local citizens in support of economic development and watershed management. It organised itself into working groups around issues of critical importance to the management of the area (natural resource management (NRM), productive activities, environmental education and collaborative NRM conflict management). Consortium members provided funds for training and technical support for six neighbourhoods to prepare a pilot resource management plan for 5000 ha in the high barren plain (*paramo*). The draft plan was widely discussed through several local fora, then collectively implemented. At the same time, local agricultural research committees were created for participatory research on water resource management, reforestation of hills and riparian corridors with native species, and small-scale plastic greenhouses for intensive vegetable production. The functions and structure of the local agricultural research committees are based on those that the International Center for Tropical Agriculture (CIAT) originally created in Colombia. Today, almost all local associations, as well as public and private institutions with operations in the watershed, participate in the Consortium and in the management of the watershed (Poats, 2002).

Obviously, there is a strong likelihood that, when setting watershed management priorities with all the stakeholders, the perspectives and voices of the poor (and women) may be drowned out and their interests sidestepped. It is important, therefore, to pay attention to social and economic differentiation among farmers and other resource users, and to actively contribute to strengthening collective action institutions that increase the capacity of the poor to represent themselves and defend their rights in the community of stakeholders. Watershed management, however, cannot take place with the participation of poor producers alone.

3 START WITH LAND USE CAPACITY

Watersheds cover a variety of resources including agricultural land, grazing land, forests, wetlands, common waterways and residential areas, and these resources have many users. It is critical to select interventions that match the protective potential of those resources as defined by their land use capacity which is the most intensive use that a land unit will support without being physically degraded. It is based on physical properties and can be considered as a constant for that unit. Ideally no land in a watershed should be used beyond its capacity. In reality, many areas in project watersheds are overused and it is these that are causing most of the watershed problems.

We recommend that the concept of land use capacity be applied by the implementing organisations in all activities that deal with land treatment. We propose adopting a classification system that is practical and easy to apply at different scales. One example is the classification used in Guatemala, which adapted some of the commonly used land use classification systems and is officially used by the forest service (INAB) for determining land eligible for reforestation incentives, allocation for agriculture and other purposes (INAB, 1999).

The categories used in the INAB methodology are ranked in decreasing order regarding the intensity of use that can be accepted without placing the land productivity at risk, i.e. contributing to increased soil erosion and decreased soil fertility. In order to show its wide applicability we include below examples for each category from Vietnam:

1. Annual cropland without limitations (A):
   - rice paddy and vegetables for cash crops
   - intensive cultivation
2. Annual cropland with improvements (Ai):
   - vegetables, maize, soybean, potatoes, beans, strawberries
   - sugar cane, cassava, tobacco
3. Agroforestry with annual crops (Aa):
   - forest plantations of soft wood with short rotation
   - flower production
4. Sylvo-pastoral systems (Ss):
   - cattle production
   - cut and carry for livestock
5. Agroforestry with perennial crops (Ap):
   - mushroom production
   - fruit trees and orchards
   - Agroforestry (coffee, tea, *miang*),
6. Forestland for production (F):
   - large-scale diversified reforestation and forest plantations
   - small-scale village woodlots for construction timber
7. Forestland for protection (Fp):
   - promotion of soft tourism
   - thinning and selective harvesting of hard and soft woods and minor forest products

A land unit classified as suitable for intensive use may also be used for less intensive activities. Hence, land classified for intensive agricultural use may be used for agroforestry systems or even for forestry production. The opposite, however, is not technically possible. A unit classified for forestry use does not support more intensive agricultural or livestock uses without jeopardising soil stability.

These land use potential categories have traditionally been applied in regional and national land evaluations to define broad and homogeneous units in a landscape. The categories have been a convenient macro-level planning tool particularly appealing to officials and technicians from outside the areas in question. However, the categories can be used at a micro-spatial level and take into account the great diversity in slopes (angles, lengths and shapes), soil types and mosaics of cultivated and fallowed fields on composite toposequences that characterise most landscapes (Turkelboom and Trebuil, 1998). Obviously, the closer one gets to the level of micro-catchments and villages the more complex the landscapes seem. Often one sees a combination of many land use classes within one dominant land use, in patterns that resemble more an archipelago of land uses (or a landscape mosaic) than a solid, single land use type. It is therefore important, so that the classifications are as useful as possible for planning at farm level, that watershed management organisations engage natural resource users to identify local land use classes that reflect their landscape.

It is more important and effective to embrace the principle of the need for farmers and other resource users to identify and agree upon simple criteria by which they can determine the most intensive use of a land unit than to adopt one classification and teach it to farmers. Micro-scale land use capacity assessment need not be complicated. It does not necessarily require investment in maps and GIS, even if it takes the form of sketch mapping with local residents as surveyors and tri-dimensional renditions or GIS (Poole, 1995; Rambaldi and Callosa, 2000; Sheng et al., 1997). Defining local land use capacity, however, certainly must reflect local resource interaction practices. Collaboratively drawing transects that indicate how cropland and forests are used, privately or communally managed and zoned in local villages may be all that is needed to define local land use categories. The bottom line is that projects should not promote practices that exceed the capacity of a site based on the local definition of land use potential. Where the land is already used beyond its capacity, projects should focus on the difficult task of promoting conversion to less intensive uses.

4 EMPHASISE PREVENTIVE, COST-EFFECTIVE AND LONG-LASTING APPROACHES

Quite often, low-cost practices with very low visibility among the farmers and public at large are more effective for watershed management than expensive structural practices. The critical importance of mulching for soil conservation on hillside farms, for instance, is hard to appreciate. It is therefore tempting to promote practices that are visible throughout the year or to address the most dramatic cases of watershed erosion. It is also quite tempting to promote reforestation and afforestation as the preferred interventions for watershed management.

Implementing organisations, however, will get more returns from watershed management efforts if they emphasise prevention rather than cure. In general, development organisations seem to spend relatively little effort in promoting preventive agronomic and agroforestry practices that have proven to be more effective for soil conservation than curative approaches. There is a tendency to invest in rehabilitation on one site while the forest is being destroyed on another nearby, or to promote physical and vegetative barriers instead of integrating these into improved tilling and cropping systems. Focus tends to be on reforestation, but very few organisations give adequate importance to the protection of existing forests. However the potential payoff of preventing damage rather than repairing it is much greater. Preventive practices such as avoiding slash-and-burn, fire prevention, zero tilling, mulching, contour farming, natural vegetative strips and selecting/combining annuals and perennials according to slope and land use potential should be promoted more widely in watershed management. These relatively simple techniques are often overlooked because they do not fit the expectations of implementing organisations and donors regarding 'sophisticated technology'. In general terms, in highly intensified production regimes it is more realistic to invest in maintaining a few vegetated areas (including riparian borders, hedges and paths) between fields rather than to invest in a quixotic quest to transform all the fields back into forests (van Noordwijk et al., 1998).

Organisations involved in watershed management should also emphasise perennial crops. Despite the steep slopes and soil erosion potential in most target areas, the predominant emphasis among development organisations tends to be on annual staple food crops or on reforestation, while neglecting the promotion of perennial crops such as pigeon peas, black pepper, citrus, cacao, coffee, tea and rubber trees which are more likely to protect the soils on hillsides than annuals. A balanced combination of annual and perennial crops will do a lot more for the farm economy, wildlife habitat and watershed conservation than annual crop production alone. Extensive areas of well-managed shade-grown coffee in Central America are an example of the good watershed cover that perennials can provide. The trees under which coffee is grown help to hold soil in place, and provide mulch with their fallen leaves and shelter for pest-eating predators. With a multilayered canopy the tree foliage and leaf litter provide foraging sites for birds seeking insects, spiders or other small prey. Some trees fix nitrogen in the soil, while others are a source of additional forest products (such as fruits, wood, vegetables, nuts and medicinal

plants) that supplement farmers' incomes (Perfecto et al., 1996).

It pays to have a strategic approach to planting trees rather than engaging in reforestation campaigns as the first and often only line of attack for watershed management. It is neither necessary nor cost-efficient to reforest to protect watersheds. Planting forest trees is very costly and there will never be sufficient public funds available for plantations to cover large enough areas to have a significant effect on the conservation of large watersheds. Furthermore, where one places trees is more important than how many trees are planted. Maintaining riparian buffer strips can be equally or more effective in reducing sedimentation and increasing water quality than establishing large tracts of forest. Soil surface cover is more important than forest cover per se, and some non-forest land can have very little erosion (Cassells, 1987). Some farmer-developed agroforestry mosaics are as effective in protecting watershed functions as the original forest cover (van Noordwijk et al., 1998). In humid tropical environments, the dense vegetation that develops after only a few months of abandoning agriculture and grazing or of excluding fire provides equal or more adequate watershed protection than planting trees. Private agroforestry, by small and large landowners alike, can do a lot more than forest plantations to form a protective cover and reduce pressure on remaining natural forests while bringing fast payback to producers (USAID, 1995). In any case, watershed management organisations should consider forest trees as crops rather than as conservation cover, i.e. crops that farmers can harvest and derive financial or other benefits from within a reasonable time. There is an increasing number of examples of private owners and communities managing blocks of forest for timber and other forest products. Although not in mountain watersheds, in the Petén of Guatemala 22 community groups, industries and cooperatives are deriving significant income from managing 350,000 ha of forest (Chemonics and IRG, 2000).

5 PROMOTE A FEW SELF-PERPETUATING PRACTICES

Improving the lives of a few hundreds or even thousands of farmers does not necessarily amount to generating sustainable development. Likewise, conserving the soil in thousands of plots does not automatically amount to managing and rehabilitating the whole watershed. The only hope of achieving a lasting impact with relatively modest funds is to foster development which starts something that will continue to grow and spread on its own. This contrasts with many current projects that continue to provide inputs but do not aim for self-perpetuating growth. Projects need to limit themselves to practices that are of such benefit to the farmer that s/he will continue them on his/her own and his/her neighbours will emulate, and will continue to change the landscape, even long after the project itself or other assistance promoting the practice has ended (Tschinkel, 2001).

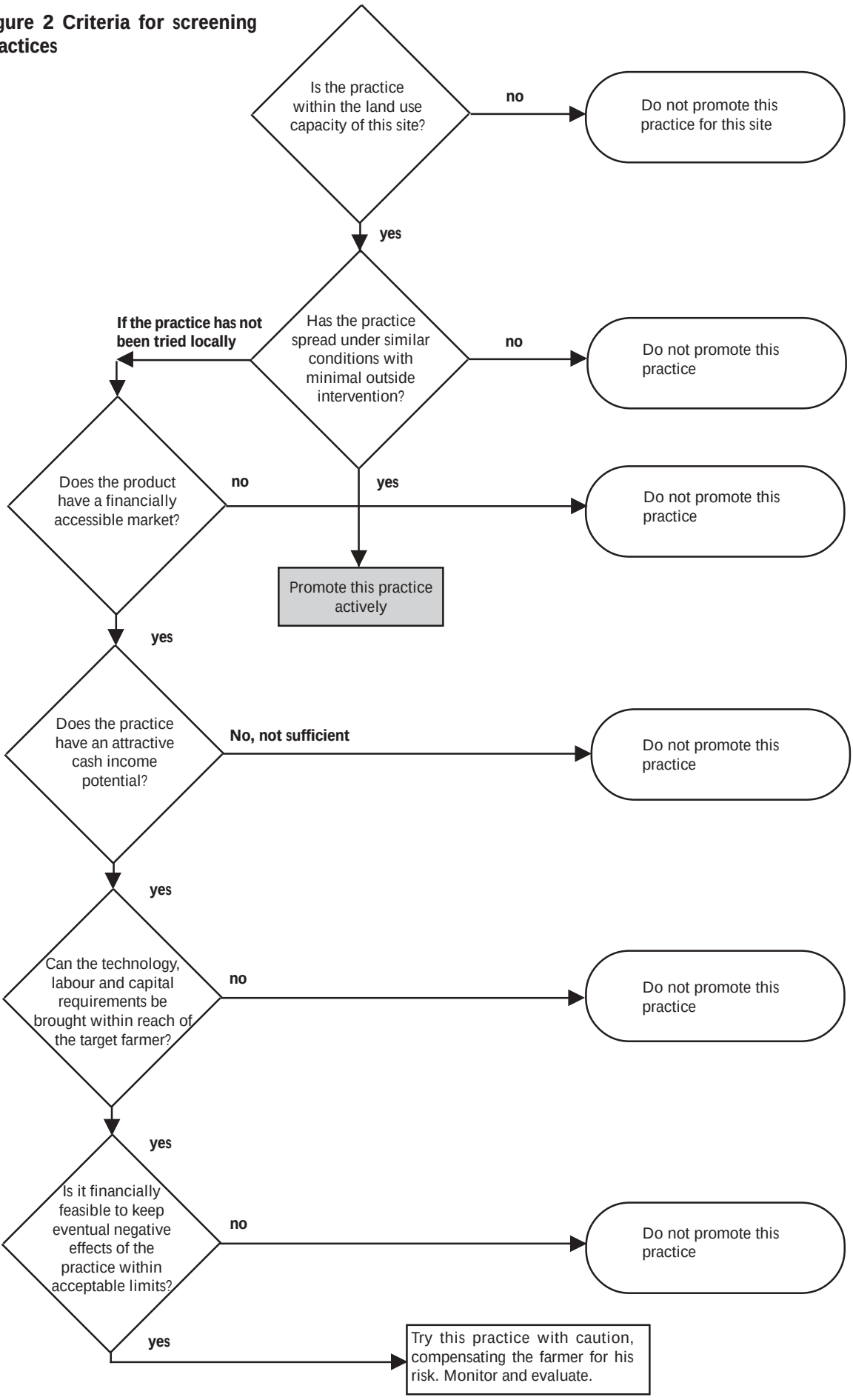
One of the most important challenges for development institutions, therefore, is to continually screen the number of practices that they offer, focusing on a few that are likely to spread on their own because they are easy, convenient and relevant to the farmers' resources and priorities. Farmers often test technological innovations in small, less than optimal segments of plots where failure would not represent a major setback. It is, therefore, critical for development organisations to keep track of evidence of spontaneous adoption of the technologies as shown, first, by their spread to other areas of the farm, and then to other parts of the landscape. Examples of spontaneous adoption are the spread of legumes for green manure and the increasing use of contour ploughing and planting on small farms in Guatemala and Honduras.

To achieve the adoption of technology by great numbers of project participants and non-participating farmers it is important to avoid 'blanket' extension recommendations that are supposed to be valid for all farmers, regardless of their resources and productive goals. One standardised recommendation (and particularly the same one over time) does not work because it does not take into account that farmers and fields are heterogeneous. In addition, farmers' goals change continuously in adaptation to new opportunities. The economic strategies of small-scale farmers are heavily influenced by short-term goals, and this increases proportionately with the integration of farmers into the market economy. What worked yesteryear may no longer be relevant today. Many of the practices that have been promoted for years, however, are not being culled or streamlined even though many non-starters should have been discarded.

We propose that the criteria indicated schematically in the decision tree of Figure 2 be used to identify practices that merit consideration. In our discussion 'practices' includes both management techniques and physical inputs (genetic material, agricultural chemicals, etc.). The decision tree highlights the need for projects to learn from what has worked and promote practices that continue on their own. At the same time, it encourages the projects to try innovations that meet land use capacity, income-generating potential and ability to respond to other farmer priorities.

Correctly defining and providing the inputs and practices most relevant to farmers will require a good understanding of (and detailed data on) their farming conditions, labour resources and other inputs available, problems farmers encounter when they try the technologies, farmers' opinions of the technologies, process of technology diffusion to other fields, changes, adaptations, add-ons and 'pruning' carried out on technology by farmers. Rather than considering technology development as one segment with a clearly defined end, it makes sense to think of it as an ongoing process of technology refining. The more farmers and other resource users participate in technology generation and adaptive transformation, the higher the likelihood of the resulting technology catching the imagination and enthusiasm of farmers, and its spontaneous adoption and diffusion (Garrity et al., 1998; Fujisaka, 1989). Over 15 years a CATIE-coordinated multipurpose tree project in Central

Figure 2 Criteria for screening practices



America evolved and promoted agroforestry practices in close collaboration with farmers, resulting in widespread adoption of spectacularly fast-growing trees such as *Eucapyptus camaldulensis* on the south coast of Guatemala and of teak, *Gmelina arborea* and *Bombacopsis* in western Costa Rica.

6 FOCUS ON INCOME GENERATION

There is an unstated belief among many of the implementing organisations that erosion occurs because farmers do not know how to manage soil and water properly. As a result, the organisations invest a great deal of effort to advise, train and 'educate' farmers about erosion-control methods. Some organisations even pay farmers with food or access to credit to adopt soil and water conservation practices. Environmental conservation campaigns are organised, with posters, bulletins and radio announcements praising the virtues of conservation, reforestation, contour ploughing, etc. Demonstration plots are set, and many hours are spent with farmers to develop land management plans for farms and small watersheds, i.e. layouts on paper showing what a site is supposed to grow in several years. Despite all these efforts there are few adoptions among farmers, and even fewer adoptions are long-lasting. Often, the conservation structures and practices are not well maintained. Construction without maintenance is at best a teaser: terraces do not withstand strong rain, and in some cases worsen gully erosion when they break (Fujisaka, 1989).

The reality is often that most farmers fully realise the losses caused by erosion, and frequently use traditional soil erosion control methods. The reasons they do not enthusiastically adopt the conservation practices espoused by the implementing organisations have more often to do with the organisations' rigidity in applying technological packages and the farmers' limited labour or financial resources to experiment with and adapt some of the most promising technologies proposed than with their ignorance of soil erosion problems and solutions. But the most important reason for non-adoption is that farmers do not see clearly visible economic returns deriving from the technologies, which often require long-term investments, are difficult to perceive or measure (Bunch, 1999) and /or subtract from area cultivated.

A staff member from an implementing organisation stated that farmers had no interest in soil conservation for the fun of it but looked instead for increases in crop yields or cash revenues. First, most of these organisations tend to promote agricultural production almost exclusively for household consumption. Clearly there is a need to improve the productivity of staple foods, but working exclusively on improving these crops provides a very limited leverage point for substantially improving the small farmers' economy and environment. Second, the organisations tend to promote some agricultural and soil conservation practices because they are effective in curtailing soil erosion. They are technology-focused (i.e. on the soil or the crop) rather than driven by economic incentives. While the organisations seek to reduce soil erosion, the farmers are more interested in improving yields and income with the scarce resources they have.

Development organisations need to take income generation and farmer market participation more into account as powerful mechanisms positively or negatively influencing watershed management. Most farmers need cash income for their households. They often purchase staple foods to complement their own production, work as day labourers or migrate to meet their cash needs. With income farmers buy food, agricultural inputs and know-how. Many farmers meet the goal of food security only through income-generation.

Organisations managing watersheds should select practices that are low-cost, productivity-enhancing, value-adding to the farm income, risk-reducing in the short term and which require little labour or management investments (Ellis-Jones and Mason, 1999; Garrity et al., 1998), in order to ensure their widespread adoption among neighbouring farmers. The economic viability of the farming households and the ecological health of the watershed depend on the farmers' access to cash via cash crops and other income-generating activities, e.g., production of cash crops, value-added processing and non-timber forest products. In recent years a variety of non-traditional crops grown for export has transformed watershed landscapes in Guatemala and Honduras (snow peas, broccoli, berries, ornamentals, cut flowers, mangoes, etc.). Not all are good watershed covers but all are very labour-intensive, thus tending to keep farmers off marginal lands. Many thousands of hectares of pine forests in Honduras were protected against wildfires for years because local inhabitants tapped the trees for resin, until a drop in resin prices made this activity less profitable. Establishment of more productive grasses (i.e. *Bracchyaria* sp.), pasture rotation, fertilisation and other good management practices are gradually replacing the extensive, traditional practices in many areas.

Compensation for the provision of environmental services that benefit society in general is receiving increased attention. In this case, watershed management efforts should include support for policy changes needed so that users of water and hydropower pay farmers for upstream interventions that protect the watersheds. This would be a large step toward assuring financial sustainability of watershed management and breaking the dependence on external funding. The city of San Pedro Sula, Honduras is about to add an item to the water bill, specifically charging consumers for management of the municipal watersheds.

Finally, in many situations there are no viable solutions based on agriculture or forestry and the only hope is to generate non land-based income. This is especially critical in some of the steep, dry, overpopulated watersheds on the Pacific slopes of Honduras, El Salvador and Guatemala where entire regions depend on supplying migrant labourers and on remittances of cash from relatives abroad.

Almost all of the practices that have radically altered the landscape in the recent past are market-driven and mostly include crops (i.e. coffee, rubber and forest tree plantations) with considerable economic returns. One should beware, however, of potentially high environmental costs. In Vietnam, for instance, large forest areas have been converted to cash crops (tea, coffee and mulberry) as part of the overall development of markets and exports since the early 1990s. Many farmers have planted cash crops even when the varieties, soil conditions and slopes have not been suitable (Ha and Espaldon, 2001). Clearly, cash crop production is not always a watershed-supporting force. The point, however, is that income-generating activities must be emphasised in watershed management.

7 FOCUS ON KEY INSTITUTIONAL AND POLICY CHANGES

Most implementing organisations' watershed management extension efforts focus on technology transfer and environmental education at the level of individual producers and their associations. In this context, it is standard practice for them to engage in dialogue with the leaders and authorities of individual villages to promote soil and water conservation. It is less common for the organisations to communicate regularly with or facilitate the coordination of activities among all the institutions operating in the same target area in order to promote a coordinated approach to watershed management. It is even more infrequent for them to go beyond coordination and actually promote policy and institutional changes.

Effective management of a watershed, however, requires taking into account and working with more factors than the typical farm-based soil conservation or site-specific restoration project. Watershed management necessarily entails coordination, comprehensive efforts and improved communications and more direct involvement of local communities, institutions, local governments and other stakeholders in the management of the watershed as a whole. This is not only because of the web of chemical recycling and energy flow (water flow, water pollution, erosion, landslides, fish migration, etc.) which unifies the watershed. It is also because of the confluence of individuals and institutions which impact on the resources of the watershed through agricultural production, irrigation, road and bridge construction, logging, mining, hydroelectric plants and other forms of employment that affect the quality of watersheds.

Local, provincial- and national-level governments and institutions influence watershed management. To one extent or another, local governments regulate zoning, rights, controls and permits for domestic, industrial, municipal and agricultural land and water uses in watersheds. They enforce common law practices or pass legislation against over-grazing, over-fishing, burning and illegal harvesting of forests and wildlife in common lands, nature reserves or protected areas. Increasingly, local governments define and enforce prices, taxes, subsidies, fines and grants related to the use of natural resources, including the operation of public or private water supply and distribution systems. This is particularly important in the context of government decentralisation and devolution of powers to municipalities and other forms of local government (Agrawal, 2001; Ardaya and Thévoz, 2001). Through land-use and other policies governments directly or indirectly promote or undermine the management of watersheds and the conservation of resources. However, the more serious problem is often enforcement of the policies and rules. Many laws and regulations are impossible to enforce or open the way to corruption because they are poorly designed. Assisting government agencies and legislatures with the drafting of the rules can have great impacts.

To be effective watershed management requires interagency and multi-user interactions and agreements regarding land-use decisions. It is critical for implementing organisations, therefore, to engage in dialogue with citizens, communities and local governments to promote planning, management and evaluation of upland and downstream activities as a whole. This will require bridging several local government and political boundaries (i.e. municipalities or provinces) within the watershed, fostering an understanding of environmental interactions and taking into account the many government, religious and customary laws and local norms that regulate access to natural resources (Buenavista et al., 2002; Bruns and Meinzen-Dick, 2000; Catacutan et al., 2001; Queblatin et al., 2001; Ravnborg and Ashby, 1996). At the same time, it will require fostering a comprehensive understanding by citizens and governments of the environmental effects and values of land and water use decisions, and promoting discussions to find ways within a watershed system to make groups more responsible for the impacts they have on other groups. This should lead to public and open recognition and reconciliation of potential conflicts between natural and political boundaries and acknowledgement of the impacts policies may have on natural resources. Achieving this type of coordination is a complex undertaking that has often been attempted but seldom satisfactorily accomplished.

Two examples of successful multi-stakeholder alliances come to mind. The *Fundación de la Cordillera Volcánica Central* is cutting across traditional lines to promote better land management in part of the highlands of Costa Rica where the government has decentralised management of protected areas and granted unusual autonomy to its regional entities (Castro-Salazar et al.). On a larger scale are the ambitious and successful attempts of the *Corporación del Valle del Cauca* in Colombia. The Corporation is a state organisation created in 1954 to promote the improvement of the quality of life of people living in the Cauca watershed. The Corporation is the most important environmental protection agency in the country. Combining savvy entrepreneurship with a strong commitment to long-term management of natural resources, the Corporation manages wastewater

treatment plants, fosters prevention of water contamination, guides the management of water resources and reforestation in the watershed, controls water contamination, and promotes biodiversity conservation and income generation through aggressive marketing of products. The Corporation operates in alliance with 14 organisations in the region including associations of large and small producers, universities and research centres.

Implementing organisations should provide information and facilitate experimentation with several methods that may be appropriate to enhance environmental stewardship, including establishing clearer property rights and land use regulations, fostering multi-government coordination groups within watersheds, applying the 'polluter pays' principle (particularly for better-off resource users) and/or providing rewards for good environmental stewardship to discourage downstream pollution by upstream polluters, and negotiating payments from downstream land and water users for soil and water conservation measures provided by upstream land users (Brooks et al., 1994; Cameron and Muller, 2001; Enters, 2001).

8 USE FARMERS' FEEDBACK AND LEARN FROM EXPERIENCE

Most development agencies carry out participatory assessments of farmers' needs, conditions and priorities but very few of them make full use of this information for planning the content or delivery of services. Despite an over-abundance of participatory assessments, the provision of extension services by many implementing organisations is strictly top-down. They often go on adopting and promoting technical packages without modifying and streamlining them fast enough or at all, even though the services that they offer are (or have become) redundant, irrelevant or are not a high priority to farmers. At the core of this lack of adaptation is the absence of a mechanism for farmers to provide corrective feedback on the practices and interventions that the organisations advocate. Yet this approach is as ineffective and self-defeating as attempting to sell cheap three-wheel cars when people are demanding and willing to pay for more expensive and appropriate four-wheel cars.

The great majority of watershed management projects design and implement actions that are clearly biased toward certain technologies and approaches used or promoted elsewhere, whether effectively or not. Individual practices are seldom added or deleted, expanded or refined depending on their effectiveness and acceptance by farmers. This is because, instead of adequately monitoring their practices, the organisations tend to concentrate on documenting outputs rather than effects and impact. At the same time, their field staff are overworked and discouraged or even forbidden to provide feedback to their supervisors. Field personnel tend to demonstrate astounding motivation and willingness to work under extremely difficult conditions, often with inadequate support and resources. It is tragic that many such admirable people and their efforts produce disappointing results because institutions follow strategies and practices which are clearly inadequate under the circumstances. Unfortunately, there is not enough pressure, either internally or from donors for development organisations to learn and improve.

Often, the unstated rule of the game is for farmers to accept thankfully whatever the organisations offer, however marginal many of those practices may be, simply because the offer is a gift. No one who receives a gift has much power to complain. Farmers tend to not openly refuse adopting some practices because they are polite and also unwilling to jeopardize their access to benefits that may later come about from development projects. This self-restraint among farmers is particularly common when the development agencies use incentives (food-for-work donations and in-kind or cash credit) that are distributed to encourage (*ex-ante*) or reward (*ex-post*) the use of specific practices pre-defined by the agencies.

It is likely that the organisations will continue to miss critical opportunities to develop highly effective practices as long as they reserve to themselves alone decisions on the composition and content of the practices they promote. Farmers should be treated as clients with rights rather than beneficiaries with needs and should be given a choice of practices. If this happened, we would expect that only those practices that meet the farmers' productivity or resource management needs would be in demand. Rather than focusing on the long-term adoption of a given technology development projects should aim at building community capability for experimentation and adaptation of simple technologies, based on locally available materials offering rapid, easy-to-recognise benefits (Bellon, 2001; Bunch, 1999; Garrity et al., 1998). Farmers should be encouraged to provide feedback and filter out irrelevant practices promoted by the agencies. The projects should identify, build on and promote conservation practices commonly used by farmers, which are often as sound as the project recommendations (Fujisaka, 1989). In some cases the farmers' practices are 'good enough' rather than 'ideal' (e.g. piles of stones within fields rather than stone boundary bunds) (Clark et al., 1999). In fact, practices that best fit the socioeconomic conditions of the farmers' households (and more likely to be widely adopted) are not necessarily the most technically effective. This is because when choosing a practice farmers face a trade-off between minimising soil erosion, for instance, and producing fodder for animals, marking the plot boundaries, matching the labour availability, etc. It is not that they do not understand technically superior conservation or production practices. They choose 'successful second best approaches' in order to meet their other objectives (Kerr and Sanghi, 1992).

The Interfish project run by the NGO CARE in Bangladesh provides an example of a mechanism for the active participation of farmers in planning, monitoring and evaluating a project's services. Interfish was an integrated pest management project where farmers explored, through experiential learning, various

ways to reduce pests and increase productivity in their rice fields. The project emphasised strengthening the farmers' capacities to analyse and solve problems. As a first step it involved farmers in monitoring information for the project, which represented a step forward, the practice (common to most projects) having previously been that staff kept track and reported on project indicators without close interaction with the farmers. Interfish staff soon realised, however, that under the new arrangement the farmers were simply gathering and handing over data rather than taking part in an on-going project planning process. They therefore invited the farmers to design a new planning, monitoring and evaluation system from scratch. The resulting system continued to focus on efficient and timely gathering of data on project activities, but more importantly it provided a means for farmers to share their experiences, gain access to information, analyse their own situation, identify emerging challenges and develop strategies accordingly, and increase their own confidence as natural resource managers. Visual tools, facilitated open discussions and participatory analysis of data were hallmarks of the new system. At the end of each rice-growing season, the farmers used the system to identify successes and failures resulting from their technological experiments. New training and experiential modules were created, while others were discontinued or modified with input from the farmers, some of whom took the project's 'prototype techniques' and adapted them to suit their own needs. The farmers reduced the project's emphasis on carp production, and modified it with experiments with native fish species (including some endangered) and shrimp. The project's focus on production of selected vegetables and trees in the paddy dykes was modified into vegetable and tree planting around homesteads and along roads. The new system also helped to increase farmer interest, ownership, enthusiasm and a healthy level of competition, which improved the overall project performance. New collective groups emerged to produce fingerlings or market fish (Barzman and Desilles, 2002; CARE Bangladesh, 1999).

9 INCREASE THE ACCOUNTABILITY OF DEVELOPMENT ORGANISATIONS

There is an urgent need for effective mechanisms to increase the accountability of development organisations to farmers. Conditioned on loose promises in 'trust-me proposals', the donors give away money to intermediaries who in turn often give it to implementing organisations who then donate their services to the farmer. Each link in the chain is controlled by the one above. Financial and programme systems in both government and non-government organisations promote accountability to donors, but hardly ever to farmers.

In order to see substantial changes in technology adoption and landscape management, the implementing organisations must adopt extension approaches that consider farmers as informed clients whose expectations they need to meet rather than charity recipients. The organisations must explore and test extension systems that encourage farmers to take the lead in defining the content of technical assistance and evaluating its impact. These alternative extension systems should be based essentially on formal contracts between the farmers and the implementing organisations whereby the two parties define common goals and the mechanisms the organisations should provide to attain them. These contracts should increase the accountability of the organisations to farmers and expand the opportunities for farmers to provide feedback that the organisations should use to hone skills and more accurately hit targets. Above all, the contracts should reinforce the notion that seeking sustainable development and natural resource management is a challenge that requires the active and leading role of farmers, combined with a focused support from the implementing organisations.

As long as technical services are free, farmers will not feel empowered to demand quality in service delivery. The implementing organisations, therefore, should ascertain the farmers' willingness to pay for what *they* consider high-priority technical services. The information on farmers' willingness to pay should be used to design fee-based extension systems linked with a payment-by-results (PBR) scheme. The private extension system would guarantee a basic fee for the extension agents, and 'bonuses' would be paid for achievements against pre-determined simple and fair objectives and targets defined jointly by resource users and extension agents (when there are no subsidies), and also by the donor agency (while subsidies are provided). Attention would be needed to avoid designing a poor PBR scheme focusing on narrow and short-term objectives at the expense of long-term economic and environmental gains for the farmers and the watershed area. If done properly, it would focus resources in the areas most likely to provide useful results. Regular evaluation of the extension system's performance by service users and donors (if appropriate) would be needed, which would likely require an overseer board to represent the service users and financial providers. Farmers would cover increasingly larger segments of the extension system's operating costs, until ideally the system became completely self-sufficient. But even if they covered only a fraction of the operating costs, fee-paying farmers would feel that the systems owed them something good in return, and would speak up accordingly.

CARE has just recently tested and validated the FEAT (*Fondo Especial de Asistencia Técnica*) model in Guatemala whereby small farmers paid fees for technical support provided by private extension agents. World Vision in Guatemala has also experimented with private extension in its AGUDESA (*Asociacion Guatemalteca para el Desarrollo*) project. Similarly, in Honduras, the Swiss Programme with Private Organisations for Sustainable Agriculture on Hillsides (PROASEL) is promoting an approach whereby interested farmers must contribute at least a part of the cost of providing the service (De Leon et al., 1997; Leal, 1996, Zellweger et al., 1998; Stürzinger and Bustamante, 1999).

In the AGUDESA, FEAT and PROASEL models:

- Farmers pay for technical advice and access to technology that results in increased productivity through higher yields and reduction of losses due to pests, diseases and/or post-harvest handling of cash crops. Advice on soil and water conservation-related technologies (cover crops, micro-irrigation, etc.) is included as part of the overall productivity-enhancing package.
- Farmers are required to pay fees to cover at least part of the operating costs of providing agricultural technical assistance (it is recognised that it is very unlikely that farmers will be able to pay all of the extension costs, at least in the short to medium term).
- Fees are heavily subsidised in the beginning. Over a period of four to five years, however, farmers should cover most of the costs.
- Fees are set according to the farmers' willingness and ability to pay for technical services. Rapid assessments of such willingness and ability are often conducted by an independent organisation.
- Contracts are signed by farmers and implementing organisations covering the provision of specific, focused technical assistance.
- Payment of fees signals to the extension agents and farmers themselves that farmers have the right to accept or reject the services that the implementing organisations provide.
- Private extension agents are more accountable for impact than the traditional extension systems. Since farmers purchase the services or inputs from the extension agent, the latter is more responsive to ensure that impact or benefit is received.
- The private extension approach does not require significant investments in staff, is relatively low-cost, is efficient, and has high potential for expansion and scaling up.
- The support role that NGOs and others provide focuses on training private extension agents and enabling them to become established, rather than on delivering technical assistance. Technical training for private extension agents and a system for monitoring and evaluating service quality with the service 'clients' are necessary.

These and other private extension approaches, as well as PBR schemes, should be widely tested, refined and adopted by all the implementing organisations. Funding agencies should actively encourage the adoption of these private extension mechanisms which ultimately represent sustainable approaches to watershed management and economic development.

10 CONCLUSIONS

The adoption of a watershed-wide approach will necessarily require some institutional adaptations. A list of the most important changes needed is included in Table 1. Our framework is based on the assumption that watershed management will work provided that

Table 1 Project design changes required for improving watershed conservation approach

Common current approach	Proposed approach
Primary focus on poverty alleviation and production for domestic consumption	Primary focus on protection and enhancement of ecological functions and services via income generation
Opportunistic selection of target communities: whoever wants to participate is accepted. Poverty used as criterion for watershed selection	Selection of target communities based on a cascade of progressively narrower criteria of severity of threat to ecosystem as a whole, potential return and cost-effectiveness
The initial focus is on the micro perspective (farm and farm technology) and later may shift to the macro perspective (watershed and regional economy)	Initial focus is on the macro-perspective (watershed and regional economy), later shifting to micro perspective
Environmental deterioration defined as a biophysical problem (primary emphasis on conservation)	Environmental deterioration defined as a sign of economic deterioration (economic solutions needed)
Broad distribution of sites and activities	Narrower target area and activities: some areas and activities more important than others
Expected results do not necessarily require to add up to a critical overall threshold	Expected results require to sum up so as to have an impact on the whole watershed
Scaling up and out is not a priority (site-specificity)	Scaling up and out critical. Commitment to landscape-level impact and large-scale economic influence
Benefits expected on-site	**Benefits expected on-site and downstream**
Promotion of practices that are locally effective	Promotion of practices that are locally effective but are also likely to continue to spread without external assistance
Activities address needs of people most in need	Activities address the needs of all major stakeholders (rich and poor) who impact on watershed conditions (on and off farms)
Generally, broad-spectrum technological packages are implemented across sites	Narrow-spectrum technological menu appropriate to specific sites according to land use characteristics and economic opportunities
Focus on technology transfer and environmental education	Focus on generation of income opportunities and economic incentives

the right biophysical context and potential are matched with the proper socioeconomic incentive and the most supportive policy context. The framework also assumes the need to adopt a flexible and learning approach to watershed management. This requires active learning from feedback, keeping track of what really is happening, and particularly what the stakeholders are doing and thinking.

The most important change needed from both implementing organisations and watershed stakeholders is the adoption of a holistic and 'systems' approach to watershed management. The holistic approach will allow both parties to consider 'a system in the context of the higher levels in which it is embedded, and provide insight into the significance of phenomena at lower levels' (Archer and Smeins, 1991, quoted in Thurow and Juo, 1995). A systems view will require engaging all stakeholders in a watershed. Part of the goal of watershed management will be to resolve conflicts of land use, which requires that organisations facilitate a dialogue between residents of the watershed and those downstream as well as the active involvement of the relevant local governments and institutions.

Second, although it may seem contradictory to the holistic approach, successful watershed management requires highly focused interventions. The critical challenge is to identify and act upon the points of highest leverage, which are often counter-intuitive and not obvious. The goal is to select small, well-focused actions in one segment of the watershed to produce significant, enduring improvements in the whole system. Such large-scale effects can usually only be accomplished by practices that spread spontaneously once obstacles have been removed. We propose that implementing organisations focus on target areas where there is good potential for success in addressing the limiting factors than where there is poverty. They should concentrate their efforts in a few priority sub-watersheds and communities within them to enhance impact, visibility, opportunities to observe and learn, and potential of replication. We suggest that organisations promote preventive rather than curative approaches to soil and water conservation. They should also hone down a short menu of conservation-tested practices that are both appropriate for the use capacity of the land in question and readily accepted by farmers, targeting particularly those activities that have demonstrated they produce cash income.

Third, implementing organisations must improve their own ability and that of the watershed stakeholders to learn from experience, their own as well as others'. The organisations take plenty of risks because they don't suffer the consequences. They need to learn from their successes and failures, use data rather than assumptions, and transfer knowledge efficiently through training, personnel rotation and more useful reporting (Garvin, 1993). Above all, learning requires better mechanisms through which farmers can give feedback to the service providers, and stronger accountability of the organisations to farmers, rather than only to donors. Converting farmers from beneficiaries to clients by having them pay for at least a small proportion of the services they receive is an approach worth exploring. Linking project performance evaluations to transparent, participatory monitoring and client satisfaction is long overdue.

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