Chapter 3

A new approach to watershed management

> Watershed management has evolved and passed through several developmental stages. In the initial stages, it was a subject of forestry and forestry-related hydrology. The involvement of people was not an issue. It was solely an affair of government forest departments. During the second stage, it became land resources management-related, including activities with an eye on economic benefits. At this stage, the focus was on beneficiaries. It is now "participatory and integrated" watershed management, with involvement and contribution from local people.
>
> Kathmandu workshop

This chapter clarifies what is innovative in the new generation of watershed management. It also discusses how these innovations link to parallel changes in other areas of development and conservation.

This is a period of experimentation in watershed management

Worldwide environmental, socio-economic and political changes are challenging some of the foundations on which watershed management has been based for the last 20 years. Watershed management is going through a period of experimentation in which old and new practices often coexist and mix. The new generation of watershed management programmes being developed has a different approach, design and implementation strategy. Table 4 summarizes some of the paradigm shifts that are emerging from this experimentation.

TABLE 4
Old and new generation paradigm shifts

Past generation	Next generation
Integration of socio-economic issues within watershed management programmes	Emphasis on watershed natural resource management as part of local socio-economic development processes
Focus on "people's" or "community" participation, with an emphasis on bottom-up participatory planning	Focus on multi-stakeholder participation, linking social, technical and policy concerns in a pluralist collaborative process
Rigid programme design that overestimates central government's capacity to enforce policies, and lacks adequate institutional/organizational arrangements at the local level. Short-term planning and financing	Flexible programme design that adjusts to local governance processes. Long-term planning and financing
Implementation responsibility entrusted to "heavy" institutions, such as donor-assisted programmes or government watershed authorities	Implementation responsibility entrusted to "light" institutions such as watershed management fora, consortiums and associations, with programmes and authorities playing a facilitating and subsidiary role
Focus on on-site, short-term effects. Small-scale projects with little watershed or basin-level coordination	Focus on upstream–downstream linkages and long-term impacts. Local-level processes coordinated at the watershed or basin level
Quick-and-dirty participatory assessment and evaluation (e.g., participatory rural appraisal [PRA]), with little or no linkage to natural and sociological evidence	Dialogue between local and scientific knowledge in "fairly-quick-fairly-clean" action research processes, involving a variety of stakeholders
Belief that access, tenure and social conflicts in watersheds can be solved by technically sound interventions	Awareness that most access, tenure and social conflicts in watersheds are rooted in society and politics and should be managed through continuing negotiation

WHAT DOES "INTEGRATED" WATERSHED MANAGEMENT REALLY MEAN?

> In the formulation of (watershed management) plans, both the attributes of the land and water resources and the socio-economic factors which affect the development of the human beings in the area in general, and land-use practices in particular, should be taken into account. Moreover, there should be provision for perpetual operational support. Without adequate social control of the use of the world's land and water resources, their technological overdevelopment can lead in the long run to regional or national underdevelopment. Furthermore, there must be an awareness of the total soil and water resources system, both upstream and downstream, and of the interrelated benefits that can be obtained by the wise application of modern technology.
>
> K. King, Director of FAO Forestry Department, 1977

The integration of environmental and socio-economic issues is not new to good watershed management

The integrated watershed management of the late 1980s was a forerunner of sustainable rural development, as advocated at the 1992 Rio summit. Both approaches share a systemic view of biophysical and social interactions, a concern for the on- and off-site and the short- and long-term effects of change, and a fundamental belief that appropriate social management can optimize the functioning of human ecosystems. Both aim to generate benefits for people and environments.

This shared paradigm suggests that it is difficult to distinguish integrated watershed management from sustainable development in watershed areas. Poverty and unsustainable livelihoods often contribute to watershed degradation, and planning needs to take more effective account of the multiple linkages between poverty and watershed management. Box 21 provides an example of how natural resource management, socio-economic development, sustainable livelihoods and poverty alleviation goals are being integrated in watershed management programmes. However, this approach has not always brought the intended positive impacts on livelihoods and the environment (Box 22).

Socio-economic and natural resource objectives are not always compatible

There is a risk that too great a commitment to sustainable livelihoods and poverty alleviation goals will push watershed management programmes' environmental role into the background. Although environmentalism has also gathered momentum, trade-off issues between livelihood and environmental concerns have arisen, especially in poverty alleviation and food security interventions. Water-centred and people-centred objectives are not always compatible, and may need to be addressed in different ways.

There is a fundamental dilemma about the relationship between integrated watershed management programmes and sustainable development processes:

- Should watershed management programmes incorporate sustainable development objectives, by committing to providing benefits and services that are not directly related to natural resource management? or
- Should they be embedded in broader sustainable development processes, by ensuring that sustainable development considers land and water issues?

The first option can be referred to as "programme-led" integrated watershed management. It prevails in many developing countries where, because of insufficient coverage by line agencies and development programmes, integrated watershed management programmes often include socio-economic development activities as complementary components of natural resource management interventions.

Watershed management links local livelihoods and natural capital assets

Embedded watershed management, on the other hand, focuses on those aspects of sustainable livelihoods that are directly linked to natural capital assets, for example, by strengthening local actors' capacity to manage agricultural land and allied resources in ways that promote environmental stability and food and water security. Other elements that are relevant to sustainable development – off-farm livelihood diversification, education, health, etc. – are less relevant to watershed management programmes.

BOX 21

Integrated watershed management and sustainable rural development in the Lao People's Democratic Republic

The Lao People's Democratic Republic (PDR) is a mountainous land-locked country with relatively low population density. Some 87 percent of its territory is upland, where there are high incidences of poverty and little infrastructure. Lao PDR has rich biodiversity and the least damaged ecosystems in Southeast Asia, but unsustainable resource management is beginning to reverse this situation.

Since 2000, the Ministry of Agriculture and Forestry has implemented an integrated watershed management strategy aimed at: (1) improving the conservation and management of watershed natural resources to enhance their use in sustainable economic production; and (2) alleviating poverty and improving sustainable livelihood opportunities, particularly where local needs are met by watershed natural resources. Meeting these two objectives simultaneously is a major challenge; each watershed has different needs, as illustrated by four model watersheds established to test the integrated watershed management approach.

Nam Tong watershed in Vientiane province, northern Lao PDR, covers 556 km^2. It contains 27 villages and a wide valley with relatively good soil conditions. It has medium levels of immigration, relatively good market access – mainly to Vientiane city – and good potential for diversified agriculture and aquaculture. The area is self-sufficient in rice, but some households lack rice at certain times of year and live below the poverty line. The watershed planning process identified land-use options for diversifying agriculture, livestock and aquaculture while maintaining the present 70 percent forest cover.

Nam Tim watershed in Bokeo province, northern Lao PDR, covers 220 km^2. It has 23 villages and a population of about 10 000 people from several ethnic groups. Another 21 villages (6 500 people) outside the watershed practise shifting cultivation in its upper parts. The government has built a reservoir to irrigate 1 200 ha in the area. The Nam Tim Integrated Watershed Management Project identified pressure from shifting cultivation as a serious problem and plans to protect the watershed's headwaters and introduce improved agricultural practices and alternative income-generating activities.

Nam Neun watershed in Xieng Khouang and Huaphan provinces, northeastern Lao PDR, is a mountainous area of 6 881 km^2. About 400 villages practise shifting cultivation and upland rice farming, raise livestock, gather non-timber forest products (NTFPs) and grow opium. This area's watershed plan addresses conservation, development and upstream–downstream linkages, as well as poverty alleviation and the eradication of opium cultivation.

Nam Et Phou Loei National Biodiversity Conservation Area in Huaphan and Luang Prabang provinces, northern Lao PDR, is a mountain range of 4 200 km^2 with high levels of biodiversity. It contains the headwaters of four major watersheds and about 110 villages in its buffer zone, with another 35 inside the conservation area. These practise mainly shifting cultivation and some opium production. Its watershed plan focuses on sustainable use of the area's natural resources.

Source: Pravongviengkham *et al.,* 2005.

BOX 22

Fallacies of integrated watershed development in India

In India, watersheds have become the pivotal unit for rural development programmes. India's first guidelines for integrated watershed development (1986) were based on the assumption that investments in watershed management have long-lasting impacts on the livelihoods of small farmers whose land is not suitable for large-scale irrigation and hi-tech agriculture. Some 60 percent of India's arable land falls into this category. The core objective was to enhance rural food security and incomes through improved natural resource management.

Between 1994 and 1999, there were about 10 000 watershed projects in India, and during 2001/2002, about 6.2 million ha of rainfed land in 5 200 micro-watersheds was under treatment, at an estimated cost of US$175 million. There are, however, no sound, comprehensive data on the performance and impact of these projects.

Local assessments and national indicators suggest that most watershed projects have not been successful. Some have not provided even the minimum drinking-water and fodder needs of watershed inhabitants, others have overlooked pastureland development and soil-moisture conservation practices, and many have failed to arrest land degradation. One study indicates that the rate of land degradation in rainfed areas during the 1990s was more than twice that of the 1980s, largely because of increased soil erosion. Continued lack of drinking- and irrigation water in several states shows that drought-proofing interventions have not generated significant downstream impacts.

These disappointing results are largely due to flaws in the financing and implementation mechanism established in the 1986 guidelines. Fixed budgeting does not adapt to the wide biophysical and socio-economic variability among watersheds, and rigid adherence to guidelines prevents projects from sharing experiences and lessons. Watershed projects' multiple objectives led them to channel limited investments into a range of on- and off-farm activities, often involving trade-offs among the interests of different stakeholders. Packages of measures, from building check-dams to promoting income-generating activities, became too large and difficult to manage, and the spreading of funds over many actions made impacts slow to materialize and intangible. Projects also often applied unscientific soil and water conservation methods, which decreased the cost-effectiveness of their interventions.

The Indian watershed management programme also lacked sustainability and equity. Many projects had no strategy for maintaining assets after project support ended; the only benefit that many farmers derived from watershed projects was the possibility of short-term paid work. Communities saw few long-term benefits from projects, so had little interest in operating and maintaining project assets. In addition, many property regimes in rural India are incompatible with the 1986 watershed management guidelines. Land is inequitably distributed and groundwater rights are bundled with landownership. Most watershed programmes have a clear hierarchy of benefits and beneficiaries: those farm households that obtain improved irrigation benefit the most; other farmers obtain on-farm treatments such as field bunds; while those with no land or livestock benefit the least. There is a need to place these issues at the centre of a participatory process and to initiate negotiations among different beneficiaries and stakeholders.

Source: Sharma, 2005.

Natural capital assets such as land and water are an obvious linkage between watershed management and livelihoods. However, watershed programmes that focus only on natural resources have limited impacts on livelihoods and poverty (Box 23). It is difficult for people affected by landlessness, illiteracy and disease to use natural resources sustainably.

BOX 23

Enhanced water availability and the livelihoods of poor households in South Africa

The hydrological cycle is often believed to make an important contribution to the livelihoods of rural communities, but there is little evidence to support this claim. Discussions tend to focus on water from rivers, boreholes or storage ("blue water"), and neglect the role of evaporation ("green water"), which is often critical for agriculture and rural livelihoods. The goods and services provided by evaporation and transpiration are being assessed by the Catchment Management and Poverty Alleviation (CAMP) Programme, supported by the United Kingdom's Department for International Development (DFID) in South Africa, the United Republic of Tanzania and Grenada, and directed by a stakeholder group of forest, water and poverty interests (Box 31).

CAMP's South African project focuses on Luvuvhu catchment in Limpopo province, which drains into the Limpopo River at the border with Zimbabwe and Mozambique. This catchment illustrates the acute problems that human-induced changes in vegetation coverage cause for water and land-use management. In Luvuvhu, expanding commercial forestry is replacing indigenous species with exotic ones, which are invading an area that is short of water and has a high prevalence of poverty.

The CAMP project is investigating how different scenarios of forest cover affect the hydrological regime and water availability, and how these in turn affect economic production and livelihoods. Linkages between water availability and livelihoods are being surveyed in several communities. Changes in river flow and evaporation caused by changing land cover are assessed using land-use-sensitive hydrological models that were specially configured for the Luvuvhu, and a framework of the linkages between water flows and the economic and livelihood values of water has been devised.

So far, the analysis has not demonstrated any significant association between income increase and greater access to water – through either improved water supply or higher rainfall. Once the statutory requirement of 25 litres of water/capita/day is met, further provision of water does not produce significant livelihood benefits. In addition, although there may be food security gains from increased water provision (e.g., for irrigating kitchen gardens), the poorest in society are less likely to benefit; wealthy households with greater access to home-based reticulated supplies will benefit more.

Sources: Calder, 2005.

TABLE 5
Comparison between (programme-led) integrated and embedded watershed management

Integrated watershed management	Embedded watershed management
Environmental and socio-economic issues are strictly related and cannot be addressed separately	Most environmental problems are related to socio-economic issues, but there is always scope for measures and actions that specifically address environmental issues
Watershed management programmes should have a sustainable development mandate and aim at both natural resource and sustainable livelihoods goals	The mandate and goals of watershed management programmes should focus on natural resource management for sustainable livelihoods and development
Integrated programmes to address environmental and livelihoods issues comprehensively should be developed	Sectoral programmes focusing on watershed natural capital assets should be developed. Issues that are not related to natural capital should be addressed in collaboration with other programmes or institutions

Integrated watershed management moves towards embedded watershed management

Partnerships between watershed management programmes and other institutions working on livelihoods, poverty alleviation, land reform, education and health issues make it easier to address environmental and socio-economic issues effectively. The differences between such embedded watershed management and the integrated approach are presented in Table 5.

So far, embedded watershed management has taken place in affluent countries, where infrastructure, social welfare services and public subsidies are available, and environmental conservation is a public concern. For instance, watershed management interventions in de-populated mountain areas of Western Europe are integrated with socio-economic development through activities that strengthen local capacities to manage forest, land and water. These interventions also promote conservation-based livelihood alternatives – such as tourism, organic farming, local food specialities and handicrafts – by linking watershed management interventions to existing public sector incentives for natural resource conservation and other subsidy systems (Boxes 24 and 25).

BOX 24
Embedded integration of environmental and socio-economic issues in France

The Plateau de la Leysse is the upstream part of the watershed near the urban settlement of Chambéry in France. The valley below is classified as being at flood risk. The upstream watershed covers 10 150 ha, half of which is private and public forest. The other half is agricultural land and prairies, parts of which have been abandoned over the last 30 years. Conservation of the area is entrusted to the Regional Natural Park of the Bauges.

In 2002, private landowners, the park and the area's six municipalities signed a collaborative management agreement aimed at managing the land sustainably – keeping it alive, attractive and visited while developing the local economy, which is based on agriculture and heritage. Following on from this, an intermunicipal consortium was established to manage a five-year plan and annual implementation programmes. The juridical framework of this initiative is a national law that reinforces environmental protection and management through public participation and natural resources management (National Law of France No. 95, 2 February 1995).

During discussions with all actors, local communities and inhabitants identified the elements that provide quality of life in the area. A legal association was established to

manage the preparatory phase of the initiative, whose operational plan identifies specific sectors, areas, measures, means and funding in an integrated way. As well as technical aspects, the plan includes involving local populations and sensitizing young people.

The actions that concern water bodies identify resources, evaluate the condition and rehabilitation needs of these, use technical enterprises for management and monitoring, and communicate to users and the public.

After an initial investment of €100 per hectare, the estimated annual costs (in 2002) are €50 for planning and €75 for field management, making a total of €125 per hectare. These costs are low compared with those of managing smaller areas or sectors because planning and management are at an appropriate scale.

Source: Zingari, 2005.

BOX 25

Embedded integration of environmental and socio-economic issues in Italy

Two-thirds of Italy is mountain area. In the late 1990s, Italy developed territorial pacts (National Laws Nos 104 of 1995 and 662 of 1996), which are legally binding social partnership contracts for planning. The pacts are public and private agreements to implement local development measures that integrate natural resource management, industry, agriculture, fisheries, public services, tourism and infrastructure. Any area can have a pact, but marginal areas are priorities. Territorial pacts now involve 47 percent of Italy's total population and cover 53 percent of its land area. The pacts' use of an integrated cross-sectoral approach and their involvement of key actors make them relevant to watershed management.

The main feature of the pacts is that they harmonize different local actors without imposing external conditions: participation is voluntary and includes all sectors – administration, enterprises, banking, research, trade, etc. The objective of a territorial pact is to achieve cohesion among current and new initiatives involving natural resources, people and economic activities. Each pact concerns specific activities, such as the management of natural resources, including water resources; more than half of the pacts approved up to 2003 include natural resource and hydrology aspects. The territory covered by a pact can range from one small watershed to, for example, the 1 600 km stretch of the Apennines.

The territorial pact for the province of Rieti involves 12 municipalities, three mountain communities and 35 signatory parties. It has created 227 new full-time jobs, and used €18 million for two main activities: reinforced capacity building in small and medium enterprises; and investment in infrastructure, tourism and environmental services, including agriculture and forestry.

The territorial pact provides a framework for action and advantages from economies of scale, but human and cultural dimensions have a great influence on its implementation. The territorial pact is not intended to be a policy instrument but a real governance goal.

Source: Zingari, 2005.

With some exceptions (Box 26), there is little embedding of watershed management in developing or transitional countries, which tend not to have an effective public sector in rural areas or subsidies and incentives. Over the last ten years, however, poverty reduction and sustainable livelihood initiatives, administrative decentralization, public–private partnerships and expansion of the market for environmental services have started to offer watershed management programmes new opportunities for partnership with local development processes in many areas of Africa, Asia and Latin America. Scope to explore the potential for embedding watershed management is increasing in developing countries as well.

BOX 26

Embedding watershed management in sustainable development in Cuba

Mountain areas cover 18 percent of Cuba's territory and are of great environmental and cultural importance. These complex and fragile ecosystems contain the country's main water, forest and mining resources and produce nearly all its coffee and cocoa outputs. Mountain areas were also the sites for most of Cuba's liberation war, and are now of immense symbolic significance to the population.

Cuba was one of the first countries to include environmental issues in its constitution (Article 27 of 1976), and has issued environmental laws since before the Bruntdland Report presented its principles for sustainable development. The relationship between social and environmental issues is fully included in national development policies, which are based on the belief that improved social conditions are a precondition for effective natural resource management.

In spite of this commitment, however, mountain areas fell behind the rest of the country. National programmes to improve social and environmental conditions either came too late or failed to address the specific needs of mountain areas. As a result, mountain people began to migrate to cities on the plains, leaving mountains with no workforce.

In response to this, the government implemented two projects in the late 1980s: the Plan Turquino and the Plan Manatì. The Plan Turquino was a socio-economic programme aimed at stabilizing mountain populations and making mountain areas as independent from urban centres as possible. The construction of 300 schools and 42 hospitals brought the levels of health service and education provision in mountain areas close to national levels. Four new mountain universities train professionals who have direct experience of local environmental problems and agricultural production issues (Box 43). The plan also trained small farmers in environmental protection and organic farming techniques, which are disseminated by university staff and local people through training courses, pilot projects and demonstration plots. Combined with the opening up of local markets and family agricultural production, these initiatives have significantly reduced the area's dependence on markets in the plains. The Plan Manatì was an environmental programme aimed at preserving the balance among agricultural areas, forests and watersheds.

In 1995, the Government of Cuba united the two plans into the Plan Turquino-Manatì, which covers the entire mountain population of 48 municipalities in the Guanihuanico, Guamuhaya, Sierra Maestra and Nipe-Sagua-Baracoa massifs. This plan is managed by the central government, with decentralization to the provincial or municipal levels for local projects. Its managers claim that the Plan Turquino-Manatì is Cuba's most important sustainable mountain development project. As well as including watershed management in social development, the plan focuses on training and information, involving universities, experts, extensionists and local populations in the sustainable use of local natural resources.

Source: Berini, 2004

PARTICIPATORY VS. COLLABORATIVE WATERSHED MANAGEMENT

Participation has been viewed as an attribute of good watershed management practice for more than 20 years

Along with integration, participation has been another essential attribute of good watershed management practice for more than 20 years. In 1983, FAO issued a conservation guide on community participation in upland management. Some of the aspects mentioned in that guide are still relevant today: (1) natural resource management cannot be successful and sustainable without the support and participation of natural resource users; (2) participants should have decision-making capacity and responsibility (empowerment); and (3) the promotion of participation in watershed management is a long and time-consuming process that requires appropriate means.

It is now clear, however, that beneficiaries, people or communities are not the only important actors in participatory watershed management. Collaboration between watershed management programmes and civil society is now increasingly mediated by a variety of institutional actors, including legally recognized user groups, unions, associations, cooperatives, local administrations, line agencies, NGOs and private companies. As these actors have diverse and sometimes conflicting interests and concerns, the main goal of participatory watershed management has shifted from awareness raising and social mobilization to negotiation and partnership.

This shift is linked to the administrative decentralization processes that followed the political reforms of the 1990s in many countries (Boxes 27 and 28). By transferring planning and governance responsibilities to local authorities, decentralization assigns a pivotal role in territorial management to regional, district and municipal administrations. Local governance processes have therefore become increasingly important for watershed management.

Administrative decentralization offers interesting opportunities for the new generation of watershed management programmes, but there are constraints to working with local governments and civil society institutions. It is often easier for central governments to devolve powers to lower units of government than to ensure that those units have the resources, capability and accountability necessary to fulfil their new functions. There is therefore a need to enhance the capacity of local governments and civil society actors to deal with technical issues, including those raised by the embedding of watershed management in territorial governance.

Participatory watershed management moves towards collaborative watershed management

External actors, such as downstream interest groups and national governments, are affected by local watershed management decisions. Hence, off-site problems and downstream impacts need to be incorporated more effectively in watershed management planning. Negotiations among local stakeholders should be linked to expert screening of the technical consistency and off-site effects of stakeholders' plans. An approach that is extremely bottom-up is not a recipe for success in watershed management, especially when downstream needs and interests are to be considered. Local stakeholder participation, horizontal linkages among authorities and local organizations, and mutual agreements among local administration, government and the private sector are all needed.

Watershed management programmes are shifting from a participatory to a collaborative approach (Boxes 28 and 29). The term "collaborative" refers to participation in natural resource management that is pluralist and based on mutual learning, exchange and negotiation among actors with diverse interests and concerns, including technical experts and policy-makers. The differences between participatory and collaborative watershed management are summarized in Table 6.

BOX 27

Participation, collaboration and decentralization in watershed management

Although most watershed management programmes, projects and plans include people's participation, it is not always clear that they implement it. One of the problems is that many watershed experts find it difficult to change their management-based, top-down method of working and do not fully understand the situation of watershed inhabitants. At the same time, local people continue to see themselves as the passive recipients of material assistance and find it difficult to enter into a new type of participatory relationship. What slows things down the most, however, is a failure to recognize local people and their associations as true partners.

It is difficult to deal with the wide variety of situations that are brought about by the participatory approach, even when it is properly implemented. There has been a shift from the top-down approach, based on providing services, to one that gives priority to individual demands. Governments are disengaging, and this can leave vacuums that may have adverse effects on communities. Giving priority to local people is a good step, but many people are now being called on to make decisions without seeing the broader picture. To avoid some of the dangers of the participatory approach, decentralization has to be strengthened; the intermediate levels – regions and provinces – need the means to provide an interface between national requirements and local expectations.

A watershed policy based on watershed players must recognize the demands of local communities and territories, while national policies have to take into account the agro-ecological, social and cultural characteristics of different territories. These two dimensions can work together only when there are strong measures to improve information sharing, strengthen the capabilities of people at all levels and organize rural areas. The major challenge is incorporating local community initiatives into a comprehensive approach.

Under decentralization, the State becomes the mobilizer and facilitator of the local development initiatives that are proposed by local communities. Economic reforms and decentralization aim to allow local initiatives that cater to local special interests, while preventing local elite groups from claiming the role of "people's representatives" to organize, run and take over projects and programmes. A contractual and partnership approach seeks to establish new relations among rural development players rather than imposing vertical relations based on strategies that ignore local and regional processes.

Central government watershed management institutions must be replaced by new ones that can create conditions for dialogue among farmer organizations and other watershed players. These new institutions must create, convert and strengthen intermediate institutions, which in turn should guide the formation of government policies to accompany decentralization. Intermediate watershed institutions should collate and regionalize the demands of rural people, and build partnerships with other rural development players to become the fora for mediation and arbitration.

Source: Bonnal, 2005.

TABLE 6
Comparison between participatory and collaborative watershed management

Participatory watershed management	Collaborative watershed management
Focuses on communities and people and targets grassroots social actors: households, small communities	Focuses on civil society and targets a variety of social and institutional actors, including local governments, line agencies, unions, enterprises and other civil society organizations, as well as technical experts and policy-makers
Based on the assumption that sound natural resource management is a public concern that is shared by all social actors	Based on the recognition that stakeholders have particular – sometimes contrasting – interests in natural resources, which need to be accommodated
Seeks (or claims) to make decisions through a bottom-up process, by which grassroots aspirations are progressively refined and turned into operational statements and action	In decision-making, seeks to merge stakeholders' aspirations and interests with technical experts' recommendations and policy guidelines through a continued two-way (bottom-up and top-down) negotiation process
Centred on the watershed management programme, with local government assisting as a side supporter	Centred on the local governance process, with the watershed management programme acting as facilitator and supporter
Aimed at creating a general consensus, presuming that conflict can be solved through dialogue and participation	Aimed at managing social conflicts over natural resources, based on awareness that dialogue and participation can mitigate (partially and temporarily) conflicts, but not solve them structurally

BOX 28
Collaborative management of natural resources: a definition

Collaborative management – also called joint, mixed, multi-party or round-table management – was developed in the 1990s by the World Conservation Union (IUCN) to embed the management of protected areas in local livelihoods, culture and governance. In collaborative management, social actors negotiate, define and guarantee among themselves a fair sharing of the management functions, entitlements and responsibilities for a given territory, area or set of natural resources.

Collaborative management is:

- a pluralist approach to managing natural resources, incorporating a variety of partners in a variety of roles, generally with the goals of environmental conservation and the sustainable use and equitable sharing of resource-related benefits and responsibilities;
- a process that requires full access to information on relevant issues and options, freedom and capacity to organize, freedom to express needs and concerns, a non-discriminatory social environment, will to negotiate, and confidence that agreements will be respected;
- a complex, often lengthy and sometimes confused process involving frequent changes, surprises, sometimes contradictory information, and the need to retrace steps;
- a political and cultural process that seeks social justice and democracy in the management of natural resources;
- the expression of a mature society that understands that there is no "unique and objective" solution to environmental problems, but rather a multiplicity of different options that are compatible with both local knowledge and scientific evidence and capable of meeting the needs of both conservation and development.

Source: Borrini-Feyerabend, 2000.

BOX 29

Towards collaborative watershed management in India

Watershed management in India has evolved from a purely technical, top-down approach in the 1970s to the current decentralized participatory approach. In 2003, the Ministry of Rural Development's guidelines on watershed development transferred a pivotal role in managing local watershed projects to village-level local government – the *panchayati raj*. This policy built on experiences of the German Agency for Technical Cooperation (GTZ), which has been involved in integrated watershed management programmes in India since the late 1990s.

GTZ defines watershed management as guiding and organizing the use of a watershed's land and other resources to provide people with desired goods and services sustainably and without adversely affecting soil and water resources. This recognizes the interrelationships among land use, soil and water, the linkages between upland and downstream areas, and the numerous types of stakeholders. GTZ's approach to watershed management encourages stakeholder participation, because a watershed development project can become sustainable only when local actors own and maintain project assets. Across India, locally elected *panchayati raj* can play a major role in this.

GTZ-supported projects focus on developing the capacity of human resources, local communities and local institutions to manage natural resources effectively. Improved farming systems – crop management, pasture and fodder development, livestock management and organic farming – provide sustainable rural livelihoods and opportunities for adding value to farm and non-farm products and services. Key features of the GTZ approach are managing the often competing demands on a watershed, such as the water needs of agriculture, households, industry, livestock, forests, wildlife and tourism, and managing conflict among social groups and between the upstream and downstream users of watershed resources. Decentralization is promoted through village-level water resources projects, self-help groups, local knowledge centres and capacity building for local actors. Technical backstopping is supplied through strengthened linkages among *panchayati raj*, line departments and private sector institutions and companies. A participatory impact monitoring system enables local governments and other stakeholders to make sound and timely decisions.

GTZ's experiences in India suggest that the best approach to watershed management is participatory, uses sound local technologies and promotes the sharing of costs and benefits. In line with government policy, GTZ's watershed projects use revenue villages or panchayats as the units of implementation, and work with local stakeholders to plan, design, implement and monitor interventions, prioritizing activities that strengthen local livelihoods. This all helps to build a sense of local ownership.

The experiences also show the importance of forging good institutional linkages. There is a crucial need for supporting actors to provide long-term technical backstopping after project support has ended. GTZ phases out the temporary organizational structures and services that run projects, and institutes post-project networking among permanent stakeholders who will continue the processes started by the project and ensure sustainability.

Source: Kotru, 2005.

KNOWLEDGE: MERGING SCIENCES AND LOCAL CULTURES

Collaborative watershed management processes must be based on shared knowledge. In conventional watershed management, planning was largely based on "hard" natural sciences and social surveys. During the 1990s, PRA methods were adopted, with the twofold aim of understanding local people's views and involving local people in establishing priorities. This did not always lead to effective exchanges of information on natural resource issues among technical experts and local stakeholders. Insufficient expertise in social and cultural research turned many participatory appraisals into "quick-and-dirty" exercises, whose main output was a shopping-list of felt needs to be accommodated in watershed management plans (Box 30).

BOX 30

Flaws in participatory appraisal and planning methods in Nepal

The Soil Conservation and Watershed Management Component (SCWMC) of the Denmark–Nepal Natural Resource Management Sector Assistance Programme was implemented from 1998 to 2004 to help soil conservation offices launch participatory watershed management in the Nepalese Middle Hills. The programme covered 20 districts, 24 sub-watersheds and 700 communities, representing about 30 000 households.

SCWMC was based on building grassroots organizational and financial capacity in integrated watershed management. Groups of participants were established at the ward and micro-catchment levels, until it became clear that these were not sufficiently socially homogeneous to function as local development units. SCWMC therefore shifted to hamlet-level community development groups (CDGs).

PRA and "vision planning" were used for participatory planning at the CDG level. The programme expected each CDG to set a development vision that was compatible with watershed management principles, such as "becoming a well-protected and healthy village". This vision would then be put into operation through a plan with specific objectives, such as "reclaiming all local degraded lands and applying soil conservation treatments to local gullies and landslides" and "obtaining access to safe drinking-water and the use of a latrine".

SCWMC introduced the service, economy, environment and democracy (SEED) approach to prioritize the activities financed by the programme. Ideally, communities were to prioritize activities that provide services, promote production, protect the environment and promote democratic norms.

Budgets were set according to communities' planned activities, with CDGs free to prepare relatively large projects. This helped the CDGs to develop the necessary skills to approach other donors for funding. Compulsory group saving schemes strengthened the groups' ownership of programmes.

Through this bottom-up planning process, CDGs drove the implementation of SCWMC. However, owing to insufficient technical backstopping from field staff and lack of expertise among community members, many CDGS implemented additional work with their budgets, which forced them to compromise on quality. CDGs were also more concerned about the service component of SEED than the environment, economic and democracy aspects, so they pressurized field staff to direct resources away from soil conservation and watershed management towards the building of schools, household water supply schemes, irrigation canals and other things that were beyond the natural resource management scope of the programme. In the long term, this threatened the relevance and sustainability of SCWMC efforts to promote sound soil conservation and watershed management practice at the grassroots of rural society.

Source: Sthapit, 2005.

Action research

In watershed management, there are still large gaps between science and practical expertise, between theory and practice, and between desire for collaboration with stakeholders and capacity to manage such collaboration. An approach is needed that links local and scientific knowledge by incorporating sound action research practice into collaborative watershed management.

Action research can be described as adaptive, collaborative, interactive, pluralist or participatory research. In watershed management, it focuses on subjects that reflect local priorities and aims to identify site-specific solutions to the problems faced by watershed stakeholders. End-users participate in identifying research topics, designing research and validating results. Procedures and outputs should be easy to understand and use for watershed inhabitants, NGOs, local governments, trainers, watershed managers and others (Boxes 31 and 32).

Action research is a joint learning process based on cross-cultural dialogue

Action research for watershed management should address natural resource management in the context of the existing productive systems and social institutions that regulate access and tenure. Local views on these issues should be gathered, and when appropriate compared with relevant scientific knowledge and policy orientations. In this way, action research can promote a two-way cross-cultural learning process through which expert knowledge is adapted to local environmental and socio-cultural conditions, while local knowledge is enhanced and strengthened by scientific understanding of the issues at stake.

BOX 31

Interactive research and action learning for watershed management: the CAMP project

What impact will improved watershed management have on local livelihoods? How can watershed management technology be used to strengthen natural capital assets and decrease environmental vulnerability? These questions are being addressed by interactive research within the CAMP programme. In interactive watershed management research, watershed stakeholders collaborate with scientific researchers at both the design stage, by helping to define programme objectives and ensuring that resources are mobilized, and the implementation phase, by monitoring and steering the programme. Experiences from South Africa, the United Republic of Tanzania and Grenada suggest that this approach has the following benefits:

- Through close involvement in the research, stakeholders assume ownership of the programme and are more likely to understand and adopt research findings.
- Best use is made of existing knowledge and data resources by building on the collective resources of all stakeholders.
- The action learning process contributes to awareness building and facilitates negotiation among different interests.
- Two-way information flows are established between stakeholders and researchers, as well as among different stakeholders.
- All aspects of watershed ecology, including livelihoods, governance and upstream–downstream linkages, are considered and represented.
- Collaboration among stakeholders with different interests and perspectives is more likely to achieve watershed management objectives.

Source: Calder, 2005.

BOX 32

Collaborative watershed management and action research in the United States

More than 150 years of agricultural development in the United States upper Midwest has created one of the most productive agricultural areas in the world. Today, however, the sustainability of this profitability and the impact on human and environmental resources are being questioned. To expand production in the Minnesota River basin, wetlands have been drained and converted to croplands, and extensive tile drainage networks and ditch systems are moving water off the land and into stream channels. Annual crops have largely replaced tall grass prairie species in the uplands and native riparian forests along stream banks and in floodplains. Stream channels have been modified to reduce flood damage to crops and farming communities.

An interdisciplinary, participatory watershed management programme was launched in the Minnesota River basin to address these ecological and hydrological imbalances. This uses a collaborative research and education approach to identify, evaluate and develop alternative cropping and management strategies that incorporate trees, woody vegetation and herbaceous perennials. It also considers alternatives to annual cropping that can compete financially with current production systems, on their own or through payment for the environmental services they provide. Programme objectives were defined with the participation of landowners, local citizen groups and local, state and federal government agencies, and partnerships have been formed with citizen groups, agency personnel, agroforestry cooperatives, university faculty and individual farmers.

Farmers adopt the programme's land-use changes and management practices with the help of learning groups that include people who have already implemented agroforestry and perennial cropping systems. Through these groups, stakeholders identify sustainable and profitable land management options that landowners can adopt easily. Field research and monitoring of demonstration areas quantify the production outcomes and hydrologic and water quality changes associated with different cropping systems. Changes in vegetative cover in upland watersheds and riparian areas will be simulated, and different scenarios of change investigated to determine the effects of scale and landscape position on project objectives.

Hydrologic modelling provides information for the economic evaluation of downstream impacts. On- and off-site costs and benefits are evaluated from the perspectives of both farmers and stakeholders in the river basin (externalities). An assessment of markets for products from alternative perennial cropping systems is essential. Workshops where land managers and farmers can discuss the economic and policy issues that constrain implementation are planned, and educational materials for different audiences will be prepared.

This programme is expected to promote land-use changes that diversify the agricultural landscape, sustain the rural economy, enhance hydrologic storage and function, and improve water quality in the Minnesota River basin. Landowners, technical service providers, policy-makers and other stakeholders have been involved from the outset. The initial learning groups are expected to expand into a network for improving and adapting management practices. The programme should lead to continuing diversification of land use and management, better understanding of the watershed benefits derived from improved land use, more involved and informed citizens, and – ultimately – the policy changes needed to support sustainable land-use practices.

Source: Brooks, Current and Wyse, 2005.

As suggested in Box 32, action research should feed a multi-stakeholder process. Research should be planned as a long-term learning exercise that includes the dissemination and replication of successful results, local best practices and lessons learned through demonstration sites and training. User-friendly tools for assessing the impacts of watershed management interventions – including local geographic information systems (GIS) – should be developed and used in participatory monitoring and evaluation. Skills in facilitating action research at the local level also need to be enhanced.

POWER: RIGHTS AND CONFLICT

Collaborative watershed management is not socially and politically neutral

The big challenge for collaborative watershed management is improving natural resource use from within local societies. This facilitates greater social ownership of watershed management interventions, and hence more sustainable environmental impacts. However, by involving social actors and local institutions in joint decision-making, watershed management can no longer be seen as a neutral or purely technical exercise; any collaborative watershed programme takes place within the local political arena.

A watershed programme or institution should intervene in local politics as an external regulatory stakeholder, and must not ignore existing power imbalances. This is because the key actors in watershed degradation are often the powerless, disadvantaged and marginal groups – such as upstream small farmers or the rural poor – whose needs and problems are not taken fully into account by local politics. Empowerment through interest groups and incentives, for example, ensures that weaker groups are not excluded from the collaborative process, but these measures may sometimes be insufficient to overcome the power gaps among stakeholders.

Natural resource use, access and tenure are the most critical links between local communities and watershed management. Collaborative management measures, such as awareness raising, capacity building, mediation and incentives, may help to resolve small, self-contained conflicts over natural resources. Conflicts that are rooted in tenure systems and access rules, however, will also need legal and legislative action to define and accommodate contrasting resource claims and rights.

Collaborative watershed management at the local level is not a "magic wand" that is sure of success because its practitioners are committed, patient and dedicated. Chapter 4 describes how collaborative watershed management is part of a more comprehensive policy reform of the land and water sectors, which is supported by strong rural development initiatives and measures to promote rural livelihoods.

INSTITUTIONAL AND FINANCIAL ARRANGEMENTS FOR COLLABORATIVE WATERSHED MANAGEMENT

Collaborative watershed management requires long-term strategic planning processes

Most government or donor-funded watershed management programmes follow a clearly defined project logical framework (logframe) specifying what is to be achieved and how. Objectives, outputs and activities are defined during the identification and formulation phase, and are normally based on limited information and superficial consultation with local stakeholders. Although project documents can be revised and amended, the general structure of the logical framework is maintained throughout the life of the project. Timing is also predetermined, which puts managers under constant pressure to deliver.

This planning format is not compatible with the new approach to watershed management, which requires greater flexibility in programme design. Strategic planning for watershed management needs to take into account different temporal and spatial scales and accept a degree of uncertainty. Watershed interventions should be planned progressively, with the involvement of local stakeholders and technical experts, and with a medium- to long-term vision.

Permanent watershed institutions should be created (or strengthened) to ensure long-term collaborative watershed management. The relationship between watershed

management institutions and local institutions and civil society should be one of subsidiarity, i.e., watershed institutions should act only on those issues that local government, civil society or private actors cannot deal with themselves. The institutions should provide: (1) a forum for pluralist consultation and negotiation; and (2) the administrative and operational capacity to solve technical problems. The differences between watershed management delivered under a project format and that provided as a subsidiary service are presented in Table 7.

Permanent, subsidiary watershed management institutions are needed

Collaborative watershed management should preferably be the responsibility of "light" institutions such as watershed fora, observatories, municipal consortia, negotiation tables, water boards and land management committees (Box 33). The role of informal indigenous institutions should also be recognized and supported (Box 34).

Existing "heavy" watershed and water-supply authorities might also be the focal points of collaborative watershed processes, but their mandates and institutional cultures need to be reformed so that they can apply the pluralist and subsidiary approach to collaborative watershed management.

The financing of permanent watershed institutions is a controversial issue. Government or donor financing may be justified by the public-good nature of watersheds and the economic externalities that watershed management generates. In order to ensure regular funding, however, market-based mechanisms should also be developed. The water and energy sectors and the carbon sequestration market provide promising channels for recovering the operation costs of watershed management though PES schemes (Chapter 4).

MATTERS OF SCALE

Watershed management can be implemented at scales that range from small upland watersheds to entire transboundary river basins. Collaborative watershed management has flourished in relatively small territorial units, generally corresponding to sub-watersheds. The advantage of these small-scale programmes is that activities can be intensive and face-to-face interaction with local stakeholders is easier. Small-scale pilot projects have a limited impact at the watershed or river basin level, however, and the scaling-up of successful local experiences is a critical challenge for the new generation of watershed management programmes.

TABLE 7
Watershed management delivered under a project format and as a subsidiary service

Project	Subsidiary service
Logframe-based, planning defined in detail at the beginning of the project, with only minor adjustments allowed during implementation	Strategic planning with major impact objectives defined in advance, and secondary outcomes, outputs and activities identified during the run of the service
Short-term, intensive presence in the watershed (normally five to ten years)	Long-term presence with variable degrees of intensity according to needs
Primarily responsive to donor and government	Primarily responsive to local government and civil society
Priorities often driven by outsiders' criteria, including delivery pressure	Priorities primarily driven by insiders' problems: conflicts, negotiation, fundraising, etc.
Limited responsibility for fundraising	Actively involved in fundraising
Services provided on an all-inclusive, "full-board" basis	Services subsidiary to stakeholders' initiative and resources, and delivered on a cost-recovery basis
Requires an appropriate exit strategy to ensure that achievements are sustainable	Sustainability is built day by day

The scaling-up of pilot experiences also helps to embed watershed management in local governance. A watershed programme should overlap as much as possible with the administrative unit that delivers economic and social services. The territory should also be sufficiently large and populated to sustain the costs of a permanent watershed management institution.

The optimal scale of a collaborative watershed programme depends on several factors, including the watershed's strategic value, the existing demand for watershed services, ecosystem fragility, disaster risk, local stakeholders' priorities and the financial and technological resources that are available. The nature and size of the final expected impact should be consistent with the scale of the programme.

The design and operation of local programmes must also consider upstream–downstream linkages. Any local-level intervention should be viewed on the "big picture" screen, and a methodology for multi-level watershed, sub-watershed and micro-watershed planning should be developed.

BOX 33

"Heavy" and "light" watershed management institutions in Indonesia

Most watershed management in the Asia–Pacific region takes a project approach, in which organizations are established for the delivery of goods and services, extension, training of farmers and other activities. A major problem is that project extension teams encroach on the jurisdiction of government institutions, often leading to conflict and hindering project delivery.

Indonesia has about 470 watersheds. These vary in size and condition, and many are degraded. In 1999, the Ministry of Forestry issued guidelines for watershed management planning, which aim to prioritize those watersheds that most need management interventions, based on a systematic and scientific assessment.

Priorities were set through consultations at the central level. A group of expert stakeholders, including government officials, watershed professionals and academics, decided the relative importance of the biophysical, socio-economic and other factors that act on a watershed and govern the benefits of interventions. This reduced the disciplinary bias in which, for example, a hydrologist tends to assign most importance to hydrological factors.

In the field, however, watershed management officers and local administrators often failed to cooperate, mainly because watershed boundaries tend not to correspond to the administrative boundaries of other management and development initiatives. This generates conflicts and complex problems that no single institution has been able to solve.

The government is now promoting the participation of local administrations and other stakeholders in watershed management decision-making. Regional watershed management fora involve traditional leaders and representatives from local administrations, NGOs, community-based organizations, universities and other civil society organizations, as well as government experts, and are expected to accommodate national and local interests in watershed management through negotiation among stakeholders. Initial experiences in central and east Java, north Sumatra and south Sulawesi have had promising results.

Source: Anwar, 2005.

BOX 34

Indigenous water management institutions in Zimbabwe

Over the last two decades, there has been a paradigm shift in conservation and natural resource management in most African countries, from costly State-centred control towards community-based approaches. Debate on the institutional arrangements for common pool resource (CPR) use has concentrated on visible and formal institutions, but other hidden and informal institutions, such as social networks, are also important for natural resources.

Romwe micro-catchment is in Chivi district, southern Zimbabwe, which has low rainfall (450 to 600 mm per annum), poor soils and severe droughts. The dryness of the area makes water a key resource in local livelihoods. As well as the three villages within the catchment, another seven villages nearby use Romwe's resources.

Water sources are either community- or privately owned. Community-owned sources include boreholes, Barura dam, streams and deep wells, which different villages use for different purposes and at different times of year. The boundaries of who can use water resources depend on the type of source and its particular use. Community-owned water sources are subject to a variety of rules and regulations, some of which are generic, while others are specific to the type of water source.

Most privately owned water sources are deep wells close to homes or in fields and dug by households with their own labour, hired labour or assistance from neighbours. Some wells have been inherited from parents and grandparents. It is rare for a single household to have exclusive use of a well, but well owners attach conditions to the use of their wells. An individual may have access to water for domestic purposes, such as drinking, cooking and laundry, but when larger amounts are needed – e.g., for beer brewing – permission has to be sought.

During droughts, when water is limited, well owners may limit the number of households that can fetch water from their wells, the frequency of fetching water, and the purposes and volumes of water to be collected. Individual owners set rules regarding access, and village health workers set rules regarding hygiene; these are communicated verbally to well users. Denial of access to water is generally resented in the community.

Water access is based on reciprocity. The benefits that well owners derive from the people who use their wells include access to arable land through land leases, draught power for agricultural work, labour, and social capital when the people who share a water point engage in other projects together.

The institutional arrangements governing communal and privately owned water sources are not usually written down, but community members know them well. Most arrangements are defined very generally, and give access conditional on appropriate use. This non-specificity allows flexibility in resolving particular cases, which recent calls to codify the rules and regulations for resource use overlook. In Africa, formalizing landholdings through registration increases conflicts over land rights, particularly when groups customarily had informal access to water. Local communities' customary rights over common pool resources and the value of flexibility in these arrangements must be recognized.

Source: Nemarundwe, 2005.