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**New Horizons:  
The Economic, Social And  
Environmental Impacts Of  
Participatory Watershed  
Development**

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# **NEW HORIZONS: THE ECONOMIC, SOCIAL AND ENVIRONMENTAL IMPACTS OF PARTICIPATORY WATERSHED DEVELOPMENT**

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## **Introduction**

For close to a century rural development policies and practice have taken the view that farmers mismanage soil and water. Farmers have been advised, lectured at, paid and forced to adopt new soil and water conservation measures and practices. Many have done so, and some environments and economies seem to have benefited for a time. But critical internal contradictions have often undermined these efforts. Financial and legal incentives bring only short-lived conservation, and farmers soon revert to their own practices. Many efforts have thus been remarkably unsuccessful, frequently resulting in more erosion (Pretty and Shah, 1994).

For soil and water conservation to be successful and sustained these contradictions must be avoided. Projects must see farmers as the solution rather than the problem, and so put local knowledge and skills at the core of programmes. They must reinforce local organisations through participatory planning, an interactive and empowering approach to participation. Recent evidence is indicating that these new encounters between professionals and farmers are producing considerable productive and sustainable benefits. There are a growing number of mostly small-scale projects that are sufficiently successful to suggest the need for application on a much wider scale. A collaborative study coordinated by the Sustainable Agriculture Programme of IIED and partner institutions in Asia, Africa, Latin America and Australia from 1992 to 1994 provided detailed case studies of the processes and impacts of 22 participatory watershed development projects. This paper summarises the findings of *New Horizons: The economic, social and environmental impacts of participatory watershed development*, and discusses implications for the future of watershed development and policy.

## **The Contradictions of Conventional Soil and Water Conservation Programmes**

Despite decades of effort, soil and water conservation programmes have had surprisingly little success in preventing erosion, although the quantitative achievements of some programmes can appear impressive. Throughout the world, terraces have been constructed, trees planted and farmers trained on a massive scale. In Lesotho, all the uplands were said to be protected by buffer stripping by 1960; in Malawi (then Nyasaland), 118,000 km of bunds were constructed on 416,000 ha between 1945-60; and in Zambia (then North Rhodesia), half the native land in eastern province was said to be protected by contour strips by 1950 (Stocking, 1985).

Ironically though, many programmes have actually increased the amount of soil eroding from farms. This is because these impressive biophysical achievements have mostly been short lived, tending to survive only within project boundaries and at most, up to project completion. Local people whose land is being rehabilitated find themselves participating for no other reason than to receive food or cash. Seldom are technical solutions developed or discussed with, let alone questioned by, local people. Seldom are the structures maintained, leading to rapid deterioration and accelerating erosion. If performance is measured over long periods, the results have been extraordinarily poor for the amount of effort and money expended (Shaxson et al, 1989; Hudson, 1991; Reij, 1991; IFAD, 1992; Pretty, 1995).

Evidence from Africa shows how terracing can exacerbate erosion. In the early 20th century, erosion in Lesotho was not a serious problem in cultivated fields because grassed boundaries were well developed and maintained (Showers, 1989). Despite this indigenous practice, contour banks were installed. Local people did not approve of the structures because they reduced the size of fields and either breached, or induced gully formation. The administration attributed these gullies to '*unusual weather*' (Showers and Malahleha, 1990). Elsewhere in southern Africa, the first anti-erosion measures introduced in the early 1930s were large ridge terraces and bunds which disturbed natural drainage patterns. Careless construction made them susceptible to bursting, and local people came to believe that gully erosion was caused by the government (Beinart, 1984).

Inappropriate structures are still being built today. Graded and contour bunds developed for large scale farming in the USA are widely applied in soil and water conservation programmes in India. Even under heavy subsidies, most small farmers reject them (Kerr and Sanghi, 1992). These bunds leave corners in some fields, so the farmer risks losing the piece of land to a neighbour. Contour farming is also only suitable where the holding is large and tractors are available. Contour bunding without facilities for dealing with surplus water commonly breach, again concentrating water flow that quickly forms gullies. It is therefore common for entire bunds to be levelled as soon as project staff move to the next village (Sanghi, 1987). Sometimes, successes are reversed almost immediately.

Failure to involve people in design and maintenance can create considerable long-term social impact. The enforced terracing and destocking in Kenya, coupled with the use of soil conservation as a punishment for those supporting the campaign for independence, helped to focus the opposition against both authority and soil conservation (Gichuki, 1991; Pretty and Shah, 1994). This led, after independence, to the deliberate destruction of many structures because of their association with the former administration (Anderson, 1984). Such attitudes are a critical constraint for many current soil conservation programmes.

## **What is Participatory Watershed Development?**

In response to the technical, social and economic failures of many past efforts in soil and water conservation, recent years have seen the growth of more participatory approaches to

watershed development. Participatory watershed development differs from the conventional approach in that:

- Local communities are fully involved in the analysis of their own soil and water conservation problems. Decisions are made with their active participation.
- The role of the external support organisation is as a facilitator of analysis and a catalyst for action, building on the local knowledge, needs and opportunities of the communities. It can help form local institutions and groups to manage the watershed and protect it on a sustained basis. These local institutions are encouraged to develop procedures and rules for management and create working capital for sustaining operation of the groups. This ensures that the watershed is managed after the external support is withdrawn.
- Farmer-to-farmer extension is a key process for passing information to the catchment inhabitants, for cultivating closer collaboration between farmers and for scaling-up watershed conservation in neighbouring watersheds and further afield.
- Project staff do not take a blueprint approach. Technologies selected and crops encouraged depend on the individual needs of farmers. The overriding feature must therefore be flexibility right through from the planning and design stage to the execution stage.
- The emphasis is on the sustainability and equity of improvements, rather than on short-term benefits. Benefits are aimed at which can occur without the help of payment or subsidies. They are therefore more likely to be sustained.

While these, and other, principles have guided participatory watershed development programmes for some years, the programmes are now being called to prove their effectiveness. Until recently, almost no evidence existed of the value of their efforts. In 1992, the Sustainable Agriculture Programme at IIED provided support to diverse organisations to assess the environmental, economic and social impacts of their work. The aim of these studies was to document and analyse the processes followed in project work, and to link these processes to their impacts.

## **The Process of Impact Analysis**

The case study teams chosen for the *New Horizons* project were all already engaged in participatory approaches to watershed development. Some were young projects of no more than three years, while others had the benefit of 40 years of hindsight. Few of the teams had undertaken such impact assessments before. Two features that distinguished the *New Horizons* cases from more conventional evaluation studies were the choice of indicators and methodology.

Understanding the economic, social and environmental impacts of watershed development means expanding the indicators to beyond 'kilometres of terraces built' or 'numbers of farmers trained'. It means understanding the benefits and costs as perceived by local men and women.

Six sets of indicators, based on a literature review, were suggested to the case study teams. These indicators included both conventional signs of ‘productivity’ and those relating to less tangible factors such as ‘ability to accept initial slow progress’. The indicators were grouped as follows:

- changes in productivity;
- changes in local and national resource degradation;
- changes in local resilience and vulnerability;
- changes in the self-dependence of local groups and communities;
- replication to non-project sites; and,
- changes in the operational procedures of the external support institution and the attitudes of professionals.

The second significant feature of the case studies was that, wherever possible, participatory methods were used (Chambers, 1992; Chambers and Guijt, 1995; Cornwall et al., 1994). Preparing the case studies proved to be a valuable learning experience for the collaborating organisations. For many of the teams this was the first time that such extensive and participatory assessments had been undertaken. They revealed both beneficial and negative impacts not previously considered. And they spurred the organisations on to consider ways to undertake more and different evaluation and to develop relevant monitoring systems.

## Key Findings

Although united in their objective, the case studies differed in terms of:

- the indicators assessed (some indicators are site-specific);
- the length of time spent on the study;
- the extent and nature of participation by local watershed residents in the evaluation process;
- the age of the programme being assessed (from 2 to 40 years); and,
- the site and size of the study area.

Despite these, and differences in the cultural, political and bio-physical context, there were important common elements in these cases of joint watershed management. All emphasised the use of locally-adapted resource-conserving technologies that provide immediate returns to farmers, rather than use of externally-derived technologies. All focused on encouraging action by groups or communities at local level, rather than working with individual farmers. All involved supportive government and/or non-government institutions working in partnership with each other and with farmers, rather than the more common mode of working in isolation.

The principal impacts were:

- Economic benefits, such as increases in land value and demand for labour; substantial increases in crop and livestock production (cereal yields on average doubled with no

additional use of external inputs); and increases in fodder and fuel production. Along with increases in yields, there were also increases in the diversity of crops grown. The overall result of these economic benefits was increased livelihood security through the diversification of livelihood sources.

- Social benefits, such as greater self-confidence and sense of cohesion in communities, reduced conflicts over resources, reduced out-migration, attention to the needs of landless groups and new rapport between local people and external professionals.
- Environmental benefits, such as recharge of aquifers and increased supply of drinking and irrigation water; reduced soil erosion, salinity, and the use of fertilisers and pesticides. The numbers of trees have increased, and birds and other wildlife returned.

In the sections that follow, some of the key findings of the case study teams are presented, organised by geographical region.

## **Latin and Central America: Innovation and Sustainability**

### **Guatemala and Honduras**

This unique analysis of changes in three regions *after* project completion clearly shows that it is not technologies themselves that are sustainable. Rather it is the process of innovation and experimentation by farmers that leads to sustainability (Bunch and López, 1994). Farmer extensionists and local institutions are continuing to develop new solutions to new problems long after the projects have ended, and crop yields and environmental conservation have continued to improve. New innovations have occurred in virtually all the villages, and the study documented 80-90 farmer-led innovations in all. These innovations include the introduction of new crops, experimentation with new green manures, processing techniques, biological pest control, recycling human waste, nutrient recycling through fish ponds and so on. The use of herbicides has been eliminated or prevented almost completely, through hand weeding or green manures. Chemical fertiliser use has also been reduced significantly with heavy use of all sorts of organic fertilisers now being common instead.

Greater crop diversity has clearly increased people's resilience to shocks, and the areas with conserved soils are better able to resist drought. The increase in local savings has allowed money to be spent on education and further improvements to the land. Furthermore there was a noticeable decrease in access to formal credit with people able to depend on their own resources. Green manures and cover crops have so improved organic matter content in soils that crop yields have more than tripled for several thousand farmers. Farmers can now farm the same piece of land continuously, and so no longer need to burn the forests.

## Brazil

EPAGRI, the state agricultural research and extension agency, is active in Santa Catarina, southern Brazil. Before developing its micro-watershed programme, the existing agricultural practices of growing maize and beans greatly contributed to soil degradation. Soil was tilled excessively during planting and there was virtually no use of green manures or organic matter. Erosion was high and production kept falling. Effluent from piggeries was left to pollute water sources and wasted valuable nutrients.

Since 1989 EPAGRI, in conjunction with farmers, has experimented with more than 60 species of green manures and cover crops. Their subsequent use has greatly reduced the need for weeding. Planting crops directly into furrows in the mulch makes ploughing unnecessary. Erosion trends have been reversed and water levels stabilised. Support in building piggeries means that streams run clear and precious manure is collected to fertilise plots. Catchment committees have been set up and collective action undertaken in areas where neighbours used to work individually. By mid-1994, 38,300 farmers in 60 micro-catchments were involved, with cereal yields increasing substantially.

EPAGRI has also pioneered innovative linkages with local municipalities and agroindustry. Municipalities are fully involved in the participatory development of technologies, and now both the municipalities and the agroindustries employ their own agronomists to work exclusively on watershed development in collaboration with EPAGRI (de Freitas, 1994).

## The Pacific Rim: New Forms of Collective Action

### The Philippines

Three upland conservation initiatives in formerly neglected parts of Bicol, Cebu and Leyte have shown the importance of farmer-based extension systems (Cerna et al, 1994; Balbarino and Alcober, 1994; Bhuktan et al, 1994). Farmer extensionists share with other farmers lessons in soil conservation and farming systems drawn from their own experiences. Farmer extensionists also assist fellow farmers to identify key problems, select appropriate technologies and to form *alayons* or farmers' work groups. The *alayon* is a traditional form of mutual labour sharing. Farmers form groups and work on each other's farms on a rotational basis. This can speed up technology adoption, especially of those that are labour intensive. The *alayon* also serves as a venue for group learning, problem solving and the promotion of equity among farmers (Cerna et al, 1994). These groups have helped to more than double agricultural yields, recuperate environments, regenerate local economies and protect forests (see Box 1).



### **Box 1. Tabayag Village, The Philippines**

Barangay Tabayag was a village trapped in a poverty and resource degradation cycle when the programme was started by the NGO the Mag-uugmad Foundation a decade ago. Inadequate education, insecurity of land tenure, unfair product prices, high costs of farm inputs, decreasing yields, malnutrition and poor health were common occurrences. Low productivity was the core problem, caused by largely inappropriate farming systems which depended on high external inputs, were based on monocropping and resulted in soil and nutrient depletion. Food shortages, the natural consequence of low productivity, drove the farmers to engage in extractive livelihood activities in the forest. This survival strategy caused the rapid destruction of the forest, eventually resulting in water shortages, soil erosion and an unfavourable microclimate, further decreasing production.

After a decade of sustained soil conservation based on farmer extension, most farmers are productive for two cropping cycles and some are farming the whole year. Now more farms are adequately covered by vegetation for most of the year. Increase in farm production and income is enabling farmers to undertake long-term but resource-conserving production systems (e.g. tree based farming) and to lessen their dependence on the forest.

One young farmer, Sergio Arobo, is one of the poorest in the village. Ten years ago, his family's farm could barely feed the family for three months. They all worked as labourers throughout the year to survive. In 1985 Sergio joined the *alayon* and started to adopt appropriate conservation technologies. After three years of sustained technology adaptation, the Arobo family attained self-sufficiency in food production. Five years later, Sergio's 1.25 hectare farm generates an average annual income of 15,000, 40% of which is derived from poultry and livestock, 20% from vegetable production, 25% from coconut and coffee, and 15% from hedgerow seeds. For the first time in their lives, the Arobos have food security and an income adequate enough to satisfy their basic needs.

Source: Cerna et al, 1994

## **Australia**

Landcare has evolved as one of the most significant social movements rural Australia has ever seen (Campbell, 1994). More than 2,000 community groups involving one third of all Australian farmers have been formed in the past five years, and are now able to tackle environmental problems that cannot be solved within a single farm boundary. New forms of collective action are emerging, resulting in improvements to the environment and farm profitability. These Landcare groups are formally linked to existing institutions, including national level policy makers, forming a unique partnership between community and government. The development of the Landcare process has required a major shift away from the traditional modes of technology transfer that have dominated agricultural extension until recent times, with a recognition of the need for more participatory approaches to natural resource management.

In the Landcare groups from both West Hume (Woodhill et al, 1994) and Balgarup (Campbell et al, 1994), impacts extend far beyond those achieved by more conventional approaches. It is clear that collective action has enabled fencing, drains and banks to be constructed to protect remnant vegetation and to control run-off and waterlogging.

Substantial revegetation of degraded lands has also been initiated. However the studies also showed that family farmers felt there was a danger of government seeing 'participation' as an opportunity to hand the responsibility for complex, conflict ridden and costly problems to local people without adequate resources to make a significant difference. This 'responsibility without resources' dressed up and sold as empowerment is a trap they wish to avoid.

## **Africa: Governments Working With the People**

### **Burkina Faso**

As of 1994, the inter-agency government programme *Land Resource Management on the Central Plateau in Burkina Faso* (PATECORE) is working with farmers in 240 villages. Its efforts have helped to improve some 10,000 hectares of unproductive drylands with conservation measures (small dams, bunds, stone lines) so that the average family's food deficit of 645 kg/year at the beginning of the programme has been turned into a 150 kg surplus. The project's approach is based on action research, appropriate in this context of a diverse and changing environment and the dynamic nature of society (Schorlemer, 1994). The project's activities are continually adapted in response to changes on the ground. One challenge which the project is currently tackling is how to better integrate pastoralists. Villagers' newly enhanced sense of ownership and responsibility for resources conflicts with the needs of more mobile groups. The problem of integrating pastoralists needs a solution and approaches to conflict resolution are proving indispensable, alongside those of participatory planning.

### **Kenya**

The catchment approach of the Soil and Water Conservation Branch (of the Ministry of Agriculture) has pioneered the development of participatory processes for extension staff (Kiara et al, 1994). The removal of subsidies allowed resources to be allocated instead to extension, training, tools and farmer-to-farmer trips. With the mobilisation of communities, support to local groups, and collaboration with other departments, some 100,000 farms are now conserved each year. There have also been increases in food production, diversification into new enterprises, reduction in resource degradation, increases in labour demand and land prices, and independent spread to other communities. Since these improvements have occurred without payment or subsidy, they are now more likely to be sustained.

### **Lesotho and Malawi**

The Environment and Land Management Sector Coordination Unit, based in Maseru, Lesotho, covers the SADC countries of Southern Africa. It advises governments of member countries on how to improve their performance in relation to the sustainable management of natural resources, particularly soil and water (Segerros et al, 1994). The Unit's innovative rural action learning areas initiative (IRALA) grew from a dissatisfaction with former approaches of governments, NGOs and donors which tried to instil foreign ideas, developed by thinkers, economists and policy makers on rural people, taking the initiative away from the farmers. IRALA builds upon the best soil and water conservation

practices of farmers and links them into research and extension structures. New forms of collaboration are emerging between institutions throughout southern Africa, with a particular focus on continual feedback and learning to improve performance.

## Asia: A Question of Confidence

### India

Nine case studies of government, non-government and partnership programmes from the states of Andhra Pradesh, Gujarat, Karnataka, Maharashtra, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal have shown how a diversity of institutional arrangements and technological innovations in very different environments (450-1200mm rainfall) can lead to substantial benefits for local people (Chatterji et al, 1994; Devavaram, 1994; Fernandez, 1994; Igbokwe et al, 1994; Krishna, 1994; Lobo and Palghadmal, 1994; Reddy et al, 1994; Shah and Kaul Shah, 1994; Thapliyal, 1994). New linkages between non-government organisations, government agencies and local communities are resulting in:

- the breakdown of hierarchy in bureaucracies;
- the resolution of conflicts in and between communities;
- the recuperation of barren lands;
- an average doubling of crop yields;
- increased crop diversity;
- improved well water availability;
- greater social cohesion;
- alternative forms of credit management by local groups ; and,
- the federation of local groups to ensure influence over higher-level institutions and political interests.

Box 2 gives an example of some of the dramatic improvements occurring.

A case study of MYRADA's project operating in Karnataka State over the past nine years makes some important observations about equity in watershed development (Fernandez, 1994). The main lesson emerging from their experience is that although the watershed is one geographic entity, it is not a homogenous community. There are four groups in particular who may not benefit from watershed development as much as others. These include the landless, those families farming the upper reaches of a catchment, women, and marginalised tribal groups (Box 3).

## **Box 2. The Strength of Local Institutions**

The Aga Khan Rural Support Programme (AKRSP) is an NGO working with village communities in Gujarat to promote and catalyse community participation in natural resource management (Shah and Kaul Shah, 1994). AKRSP focuses on the formation of village institutions to implement the villagers' resource conservation plans. This approach has shown that programmes managed by local institutions result in higher investment by farmers in soil, water and nutrient conservation. Local villagers trained as paraprofessionals were able to create demand for their services of planning, management and monitoring. Agricultural productivity has increased by 30% to 100% over a two to three year period. Soil loss has been reduced, and out-migration slowed. Many households have diversified into animal husbandry and horticulture. The local paraprofessionals are seen as a key resource. They have become confident enough to help promote similar activities in neighbouring areas.

The Society for People's Education and Economic Change (SPEECH) has been working in Kamarajar District of Tamil Nadu since 1986. This region is one of the most disadvantaged of the state, and is known for its acute droughts, erratic monsoons, poor services and entrenched socio-economic and cultural division. SPEECH has helped to build and strengthen local groups and institutions in 45 villages. For example in Paraikulam village, villagers have rehabilitated 30 ha of the upper watershed, bringing severely degraded land under the plough for the first time in 20 years. They have constructed contour bunds and structures for channelling and harvesting water. They have dug a new well, and have developed new arrangements for sharing labour between men and women to maintain these new technologies. Now more water percolates into the soil and recharges the wells. Surface water is better channelled into the tank, which gives villagers a second crop on the irrigated lands. Using only locally-available resources, this village of 100 households now produces an extra 100 tonnes of rice every year (Devavaram, 1994).

The novelty of the approach is beginning to be recognised by government departments. A senior engineer of the Agriculture Department visited Paraikulam. He accepted for the first time that it was important to involve farmers before planning any project for them. Now government has made participatory methods a part of their nearby large watershed project, and are paying village motivators from Paraikulam to help them.

## **Box 3. A Structural Image of Society**

In the Wadigera watershed a meeting was called of the families who lived and farmed there (Fernandez, 1994). When all the people had gathered, a clear picture emerged of the class distinctions operating. On the floor, in front, sat those farmers with lands in the lower reaches of the watershed – the most fertile and benefiting from irrigation. Behind them sat or stood those farmers with lands in the middle reaches – slightly less productive and more vulnerable to dry spells, without the benefit of irrigation. The people on the periphery were mainly tribals and those with holdings in the upper reaches of the catchment. The landless hung around. There were no women present initially but as the meeting went on they strolled in, more as interested bystanders than as participants.

The landless tend to be marginalised in watershed programmes since the major thrust of investments is on land. Although the landless do get work and income during the implementation period, this is not necessarily sustained. Families in the upper reaches of the catchment tend to be poor or marginalised socially. In these upper reaches, despite soil and water conservation measures, productivity often fails to increase with farmers unwilling to switch to hybrids or cash crops. Soil erosion can sometimes remain a problem. Often the cause is lack of confidence or misperceptions. Conservation measures such as afforestation of the upper slopes may benefit farmers downstream, but might be perceived by those in the upper catchments as an attempt to encroach on their land. People are reluctant to invest time and labour in treating land for which they have no clear title.

The effect of watershed development on women also tends to be overlooked. They often farm as actively as men, but need to combine this with their domestic responsibilities. Whilst frequently active in implementing soil and water conservation measures, they are often left out of training efforts and decision-making processes. They have much to contribute if involved more, and much to lose if left out of watershed programmes.

Emerging evidence has shown that if equity cannot be achieved, sustained productivity is unlikely to occur. To tackle these problems, MYRADA helped form Self Help Groups (SHGs), small groups whose members share a common interest, background or occupation. MYRADA provided group members with training in the skills needed to manage their own affairs, such as managing their own common funds. By 1993 there were 103 SHGs in the project area, with others being created spontaneously elsewhere. The groups include the landless, women, tribals and scheduled castes. The evidence shows that these SHGs provide an opportunity for marginal groups to attain a higher level of self-confidence in managing their own affairs, and to lessen their dependence on moneylenders (Fernandez, 1994).

## Nepal

A ten year collaborative effort between government and non-government agencies established conservation committees and local users' groups to implement and monitor improvement in a region with steep slopes. Conservation farming has spread, resulting in reduced erosion, increased tree cover and increased cereal yields. An interesting aspect of the project is how resource conservation on common lands has improved. Since the project started, competition and conflict between farmers pursuing individual goals has ceased. One reason is farmers are able to participate in decision making and in managing community forests. There are about 94 common resource conservation groups active in the project area, 19 of which comprise women and occupational castes. Much degraded land has been planted as community forests and abandoned natural forests handed over to the community to manage, resulting in an increase in the number of forest species and wild animals (Wagley et al, 1994).

## Pakistan

The study of the impacts of a large-scale soil and water engineering project in Pakistan provides an interesting contrast to the above success stories. It clearly illustrates how, despite a 31-year field presence, there has been a critical lack of maintenance of soil

conservation technologies because villagers had not participated in what they perceived to be an entirely government-run and owned programme. The programme lacks an active extension service, with farmers having to make their own arrangements to visit line departments if they need advice. Any adoption of innovations which does occur is rarely replicated since farmers act individually in the absence of any community organisation. Thus any productivity increases have been unsustainable since most catchment development efforts require cooperative action, such as for grazing and afforestation (Ahmed and Ahmad, 1994). An attempt is now under way to reorient the programme towards a more participatory approach to joint watershed development.

## Implications for Joint Watershed Development

Despite their many achievements, these cases are only as yet islands of success. They have generally been successful despite existing policies that tend to undermine sustainability. If these impacts are to spread further, then policies and practice must now be more directed towards these proven alternatives.

In November 1994 a workshop was held in Bangalore, India. This was a forum for the *New Horizons* case study team members to meet and discuss the lessons learned from their studies and to suggest practical ways forward. Participants suggested some immediate implications for all existing national and international institutions concerned with agricultural development, watershed management, and soil and water conservation. These are listed below with respect to five cross-cutting themes, namely technology, process and methods, impacts and indicators, inter-institutional arrangements and policies.

### Technologies

- *Redirect incentives.* Linking financial and food inducements to pre-selected conservation measures must cease. These encourage farmers to permit or engage in the construction of conservation measures that they neither agree with nor feel responsible for maintaining. When these incentives stop, so does the conservation. Instead, incentives should be increasingly directed towards institutional development at the watershed level. Incentives are effective only in certain situations when they are decided in consultation with communities for group management and institutional development. Access to credit for taking up productive enterprises and technologies should be increased, particularly for poorer households.
- *Innovation.* The capacity of individuals and institutions to innovate and experiment must be actively encouraged. It is impossible to predict the technologies that may be appropriate in a particular time and place. Good technologies today will be superseded by others in the future. What needs to be made sustainable is the process of innovation itself.
- *Biological measures.* A much greater emphasis is needed on adapting and applying biological measures for soil and water conservation, such as green manures, cover

crops, mulching, composting and reduced tillage. These are favoured by farmers because they can improve productivity as well as reduce labour needs.

- *Participatory technology development* and adaptive research should become an integral part of watershed management programmes. 'On-watershed' research would be an appropriate approach (using on-farm research as a model).

## Process and Methods

- *Farmer-to farmer extension* and experimentation should be an integral part of watershed management programmes if they are to be sustainable and are to encourage scaling-up. The capacity of farmer and community-level organisations for experimentation and extension should therefore be strengthened.
- *Flexibility*. External institutions must be flexible and responsive, and ready to learn with farmers. Every farm has its own signature. No one can predict what each farm requires and how needs will change over time. A thoroughly designed and pre-planned project is not a good project.
- *Confidence-building*. The pace of programmes and projects must be slow in order to build motivation, confidence and rapport amongst all the groups involved.
- *Decentralisation*. The village-based management of programme funds and planning are important pre-requisites for sustainable watershed management.

## Impacts and Indicators

- *Adaptation versus adoption*. Impact indicators should focus on adaptation of technologies and practices by farmers, rather than on adoption of technologies.
- *Equity*. Much greater efforts are needed to address equity issues if the poorest and most marginalised in any society are not to be missed. This is, at present, largely left out, even of participatory programmes.
- *Self-evaluation* enriches the learning process in institutions. It leads to greater honesty about what does and does not work, particularly if local people's measures of what constitutes success are used. What is needed is a widespread transition towards 'learning organisations', using impact analysis as the impetus for improvement.

## Inter-Institutional Arrangements

- *Widespread training* and competence building is needed to encourage and sustain a participatory approach to joint watershed management, especially in bureaucracies and

universities. There is a particular need for expanding training in participatory methods that focus on joint learning for action.

- *Joint approaches* increase the contacts and linkages between farmers and external institutions, improving the likelihood of policies and practices emerging that satisfy all stakeholders. The case studies highlighted many creative approaches to developing partnerships between farmers and extensionists, researchers, markets, private companies, local authorities and education systems.
- *Clear roles.* There is a need to clarify the roles of the different institutions, such as governments and NGOs, involved in developing joint watershed management.
- *Inter-village federations.* Sustainable watershed development requires the development of strong inter-village institutions or federations. These institutions can effectively manage a range of activities such as credit, marketing and the protection of common lands with limited external support.

## Policies

- *Policy reform.* Most national and international agricultural and rural policies do not provide a favourable climate for the implementation of the approaches to watershed development described here. There is a need for widespread reform to create a more supportive and enabling policy environment.
- *Appropriate support.* If authorities are to hand responsibility for complex, costly and conflict-ridden problems back to local people, this must be accompanied by adequate financial and institutional support.
- *Equity and livelihoods.* The policy focus should not be solely on natural resource management, but should also encompass livelihood security, equity and institutional development.

## Challenges for the Future

Soil and water conservation practices based on imposed technological interventions have not delivered the environmental or economic benefits they promised. The practice of designing and implementing interventions without involving local people can only succeed with coercion. Such enforced responses may appear technically appropriate but are commonly rejected by local people when external pressure is removed.

A thorough reassessment and reorientation of existing soil and water conservation practices is needed, building on the experiences of participatory watershed programmes such as the *New Horizons* case studies presented here. These experiences make no claim to perfection, but signal that changes to soil and water conservation programmes are both possible and positive. The challenge is to identify and encourage the conditions that will foster the further spread of these innovative efforts.



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The Sustainable Agriculture and Rural Livelihoods Programme of IIED promotes and supports the development of socially and environmentally aware agriculture through policy research, training and capacity strengthening, networking and information dissemination, and advisory services.

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