

# Changing Approaches to Mountain Watersheds Management in Mainland South and Southeast Asia

**GOPAL B. THAPA**

School of Environment, Resources and Development  
Asian Institute of Technology  
P.O. Box 4, Klong Luang  
Pathumthani 12120, Thailand

**ABSTRACT** / Mountain watersheds, comprising a substantial proportion of national territories of countries in mainland South and Southeast Asia, are biophysical and socioeconomic entities, regulating the hydrological cycle, sequestering carbon dioxide, and providing natural resources for the benefit of people living in and outside the watersheds. A review of the literature reveals that watersheds are undergoing degradation at varying rates caused by a myriad of factors ranging from national policies to farmers' socioeconomic conditions. Many agencies—governmental and private—have tried to address the problem in selected watersheds. Against the backdrop of the many causes of degradation, this study examines the evolving approaches to watershed management and development. Until the early 1990s, watershed management planning and implementation followed a highly centralized approach focused on heavily subsidized structural measures of soil con-

servation, planned and implemented without any consultation with the mainstream development agencies and local people. Watershed management was either the sole responsibility of specially created line agencies or a project authority established by external donors. As a consequence, the initiatives could not be continued or contribute to effective conservation of watersheds. Cognizant of this, emphasis has been laid on integrated, participatory approaches since the early 1990s. Based on an evaluation of experiences in mainland South and Southeast Asia, this study finds not much change in the way that management plans are being prepared and executed. The emergence of a multitude of independent watershed management agencies, with their own organizational structures and objectives and planning and implementation systems has resulted in watershed management endeavors that have been in complete disarray. Consistent with the principle of sustainable development, a real integrated, participatory approach requires area-specific conservation programs that are well incorporated into integrated socioeconomic development plans prepared and implemented by local line agencies in cooperation with nongovernment organizations (NGOs) and concerned people.

Typical mountain watersheds are areas predominantly comprising mountain ranges with interspersed river valleys and plateaus. In South and Southeast Asia, they are headwaters of the major river systems, such as the Indo-Ganges and Brahmaputra in the Indian subcontinent, and the Mekong and Red rivers in mainland Southeast Asia. They have significant ecological, aesthetic, and socioeconomic importance. These watersheds are home to millions of people, a substantial proportion of whom are indigenous ethnic minorities eking out their livelihoods by utilizing the natural resources available there. As much as 65% of the rural population of Asia, and a much larger percentage of its poor, live in upland regions (Douglas 1999). In Nepal and Laos, half of the people live in the mountains. About 35 million people of India and 23 million of Pakistan have settled in the mountains compris-

ing part of the Hindu-Kush Himalayas (Sharma and Par-tap 1994, p. 62).

The well known but not fully appreciated fact is that mountain watersheds have been lifelines not only for the people living there, but for also the population living beyond. About 10% of the world's people depend directly on the use of mountain resources for their well-being; as much as 40% depend indirectly for water, hydroelectricity, timber, mineral resources, recreation, and flood control (Ives 1985, p. 33). To what extent or how long the ecosystem-balancing and economic opportunity-generating roles of watersheds will continue depends on their status as reflected in the distribution, density, and type of vegetation cover and the pace of soil erosion and level of land productivity. Due to the lack of comprehensive macrolevel studies, no conclusion can be drawn about the status of watersheds on a regional scale. However, findings of several microlevel studies indicate that watersheds are undergoing soil erosion, soil nutrient depletion and deforestation, although the extent of these problems varies from one area to another (Hamilton 1983, Carson 1992, Chazee 1994, Metz 1994, Enters 1995, Sharma and Wagley 1997, Swati 1998).

**KEY WORDS:** Mountain watersheds; Watershed degradation; Causes of degradation; Compartmentalization; Top-down approach; Integrated participatory approach

*Email:* gopal@ait.ac.th

In Southeast Asia, the practice of slashing and burning forests for crop cultivation, commonly known as shifting cultivation or swidden system, has taken a toll on forest resources and accelerated the pace of soil erosion as settlers have been forced to shorten the fallow period to cope with problems of ever-increasing populations and of poverty. In Laos, about 4.9 million ha of land, most of which is in the mountains, is under shifting cultivation (Chazee 1994). As a result, particularly in the Nam Ngum watershed, every year 28.6 million tons of soil are lost at the rate of 36.6 tons/ha (BCEOM/SEATEC/SEMED 1999, p. 16). Similarly, considerable expanses of upland areas in Thailand (Seetisarn 1996), Vietnam (Sam 1996, Rambo and Cuc 1998), and Cambodia (Bowden 1998) are undergoing degradation due to shifting cultivation.

Carefully managed land use systems, including the construction of extensive terraces, in the mountains of India and Nepal, which evolved as a response to the ever-increasing demand for food arising from steady population growth, have controlled agricultural land degradation to a considerable extent. However, particularly in the mountains of Nepal, the nonirrigated agricultural lands characterized by relatively wide and outward facing rainfed terraces have been undergoing accelerated soil erosion at the rate of 5–20 t/ha/yr, and the most serious problem is degraded grazing lands, which are losing soils by as much as 100 t/ha/yr (Carson 1992).

Regarding forest resources, in the Siran watershed of Pakistan, 8.3% of forests were completely lost and the forest density decreased by 8.4% during 1985–1992 (Swati 1998). The findings of scientific studies have overturned the widely held perception of severe deforestation in the Himalayan region (Ives and Messerli 1989). Some areas have seen appreciation in forest stock, despite steady population growth (Fox 1993). In other areas, however, forests are undergoing degradation (Thapa and Weber 1991, Metz 1994, Rogers and Aitchison 1998). The situation in Southeast Asia seems to be more serious. In Laos, 300,000 ha of forests are being wiped out every year (Phanthanousy 1994). A similar trend is found in the mountains of Thailand (Enters 1995), Cambodia, and Vietnam (Bowden 1998).

South and Southeast Asian countries have realized the consequences of watershed degradation and have taken initiatives to control it (ESCAP 1997, Sharma and Wagley 1997). Planned efforts made to conserve watersheds date back to 1957 when the Government of India in cooperation with the Food and Agriculture Organization of the United Nations (UN/FAO) launched the first of its watershed management programs (Seth

1996). With the exception of transitional economies in Southeast Asia, in most other countries systematic efforts began in the mid-1970s. Since then watershed management projects have been increasingly implemented, with changing approaches built upon experience. One approach, as conceived in this paper, comprises four components, including scope of the program, planning and implementation, institutional arrangements, and public participation. The primary aim of this paper is to evaluate the appropriateness of the evolving approaches against the backdrop of factors causing watershed degradation.

Mountain watersheds have increasingly attracted the attention of policy-makers, planners, and academicians whose works have been published as research reports, working papers, books, and journal articles. This article is based, to a large extent, on these works. The author's accumulated experience in pursuing research on mountain watersheds for more than a decade enabled him to evaluate the approaches to watershed management.

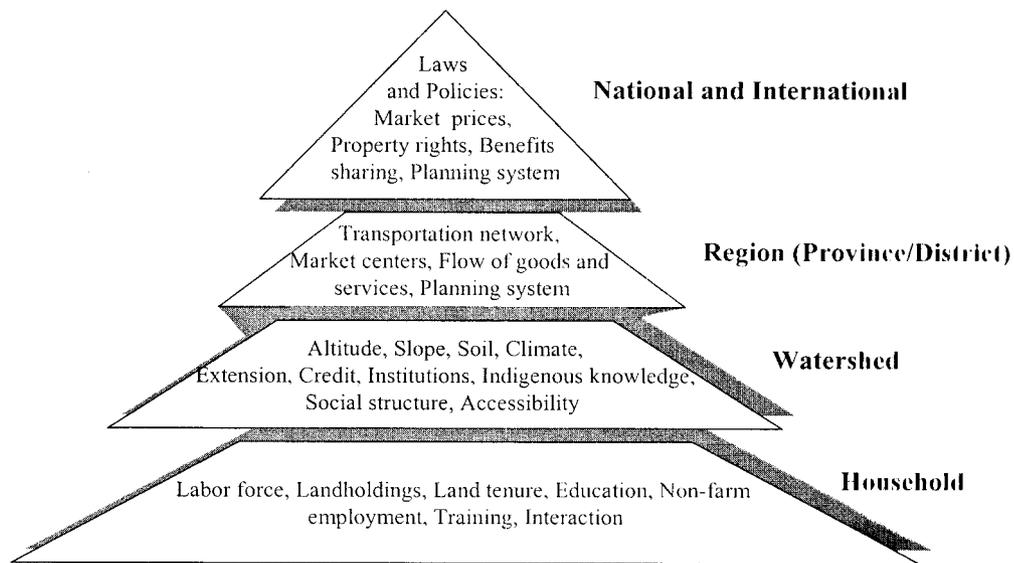
### Why Are Watersheds Undergoing Degradation?

Prior to examining the evolving approaches to watershed management in mainland South and Southeast Asia, it is essential to explore neatly interwoven factors that determine the status of watersheds in one way or another. Whatever approaches are being adopted, they have to address the causes of degradation in order ensure effective and sustainable conservation of watersheds. Approaches adopted arbitrarily without due consideration of such causes would incur a lot of financial cost without appreciable achievements.

#### Compartmental Explanation

Academicians, policy-makers, and planners have been seeking an explanation of mountain watershed degradation. In most cases, they have either been confined to narrow boundaries of watersheds or have paid attention to a particular sector(s) they are interested in or are affiliated with. Examples of the former pursuits are those that consider inadequate or lack of structural and vegetative measures of soil and water conservation (Lobo and Kochendorfer-Lucius 1995, Mandal and Malla 1996, Choudhury 1998) population pressure, poverty (Douglas 1999, Sharma and Partap 1994), insecure or unfair land tenure systems, poor support services and facilities, including extension service (Paul 1998, Douglas 1999), and weak market linkages (ICI-MOD 1986).

Recently there has been an increasing recognition that centralized planning and management systems,



**Figure 1.** The four-tier hierarchy of factors influencing watershed resources use and management. This is a list of selected multilayer factors influencing watershed resources use and management. Depending on the location-specific situation, the influencing factors vary from one watershed to another.

weak local institutional capability, poor public participation, and neglect of indigenous knowledge are primary causes of watershed degradation (Lobo and Kochendorfer-Lucius 1996, Sharma and Wagley 1996, Sharma 1997, Kandel and Wagley 1999). National policies that accord second priority to the mountain development and other export, import, and price policies are also important factors explaining watershed degradation (Dani 1991, Sfeir-Younis 1991).

#### Holistic Explanation

The above explanations are valid, although they may not be equally applicable to all regions. The fundamental question that needs to be answered, however, is whether such narrowly focused explanations would help to devise a comprehensive approach to watershed management that can enable people to improve their quality of life as well as maintain ecological balance through sustainable conservation of forest and land resources. Watersheds, which have been a matter of concern, are both socioeconomic and biophysical entities. Therefore, their management and development demand an approach that ensures the well-being of both constituents.

Based on research experience in watershed management as well as observation of the situation in the mountains of Laos and Nepal, the author finds the compartmental explanation to be an artificial segregation of intricately interwoven factors corresponding to different levels of a four-tier hierarchy (Figure 1).

These factors have a bearing on watershed use and management in one way or another. Resource use and management systems that evolve at a certain time in a particular watershed are manifestations of the combined influence of factors pertaining to the four-tier hierarchy. In Laos, for example, the national policy of depriving farmers from ownership of land and forest resources is one of the major causes of watershed degradation. In addition, poor accessibility impairing interregional flows of goods and commodities and poverty are other equally important causes. This implies that the sectoral explanation cannot help to devise a comprehensive approach conducive to reconciling conservation and development in mountain regions.

Based on the above holistic explanation, the following conclusions are drawn that fit well into a four-dimensional framework comprising (1) scope, (2) planning and implementation, (3) institutions and organizations, and (4) public participation, and serve as criteria for evaluation of approaches being adopted.

1. *Scope.* Watersheds are undergoing degradation due to economic policies and activities pursued to fulfill basic needs of poor people and commercial interests of entrepreneurs. Their management is therefore an integral part of the socioeconomic development efforts.

2. *Planning and implementation.* Planning and implementation of conservation and development programs have to be decentralized, as plans prepared by the

Table 1. Activities carried out by Department of Soil Conservation Watershed Management until 1980

Activity	Region				Total
	Eastern	Central	Western	Far-western	
Check dams construction (N)	135	630	370	340	1475
Tree plantation (ha)	95	374	320	240	1029
Grass plantation (ha)	25	97	65	45	232
Horticulture (ha)	25	111	50	25	211
Terrace improvement (ha)	25	40	155	50	270
Embankments (m)	1100	3950	640	420	6110

Source: Fearnside and others (1980).

central line agencies do not reflect local needs and aspirations.

3. *Institutions and organizations.* Most development agencies, in one way or the other, are pursuing conservation and development activities in watersheds. To ensure effective and sustainable watershed conservation, these agencies have to be made responsible for planning and implementation of related programs in a well coordinated way.

4. *Public participation.* Active public participation in planning, implementation, and monitoring is indispensable for sustainable conservation and development of watersheds. Watershed settlers depend on water, forest, and land resources to fulfill their needs. They therefore have a vested interest in watershed conservation, provided it is facilitated and promoted through an appropriate institutional system encouraging their active involvement in planning, implementation, management, and monitoring of programs.

### Evolving Approaches to Watershed Management

The problem of watershed degradation was realized as early as the 1930s in India. A concentrated and wide-scale interest, however, seems to have arisen since the mid-1970s when several donor agencies, including UN/FAO, Danish International Development Agency (DANIDA), and Swedish International Development Agency (SIDA), supported watershed management projects implemented in some microwatersheds of India, Pakistan, Nepal, and Thailand (Nalampoon 1997, Seth 1996, Hamilton, 1983, Fearnside and others 1980). While interest in Southeast Asian countries arose relatively late, currently many watershed management projects have been implemented in Laos, Cambodia, and Vietnam under technical and financial support provided by several international agencies (BCEOM/SEATEC/SEMED 1999, Dong 1997). In view of the scope of activities, planning, and implementation sys-

tems and provision for public participation, the approaches that these projects have adopted can be broadly categorized into two types: (1) a compartmental, top-down approach and (2) an integrated, participatory approach. In the following sections, an attempt has been made to evaluate these approaches on the basis of the above four items as evaluation criteria.

#### Compartmental, Top-Down Approach

A review of watershed management projects implemented in South and Southeast Asian countries reveals that until the early 1990s, they followed heavily centralized top-down planning and implementation systems with a focus on selected sectors. This approach is going to be examined in terms of its coverage of activities, institutional structure, planning and implementation system, and public participation.

*Scope.* In most countries under the scope of this study, the initial concern over watershed management emanated from the threat of dwindling hydropower generation capacity due to reservoir siltation (Sharma and Wagley 1997, Seth 1996, Fearnside and others 1980). In this regard, attention was paid to erosion control specifically in reservoir catchments through capital-intensive structural measures, including diversion drains, contour dikes, grassed waterways, and silt-detention dams, while the entire mountains were either undergoing or vulnerable to degradation. Farmers in the Phewatal watershed of Nepal (Hamilton 1983), Luang Prabang province of Laos (personal communication with officials of the Ministry of Agriculture and Forestry 1999), and in the northern mountains of Thailand were provided with funding support for terrace construction and repair. Investments in afforestation and reforestation projects were made without paying much attention to important factors such as free access to forests and poverty, deterring conservation of forest resources. Such a tendency toward watershed management has been clearly reflected in official progress reports (Table 1), and this is often preferred by con-

cerned technocrats as it entails the least resistance by the department of forestry and other vested interest groups, and the results achieved are more immediately measurable. Cooperation of the local people is quite easily obtained as all structural work is highly subsidized (Mirza 1998).

The sectoral approach to watershed management has its roots in blindness to the structural factors, including socioeconomic conditions of watershed settlers who play a role in determining the status of natural resources. This has resulted in the use of scarce resources without any appreciable achievements. In India (Paul 1998) and Nepal, a significant amount of resources was devoted to relatively small watersheds to protect man-made and natural lakes, but the problem of siltation could not be effectively controlled. One of the obvious reasons was that watershed management initiatives could not be linked with needs and aspirations of local people, whose active participation is indispensable for sustainable use and management of natural resources.

The typical system of providing funding support for structural measures of soil conservation undermined the prospect of sustainable conservation by cultivating a feeling in the hearts and minds of people that they cannot do anything without government support. "Whenever we advised them to prepare a conservation plan, the villagers asked for financial assistance for the construction or repair of terraces, culverts, irrigation canals and retaining walls" said a watershed manager working with the Department of Soil and Watershed Conservation in Nepal.

To a considerable extent, the tradition of not seeing conservation and development as interrelated, and focusing instead on structural measures emanated from the rigid academic background of watershed managers who, in most instances, were either foresters or soil conservationists (Sharma and others 1997). As the interdependency between development and conservation has been gradually realized, watershed management has been a sustainable development strategy that cuts across both sectors. Watershed managers should therefore be able to handle both conservation and development pursuits, leaving behind the traditions of a compartmental approach.

*Institutional structure.* Creation of public agencies according to the perceived needs of planners and policymakers has been a common phenomenon in developing countries. Watershed conservation has not been an exception. In Nepal, a separate Department of Soil and Water Conservation (later renamed the Department of Soil Conservation and Watershed Management) was created under the Ministry of Forestry without regard

for the role of existing line agencies, including Departments of Agriculture and Forestry, and local organizations (Fearnside and others 1980). Following the organizational setup of other departments, this department also established district level offices in 45 of the 75 districts (Wagley 1997). In the same vein, Thailand established the Watershed Management Division under the Ministry of Forestry in 1981 (Nalampoon 1997). In India, the national government has launched the National Watershed Development Programme for Rainfed Areas and Integrated Wasteland Development Project for soil and water conservation in mountain areas. Besides these, there are many programs and projects being implemented by state governments and international agencies (Choudhury 1998).

Looking at the organizational arrangement made for planning and executing watershed management activities, one can easily draw the conclusion that the management system is in complete disarray. In India, Nepal, and Thailand, separate line agencies were created by the government to deal with watershed management, but as in the case of India, parallel agencies were created by both the central and the provincial governments, and these agencies were planning and executing programs as per their ministries' agendas. Moreover, the donor agencies that funded the majority of watershed management projects did not like to implement their projects with the existing line agencies and created independent project agencies, pursuing their activities without any coordination with other development agencies. For example, the Department of Soil Conservation and Watershed Management in Nepal was responsible for implementation of the government initiated programs, while the US Agency for International Development (USAID), Finnish International Development Agency (FINIDA), and Danish International Development Agency (DANIDA) were also implementing projects in different parts of the country in their own way.

The striking feature of these special agencies was that in most instances they were functioning in isolation without any coordination with line agencies in charge of development activities. Apart from the weakness of not seeing conservation and development as being interdependent, this type of institutional arrangement was an outcome of bureaucrats' greed for power and money. Bureaucrats, who are often involved as counterparts in externally supported projects, get additional financial benefits such as project allowances and other privileges that they do not want to share with others. If this was not the case, existing line agencies, including departments of forestry, agriculture and industry should have been made responsible for watershed management and development instead of creating

a separate agency such as the Department of Soil and Watershed Conservation in Nepal. Even if watershed management programs are focused on conservation of forest and land resources, existing departments of forestry and agriculture are the ones who should take the responsibility as in the case of three northern districts of Karnataka in India (Naik 1996).

Equally important role players in the creation of a separate institution for watershed management were the donor agencies who found it much easier to work with a separate agency rather than with several line agencies plagued with problems of red tape and corruption. By investing a relatively large amount of resources in a small watershed they can clearly demonstrate benefits of their projects.

One of the consequences of creating a separate institution was that many of the watershed management agencies were in a dire state without funds required for highly subsidized conservation activities, especially after the withdrawal of external assistance. In the Nuwakot district of Nepal, the District Soil Conservation Office had no budget for its annual activities to be implemented in 1996 (Mandal and Malla 1996). All related activities in the Luang Prabang province of Laos had disappeared with the termination of the FAO-sponsored watershed management project (personal communication with officials of the Ministry of Agriculture and Forestry (1999)). In Laos, such projects are referred to as "sunset" projects.

*Planning and implementation.* Partly due to the traditionally held belief that structural measures and reforestation were the only means of conservation, and partly due to the perception that local people lacked required knowledge, watershed management was the exclusive responsibility of a specially created agency. In this regard, the concerned central agency prepared blueprint plans without due consideration of locational attributes and social reactions, and implemented them through regional or field offices that had no flexibility to modify the plan to suit local conditions.

One of the anomalies of the planning and implementation system was that management plans were prepared and implemented in isolation, without any coordination with development programs implemented by other agencies. Most activities being pursued by watershed management agencies were related to conservation of forests and agricultural lands, but management plans were prepared with total disregard of forestry and agricultural development plans prepared by departments of agriculture and forestry, eventually duplicating activities and making inefficient use of scarce resources. Due to the lack of coordination or integration with mainstream development planning and imple-

mentation, watershed management activities stopped following the withdrawal of external support (Mandal and Malla 1996, personal communication with officials of the Laotian Ministry of Agriculture and Forestry 1999).

*Public participation.* According to a report prepared by FAO for the Department of Soil Conservation and Watershed Management (Fearnside 1982), the agency was supposed to prepare and implement its plan with the full support of local people. In practice, the people, who are the most important stakeholders, were not even consulted in the process of planning because of concerned officials' deeply rooted perception that they know everything and the local people know nothing. Being generously supported by the donor agencies, the potential and importance of mobilizing local resources for sustainable watershed conservation was completely neglected. As a result, the local people were just silent receptors of the heavily subsidized conservation technologies that promoted the culture of dependency, which perceives anything to be impossible without external support. Watershed management plans could not promote a spirit of ownership of projects among people, which constrained their active participation in management activities.

The above remarks do not imply that the people did not contribute anything to watershed management. A review of experiences in the region reveals that they have made contributions to structural works, primarily in the form of labor, but in the majority of instances they have received a partial payment for their contribution, while in some instances, they received full payment. Such support is considered essential in order to promote poor people's participation in conservation activities (Wagley 1997). This support might be possible if only a few small watersheds are undergoing degradation. Some of the countries in this study, like Nepal, Laos, and Vietnam, are predominantly mountainous. A substantial proportion of other countries, including India and Thailand, are also mountainous. In this type of situation, government agencies need to be equally concerned about the problems of the entire mountain regions. Implementing heavily subsidized watershed conservation programs in these countries would require a huge investment, which is beyond their means.

#### Integrated, Participatory Approach

The failure of the compartmental, top-down approach in addressing watershed degradation problems effectively, because of the above-mentioned weaknesses, were being realized in the early 1990s. This is reflected in the gradual policy shift towards the integrated participatory approach in India, Nepal, and

Thailand (Sinha 1997, Wagley 1997, Nalampoon 1997), all of which have been implemented in watershed management projects since the late 1970s. This approach is now being used in Laos, Vietnam, and Cambodia, countries that started paying attention to this approach relatively late (Dong 1997). The following sections examine watershed management projects reportedly following the integrated, participatory approach to planning and implementation. In this regard, an attempt has been made to examine whether the on-going practice is in line with the principles of this approach.

*Scope.* The most important lesson in the failure of the compartmental, top-down approach in watershed conservation programs has been that structural works and forestry-based management systems cannot help much to ensure effective watershed management because the roots of watershed degradation are deeply entrenched in the socioeconomic fabric of the society. In response, there is an increasing emphasis on a comprehensive watershed management program that integrates conservation pursuits with people's needs and aspirations. The specific constituents of integrated watershed management projects vary from one area to another, depending on the vision and attitude of concerned authorities and resources available. Their typical aims are: (1) promotion of vegetative measures of soil and water conservation as they are generally cheaper and easier to adopt, (2) introduction and dissemination of conservation practices that contribute to enhancement of household economies of the local people, and (3) provision of support services, facilities and institutional frameworks required to translate the former two objectives into reality (Paul 1998, Sharma and Wagley 1997, Jensen and others 1996, Lobo and Kochendorfer-Lucius 1995).

Certainly, the so-called integrated, participatory projects are more comprehensive than compartmental, top-down approaches in terms of coverage of activities. They emphasize linking land and water conservation with economic incentives through the provision of required support services and facilities. However, in view of the field experiences, it can be said that the projects have so far not been well integrated for three reasons.

Firstly, the projects are implemented in a few micro-watersheds as islands, independent of the national and regional systems that are closely interlinked with watersheds. While the entire mountain watersheds are undergoing degradation one way or another, watershed management projects implemented in selected areas of the Kaski, Palpa, and Nuwakot districts of Nepal (Wagley 1997), Luang Prabang and Xieng Khoua provinces of Laos and Andhara Pradesh, Karnataka, Madhya Pradesh, Maharashtra, and Himanchal Pradesh of India

Table 2. Comprehensive watershed development project, Ramanathapuram: Budget allocation by activity

Activity	Million Rupees	Percentage
Well construction	4.040	19.7
Shelter belts	3.600	17.5
Repairs to tanks & waterways	0.100	0.5
Moisture conservation	0.100	0.5
Conservation plan	0.060	0.3
Demonstration plots	0.100	0.5
Research trials	0.400	1.9
Training & study tours	0.750	3.6
Machinery & equipments purchase	1.921	9.3
Motor vehicles purchase, salaries & allowance, office operation etc.	9.491	46.2
Total	20.562	100.0

Source: Amrithalingam (1996).

(Seth 1996) have been implemented without paying attention to the national land tenure policy and access to regional market centers that determine the adoption of locationally suitable land use. The state policy in Laos and upland Thailand has been to grant transferable rights of use to farmers, which has constrained investments in sustainable land management.

Secondly, the focus of most watershed management projects has been land-based activities, as reflected in activities of a typical Danish International Development Agency (DANIDA)- assisted watershed management project in the Ramanathapuram district of India (Table 2). Irrespective of location, terrace construction and improvement, alley cropping, agroforestry, and promotion of livestock raising and fruit farming have been typical measures of watershed management (Jensen and others 1996, Sharma and Wagley 1997). In most mountains, where, on average, an individual farmer possesses less than 0.1 ha of land, it is not feasible to improve the socioeconomic condition of settlers even if all required services and facilities are provided to promote land productivity (Thapa 1990). Moreover, the dependency on land resources perpetuates dependency on forest and grazing-land resources. Watersheds cannot be conserved and developed effectively without alleviating population pressure on land and forest resources through effective control of population and promotion of locationally suitable nonfarming activities.

Finally, the watershed management activities are neither integrated nor linked with mainstream development activities. In all countries under the scope of this study, departments of forestry and agriculture have implemented projects associated in one way or another

with watershed conservation. Likewise, the departments of industry and health have been pursuing industrial development and population programs, but watershed management activities are planned and implemented by concerned line agency and project officials without any consultation or coordination with programs being implemented by these line agencies. Due to such isolated project planning and implementation systems, the mainstream government line agencies do not pursue activities implemented after the termination of the project, as happened in the Nuwakot district of Nepal (Mandal and Malla 1996) and in Luang Prabang province of Laos (personal communication with officials of the Ministry of Agriculture and Forestry).

*Institutional structure.* In all countries under the scope of this paper, the problem of institutional disarray discussed under the compartmental, top-down approach has been aggravated as the number of watershed management agencies has proliferated with the increased number of donor agencies that do not like to implement their projects through existing line agencies. The situation is so severe that in a small country such as Laos there are at least 16 watershed management projects supported by 11 international and regional agencies, including DANIDA, German Agency for Technical Cooperation (GTZ), Japan International Cooperation Agency (JICA), Swedish International Development Agency (SIDA) and United Nations Food and Agriculture Organization (UN/FAO) (BCEOM/SEATEC/SEMED 1999), and each agency has been pursuing activities independently with its own type of objectives, organizational structure, and working style. Similar situations exist in Nepal, India, Thailand, and Vietnam. The continuation of watershed management activities after the withdrawal of external assistance seems to be nobody's concern. The general bureaucratic attitude has been to not be much concerned about this and continue accepting the assistance as long as it is provided.

A unique but desirable institutional arrangement has been established in three northern districts of Karnataka of India, where no separate agency has been created for watershed management. Consistent with the above conclusions based on the holistic explanation of watershed degradation, sectoral line agencies, including departments of agriculture fisheries horticulture, and forestry, have been responsible for planning, implementing, and monitoring overall watershed management activities. There are no exclusive staff for the project work except a few for forestry and horticulture (Naik 1996). One obvious advantage of this type of institutional arrangement is that it reinforces watershed

development planning and management capabilities of existing line agencies with multitude of staff.

A very significant change with regard to institutions has been the growing recognition and involvement of NGOs and grassroots organizations as agencies responsible for planning, implementing and monitoring of watershed conservation programs. The Social Centre in Maharashtra of India (Lobo and Kochendorfer-Lucius 1995), CARE/Nepal (Bogati 1996), and many other NGOs and international nongovernment organizations (INGOs) have been increasingly involved in watershed management by mobilizing users' groups. Supported mostly by international agencies, the experiences of these agencies have been mixed. However, there is a general tendency for their performance to be positively related to financial and technical capabilities.

In Nepal and Laos, watershed management projects being implemented by INGOs in a few small watersheds are in a far better position compared to projects implemented by government agencies due to the provision of generous financial and technical support provided by several international agencies. While the majority of watersheds remain virtually ignored, the fate of watersheds with good programs currently in place seems bleak because nobody will be concerned about them after the withdrawal of external assistance. After providing generous support to farmers for 26 years, the British government-supported Lumle Agricultural Centre located in the western hills of Nepal was handed over to the government. In the aftermath, even extension workers are not visiting farmers, not to mention extension officers who used to visit them frequently in the past (personal communication with farmers in Dhikurpokhari VDC, August 1999).

In situations where the sectoral line agencies are incapable of handling watershed management effectively, NGOs and INGOs can make important contributions. By working independently from sectoral line agencies, however, they cannot bring desirable change in entire mountain watersheds because the financial and human resources available to them are not adequate to implement conservation and development activities in a large area. In many instances, implementation of their uncoordinated activities in small watersheds has led to inefficient utilization of scarce resources, duplication of activities and lavish use of funds provided by external agencies.

*Planning and implementation.* There has been growing emphasis on decentralized watershed management and development (Jensen 1996). In Nepal, the District Soil Conservation and Watershed Management Office compiles annual programs prepared by village development committees (VDCs) and user groups, and then

forwards them to the central department for budget approval (Mandal and Malla 1996). The Decentralization Act empowered local line agencies to initiate and implement development projects. These agencies have still not been able to exercise the authority granted by this act, owing to inadequate budget, contrary to the spirit of the national decentralization policy. However, a large proportion of the development budget continues to be allocated to programs planned by the central line agencies.

Another flaw in existing watershed management planning using this approach has been the continuation of the traditional sectoral planning systems. Watershed management activities are confined to narrow boundaries delineated by concerned agencies. In most projects implemented in India (Jensen and others 1996), Laos, and other countries (Sharma and Wagley 1997), soil erosion control and land use have been the focus of activities. Population control and nonfarming development programs, which can make a significant contribution to the overall watershed development and management endeavor, have been constantly overlooked. This is partly explained by the inability of concerned policy-makers and planners to comprehend the relationship between population, economic activities, and watershed resources.

The problem is not limited to activities pursued by watershed management agencies. As noted above, land use and soil conservation have been the focus of activities that are also supposed to be undertaken by departments of forestry and agriculture. Being concerned about agricultural development, the department of agriculture should in principle promote technology that controls land degradation and alleviates pressure on forest and grazing-land resources. Obviously, an integrated watershed development and management plan needs to be prepared in cooperation with all concerned line agencies. So far this has not been done. Following their tradition, watershed management agencies prepare management plans without any coordination or consultation with other line agencies.

The rationale for pursuing the compartmental approach is that unlike a line agency under the umbrella of a ministry, specially created watershed management agencies have the freedom to prepare and implement socially acceptable and locationally suitable programs (Wagley 1997). The decision-making system is facilitated by the absence of a hierarchical organizational structure, as such agencies are created in accordance with the terms of reference set by donor agencies and the provision of relatively generous support. Being safeguarded by their terms of reference, these agencies prepare and implement programs in line with their

interest, and do not pay attention to the integrated watershed development planning that requires cooperation with other development agencies.

In most instances, watershed management plans are prepared without a rigorous analysis of local biophysical and socioeconomic conditions followed by identification of the most pressing problems and promising potentials in cooperation with people. Moreover, the concerned officials are either not capable of preparing or have very poor knowledge about integrated watershed management plans due partly to their narrowly focused educational background (Sharma 1997). The so-called innovative planning systems introduced by the external agencies wane with the termination of projects, and the mainstream line agencies do not care about the adoption of such systems.

*Public participation.* Another dimension of the change in the approach to watershed management has been the growing recognition of the importance of local people's contribution to planning, implementing, and monitoring of related activities. This is attributed to the realization on the part of concerned officials that people are not much interested in conservation activities imposed by outsiders and that governments have inadequate funds to finance all sorts of conservation activities throughout all watersheds.

Experiences gained from implementing participatory watershed management projects in India (Lobo and Kochendorfer-Lucius 1995, Jensen and others 1996), Nepal (Bogati 1996), and Thailand (Emphandhu and others 1997) indicate a tendency towards activities identified and supported by implementing agencies, with some voluntary contributions from local people. Owing to very limited independent evaluation studies, it is difficult to examine where and how people contributed to planning and implementation. However, in most instances participation in planning has involved preparation of a wish list based on rapid appraisal and participatory appraisal methods are very much influenced by the project officials' perception of problems.

An independent study (Sawhney and others 1996) carried out to evaluate the comprehensive watershed development projects supported by DANIDA in Karnataka, Orissa, and Tamil Nadu of India found that problems were not analyzed in consultation with the target groups and that the activities were being duplicated. Target populations were considered as passive recipients of aid and technology, and their active participation in project planning through local institutions was neglected.

Regarding the implementation of programs, agencies in charge provide partial support in cash for labor

contribution or in kind as incentive for public participation (Wagley 1997). The Chieng Dong commune in San La province of Vietnam organized farmer groups for watershed management, but most groups could not do anything due to lack of funds (Dong and Dong 1997). Besides voluntary labor contributions, villagers participate in conservation programs by following practices set as conditions by concerned authorities. In Pimpalgaon Wagha, India, for instance, the condition for project implementation was that people would provide 50 man-days of labor, and two days of free labor per family per month, and they would follow all other conditions of the scheme (Lobo and Kochendorfer-Lucius 1995).

## Conclusion

Originated primarily with the objective of preventing siltation in reservoirs constructed for hydroelectric power generation, watershed management has been a strategy for natural resources conservation as well as economic development in the mountain regions of South and Southeast Asia. This shift in thrust has been accompanied by the growing realization of the need for a shift from the compartmental, top-down to the integrated, participatory approach to management. Some changes have taken place, especially in terms of coverage of activities, institutional structure, planning and implementation system, and public participation in related activities, but from the above review of experiences in countries under the scope of this paper, we can conclude that all these changes have been more cosmetic and thus, in many instances, ineffective and unsustainable.

Despite the emphasis on the "integrated" approach, which requires integration of conservation and development activities, the inclination has still been towards vegetative and structural measures of soil conservation. In most instances, separate agencies have been created to pursue the intended tasks, while the role of existing conservation and development agencies, including departments of agriculture, forestry, irrigation, and industry, have been grossly neglected, as if watershed management has nothing to do with their activities. The institutional structure remains in a state of disarray, as even within a province or a district, projects supported by different external and internal agencies have been operating under different organizational structures, independent from each other. Planning and implementation are decentralized in the sense that the concerned projects have got freedom to plan and execute their watershed management activities, but in view of the predominance of the traditional type of conserva-

tion measures, one can conclude that the system is still very much top-down, and the so-called plans are nothing but a compilation of wish lists. Public participation, according to project documents, does take place during the planning stage, but if one looks at the programs implemented one has to be doubtful because almost all projects have implemented standard structural and vegetative measures that always remain under the control of traditional watershed management planners. A genuine integrated watershed development and management program should include all land- and non-land-based activities that contribute to conserve forest, grazing land, and agricultural land resources as well as enhance the socioeconomic condition of people. In this regard, population control, community health, and nonfarming activities promotion programs should be an integral part of the program.

The pursuit of watershed management and development is consistent with the pursuit of sustainable development, as it requires pursuing economic activities for improvement of quality of life of people without inflicting damage upon natural resources. Therefore, watershed management cannot be the exclusive responsibility of a particular agency. While entire mountains are undergoing degradation in one way or another, implementing externally supported programs under the leadership of especially created agencies cannot help to address the problem effectively. Even in watersheds where management projects are implemented, the overall activities run the risk of collapsing, as it would be nobody's responsibility to pursue related activities, especially after the termination of these projects. In countries under the scope of this study, where mountain watersheds comprise a considerable proportion of the national territory, the local area development plans should actually be integrated watershed development and management plans prepared and implemented jointly by all development agencies, including NGOs, in cooperation with local organizations and people. In this regard, development planning should be effectively decentralized and reinforced through the provision of adequate funds. Only then will the endeavors made bring about a sustainable positive result, since such endeavors will become an integral part of activities pursued by development agencies and people.

Watersheds are considered to be the best planning units (Dixon and Easter 1991). However, development plans are prepared for administrative units because the latter are formally recognized planning areas whose boundaries do not follow watershed boundaries. While a radical change cannot be expected in the foreseeable future, it would be sensible to suggest that integrated watershed management plans be prepared at district or

subdistrict levels, depending on the area and population of these administrative units. Integrated watershed management plans can be prepared by through a mechanism of coordination between districts or subdistricts within the boundaries of a particular watershed. Complications would, however, arise, if administrative boundaries extend into other watersheds.

Participatory planning is not simply drawing up a wish list based on observations and brief interviews with selected key persons. Based on regional experiences, it can be concluded that such lists often end up with the provision of physical infrastructure, including structural measures of soil conservation. Genuine participatory planning entails formulation of appropriate management and development strategies based on analysis of problems and potentials by people with the assistance of development agents capable of technical analysis (Johnson and others, 1996). People feel deceived, and as a result keep themselves alienated from programs to be implemented, as concerned agencies either just stop or curtail their programs without any consultation, mostly on the grounds of inadequate financial resources. To avoid this, concerned people have to be made aware of the tentative nature of the technical and financial support to be provided, and utmost attention should be paid to mobilization of local resources for continuation of management activities and for efficient use of scarce financial resources. This entails institutionalization of a system involving local people in planning, implementation, and management of conservation as well as development activities in a systematic way that has not been practiced yet.

### Acknowledgments

The author extends his sincere thanks to two referees for their constructive comments on the manuscript.

### Literature Cited

- Amrithalingam, D. 1996. Comprehensive watershed development project, Ramanathapuram. *In* J. R. Jensen, S. L. Seth, T. Sawhney, and P. Kumar (eds.), *Watershed development: Emerging issues and framework for action plan for strengthening a learning process at all levels*. Danida Watershed development Programme, New Delhi.
- BCEOM/SEA TEC/SEMED. 1999. Nam Ngum watershed management. Draft final report. Ministry of Agriculture and Forestry, Vientiane.
- Bogati, R. 1996. A case study of people's participation in Beganastal and rupatal (BTRT) watershed management in Nepal. *In* P. N. Sharma, and M. P. Wagley (eds.), *Case studies of people's participation in watershed management in Asia. Part I: Nepal and China*. PWMTA-UNDP/FAO/NET, Kathmandu.
- Bowden, D. 1998. The Mekong river basin: Case studies in biodiversity and ecologically sustainable development. Australian Association for Environmental Education, Manly, NSW.
- Carson, B. 1992. The land, the farmer and the future: A soil fertility management strategy for Nepal. ICIMOD occasional paper no. 21. International Centre for Integrated Mountain Development, Kathmandu.
- Chazee, L. 1994. Shifting practices in Laos; present system and their future. *In* D. V. Gansberge and R. Pals (eds.), *Shifting cultivation systems and rural development in Lao PDR*. Report of the Nabong Technical Meeting. UNDP/Ministry of Agriculture and Forestry, Vientiane.
- Choudhury, R. C. 1998. Watershed development programmes in India: Status, issues and prospects. *In* *Approaches to Watershed Management*. Afro-Asian Rural Reconstruction Organization, New Delhi.
- Dani, A. A. 1991. Annexation, alienation, and underdevelopment of the watershed community. *In* K. W. Easter, J. A. Dixon, and M. M. Hufschmidt (eds.), *Watershed resources management: Studies from Asia and the Pacific*. Institute of Southeast Asian Studies/East-West Center, Singapore.
- Dixon, J. A., and K. W. Easter. 1991. Framework of analysis for integrated watershed management. *In* K. W. Easter, J. A. Dixon, and M. M. Hufschmidt (eds.), *Watershed resources management: studies from Asia and the Pacific*. Institute of Southeast Asian Studies/East-West Center, Singapore.
- Dong, H. S. 1997. Status of watershed management in Vietnam. *In* P. Sharma and M. P. Wagley (eds.), *The status of watershed management in Asia*. PWMTA-FARM, Kathmandu.
- Dong, S. D., and N. H. Dong. 1997. A case study of farmer based watershed management in Chieng Dong commune of Yen chau district, Son La Province, Vietnam. *In* P. N. Sharma (ed.), *Case studies of people's participation in watershed management in Asia, Part II: Sri Lanka, Thailand, Vietnam and Philippines*. NET/UNDP/FAO, Kathmandu.
- Douglas, M. 1999. IFAD proposed programme for Asia: A Strategy for alleviation of poverty through sustainable development in the uplands of Asia. Paper presented at the Workshop on Special Programs for Sustainable Upland Development in Asia—Reality Check Consultation, 19–21 April 1999. Klong Luang, Thailand, organized by IFAD/IUCN.
- Emphandhu, E., T. Lakhaviwattanukul, and S. Kalyawongsa. 1997. A case study of successful participatory watershed management in protected areas of northern Thailand. *In* P. N. Sharma (ed.), *Case studies of people's participation in watershed management in Asia, Part II: Sri Lanka, Thailand, Vietnam and Philippines*. NET/UNDP/FAO, Kathmandu.
- Enters, T. 1995. The economics of land degradation in northern Thailand: Challenging the assumptions. *In* J. Rigg (ed.), *Counting the costs: Economic growth and environmental change in Thailand*. Institute of Southeast Asian Studies, Singapore.
- ESCAP (Economic and Social Commission for Asia and the Pacific). 1997. *Guideline and manual on land-use planning and practices in watershed management and disaster reduction*. ESCAP, Bangkok.

- Fearnside, A. 1982. Project report and recommendations for continued integrated watershed management and land use improvement in Nepal. FAO/UNDP, Rome.
- Fearnside, A., D. O. Nelson, and P. M. Baisyet. 1980. Policy and basic organisation for soil and water conservation in Nepal. Ministry of Forest and soil Conservation, Kathmandu.
- Fox, J. 1993. Forest resources in a Nepali village in 1980 and 1990: The positive influence of population growth. *Mountain Research and Development* 13(1):89–98.
- Hamilton, L. S. (ed.). 1983. Forest and watershed development and conservation in Asia and the Pacific. Westview Press, Boulder, Col.
- ICIMOD (International Centre for Integrated Mountain Development). 1986. Towns in the mountains. Kathmandu.
- Ives, J. D. 1985. The mountain malaise: quest for an integrated development. In T. V. Singh and J. Kaur (eds.), *Integrated mountain development*. Himalayan Books, New Delhi.
- Ives, J. D., and B. Messerli. 1989. *The Himalayan dilemma: reconciling conservation and development*. Routledge, London.
- Jensen, J. R. 1996. Watershed development: concept and issues. In J. R. Jensen, S. L. Seth, T. Sawhney, and P. Kumar (eds.), *Watershed development: emerging issues and framework for action plan for strengthening a learning process at all levels*. Danida Watershed development Programme, New Delhi.
- Jensen, J. R., S. L. Seth, T. Sawhney, and P. Kumar (eds.). 1996. *Watershed development: Emerging issues and framework for action plan for strengthening a learning process at all levels*. DANIDA Watershed Development Programme, New Delhi.
- Johnson, A. K. L., D. Shrubsole, and M. Merrin. 1996. Integrated catchment management in northern Australia. *Land Use Policy* 13:303–316.
- Kandel, D. D., and M. P. Wagley. 1999. Some salient indigenous technology practices for watershed management in Nepal. Department of Soil Conservation and Watershed Management/PWMTA-FAO, Kathmandu.
- Lobo, C., and G. Kochendorfer-Lucius. 1995. The rain decided to help us: Participatory watershed management in the state of Maharashtra, India. EDI learning resources series. World Bank, Washington, DC.
- Mandal, S., and I. B. Malla. 1996. People's participation and coordination in planning and implementation of soil conservation/watershed development programs in Nuwakot and Rasuwa districts, Nepal. In J. R. Jensen, S. L. Seth, T. Sawhney, and P. Kumar (eds.), *Watershed development: Emerging issues and framework for action plan for strengthening a learning process at all levels*. DANIDA Watershed development Programme, New Delhi.
- Metz, J. 1994. Forest product use at an upper elevation village in Nepal. *Environmental Management* 18:371–390.
- Mirza, A. 1998. Watershed management in upland areas. In *Approaches to watershed management*. Afro-Asian Rural Reconstruction Organization, New Delhi.
- Naik, C. V. 1996. Karnataka watershed development project. In J. R. Jensen, S. L. Seth, T. Sawhney, and P. Kumar (eds.), *Watershed development: Emerging issues and framework for action plan for strengthening a learning process at all levels*. DANIDA Watershed development Programme, New Delhi.
- Nalampoon, A. 1997. Status of watershed management in Thailand. In P. Sharma and M. P. Wagley (eds.), *The status of watershed management in Asia*. PWMTA-FARM, Kathmandu.
- OEPP (Office of Environmental Policy and Planning). 1997. *Policy and national action plan for sustainable development*. Bangkok.
- Paul, D. K. 1998. Approach to integrated watershed management for rainfed farming system development in Afro-Asian countries. In *Approaches to watershed management*. Afro-Asian Rural Reconstruction Organization, New Delhi.
- Phanthanousy, B. 1994. The experience of shifting cultivation stabilisation programme of the Department of Forestry. In D. V. Gansberghe and R. Pals (eds.), *Shifting cultivation systems and rural development in Lao PDR*. Ministry of Agriculture and Forestry/UNDP, Vientiane.
- Rambo, T., and L. T. Cuc. 1998. Some observations on the role of livestock in composite swidden systems in Northern Vietnam. In E. C. Chapman, B. Bouahom and P. K. Hansen (eds.), *Upland farming systems in the Lao PDR—problems and opportunities for livestock*. ACIAR Proceedings No. 87. Canberra, Australian Centre for International Agricultural Research.
- Rogers, P., and J. Aitchison. 1998. *Towards sustainable tourism in the Everest region of Nepal*. IUCN, Kathmandu.
- Sam, D. D. 1996. Shifting agriculture practices today in Vietnam. In *Montane mainland Southeast Asia in transition*. Chiang Mai University, Chiang Mai.
- Sawhney, T., P. Abraham, J. Devavaram, N. Nagaraja and T. Nayak. 1996. Community participation in DANWADEP: A comparative analysis. In J. R. Jensen, S. L. Seth, T. Sawhney, and P. Kumar (eds.), *Watershed development: Emerging issues and framework for action plan for strengthening a learning process at all levels*. DANIDA Watershed development Programme, New Delhi.
- Seetisarn, M. 1996. Shifting agriculture in Northern Thailand. In *Montane mainland Southeast Asia in transition*. Chiang Mai University, Chiang Mai.
- Seth, S. L. 1996. The national watershed development program for rainfed areas (NWDPR): retrospect and prospects. In J. R. Jensen, S. L. Seth, T. Sawhney, and P. Kumar (eds.), *Watershed development: Emerging issues and framework for action plan for strengthening a learning process at all levels*. Danida Watershed development Programme, New Delhi.
- Sfeir-Younis, A. 1991. Economic policies and watershed management. In K. W. Easter, J. A. Dixon, and M. M. Hufschmidt (eds.), *Watershed resources management: Studies from Asia and the Pacific*. Institute of Southeast Asian Studies/East-West Center, Singapore.
- Sharma, P. N. (ed.). 1997. *Case studies of people's participation in watershed management in Asia*. Part II: Sri Lanka, Thailand, Vietnam and Philippines. PWMTA-UNDP/FAO/NET, Kathmandu.
- Sharma, P. N., and J. Dixon. 1997. *Watershed management*

- policy issues in Asia. In Sharma P. and M. P. Wagley (eds.). The status of watershed management in Asia. PWMTA/FARM- UNDP/FAO/NET, Kathmandu.
- Sharma, P. and T. Partap. 1994. Population, poverty and development issues in the Hindu-Kush Himalayas. In M. Banskota and P. Sharma (eds.), Development of poor mountain areas. Proceedings of an International Forum, Beijing, 22–27 March 1993. International Centre for Integrated Mountain Development, Kathmandu.
- Sharma, P. N., and M. P. Wagley (eds.). 1996. Case studies of people's participation in watershed management in Asia. Part I: Nepal and China. PWMTA-UNDP/FAO/NET, Kathmandu.
- Sharma, P. N., and M. P. Wagley (eds.). 1997. The status of watershed management in Asia. PWMTA-FARM, Kathmandu
- Sharma, P. N., F. J. Dent, P. Dyke, H. Gamage, T. Pratap, M. P. Wagley, and B. Pudasaini. 1997. Analysis of gaps in participatory watershed management education/training and a three years action plan to reduce the gaps. In P. N. Sharma (ed.), Recent development, status and gaps in participatory watershed management education and training in Asia. PWMTA/FARM-UNDP/FAO/NET, Kathmandu.
- Sinha, M. S. 1997. Review and status of rainfed farming and watershed management in India. In P. Sharma and M. P. Wagley (eds.), The status of watershed management in Asia. PWMTA-FARM, Kathmandu.
- Swati, M. K. 1998. Sustainable management of forests in the Siran watershed of the Western Himalayan Pakistan: an inquiry into various management options. PhD proposal. Asian Institute of Technology, Bangkok.
- Thapa, G. B. 1990. Integrated watershed management in the Upper Pokhara Valley. PhD dissertation. Asian Institute of Technology, Bangkok.
- Thapa, G. B., and K. E. Weber. 1991. Deforestation in the upper Pokhara Valley, Nepal. *Singapore Journal of Tropical Geography* 12:52–67.
- Wagley, M. 1997. Status of watershed management in Nepal. In P. N. Sharma and M. P. Wagley (eds.), 1997. The status of watershed management in Asia. PWMTA-FARM, Kathmandu.