

Draft

Watershed Management in Nepal
Recent Experiences and Lessons

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1. Introduction:

Many environmental problems in Nepal are related to the over-exploitation of natural resources, particularly forests, which in turn is caused by rural poverty. The related problems of soil erosion and watershed degradation are some of the greatest stumbling blocks to the development of Nepal. They obstruct many of the aspirations of the government and the people and unless appropriate measures are taken to resolve these problems, the country may suffer a great economic and environmental crisis. Because of this situation, in 1974, His Majesty's Government of Nepal initiated soil conservation and watershed management programs through the Soil Conservation Department (now Department of Soil Conservation and Watershed Management, the Ministry of Forests and Soil Conservation). Since then, the Department has planned, implemented, and monitored soil conservation and watershed management activities within the framework of the principles of integrated watershed management.

Initially, the Department launched programs without considering the participation of local inhabitants. However, as such programs were not sustainable, the Department started to incorporate the cooperation of local inhabitants in conservation programs through the mobilization of local user groups. Now the Government has placed a high priority on local participation in soil conservation and watershed management. Government policy has now made it mandatory to involve local citizens in all the conservation activities and to implement them through local user groups. The level of participation varies from 10-50% of the cost of watershed management, depending upon the nature and scope of the work. As a result, with the support and cooperation of the people, soil conservation and watershed management programs are yielding successful results and it is believed that these programs are becoming more and more popular (DSCWM 1996). The Department is making the best use of experiences and know-how accumulated through the project implementation process and replicating the program in other areas adapting the methods developed by the projects.

Lessons learned from watershed management projects are listed in Section 3.

At present, District Soil Conservation Offices have been established in 55 out of 75 districts of Nepal. These offices are concentrated mainly in the mid-hills of Nepal and existing watershed conditions were used as the criteria for selecting these districts. Of the total watershed areas of the country, 0.4%, 1.5%, and 11.7% are found to be in very poor, poor, and fair conditions, respectively. Though 33.8% and 52.6% are in good and excellent conditions, respectively, they are also on the verge of rapid deterioration due to the over exploitation of watershed resources by their inhabitants. Because of Nepal's geographic extremes, soil and water conservation is indeed a formidable challenge for its people.

Land stability problems in the plain areas of Nepal (*Terai*) and the Himalayan foot hills (*Siwalik*) regions are radically different from those of the Mid and High Mountain regions. In the Terai, valley bottoms have serious erosion problems such as flash floods, river bank erosion, deposition of sediments, and rising river beds. In the Mid and High Mountain regions, the problems are mainly severe surface erosion from unprotected farms, degraded forests, and denuded grazing

lands. Severe rilling and gulling also occur on poorly managed farms, in the overgrazed and degraded forests, along the trails, and in newly cut roadsides whenever the disposal of rainwater is not properly managed. The High Mountain region has to contend with severe landslides and mass wasting in addition to the usual surface and gully erosion.

The objectives of this paper are:

1. review the soil conservation and watershed management policies and projects in Nepal;
2. list the lessons learned, if any; and
3. analyze the soil conservation and watershed management activities in relation to hydro-power development.

2. Legal and policy measures:

The Soil and Water Conservation Act was promulgated in 1982, followed by the Soil Conservation Regulation in 1985. These give authority to the Government to declare any watershed a "Protected Watershed" and to implement various conservation measures in these areas. For administrative reasons, this authority has not yet been used. Statutory amendments or additional regulations may be needed.

For the Ninth Five Year Plan period (1997-2002), the main objectives of the forestry sector are the mobilisation, conservation and management of forest resources to equalize their demand and supply; the creation of income-oriented and employment opportunities for poor and marginal families; the mobilisation of people's participation for productivity enhancement; and the adoption of proper land-use plans.

During the plan period under the Soil and Watershed Conservation Program, services being delivered to 55 districts are to be expanded to 75 districts by determining the priority on the basis of evaluation of the deteriorating condition of sub-watershed areas. Activities of integrated watershed management are given high priority. Benefit monitoring indicators are to be maintained in setting the objective and targets of each program in a participatory way. Through the preparation of simple working plans for sub-watersheds, income generation, poverty alleviation, and production programs as well as the system of inter unit co-ordination and mobilization of savings and resources of rural people, are to be adopted. In addition, the productivity of land is to be increased. Formation, operation, and strengthening of users group are co-ordinated and integrated in sub-watersheds with other programs of the forestry sector.

The watershed management programs under the Ninth Plan period are to be carried out in order to mitigate the negative impact that may be caused by the destruction of resources in the watershed areas of large hydro-electricity and irrigation projects. Integrated resource management and mobilization are to be carried out through people's participation in the functional watershed areas of 15-25 km². Since the *Churia* range is geologically fragile, soil conservation has been a high priority in this area. To protect the land from potential calamities of floods and landslides, policies and implementation strategies such as conserving upper watersheds, establishing participatory watershed management training centers, conservation at

exhibition sites and watershed laboratories, mobilizing people's participation in watershed management, and developing human resources at the local level, are to be adopted for conserving river and stream banks. High priority has been given to soil conservation work while carrying out development activities. Activities like controlling landslides and carrying out conservation of watershed areas, developing bioengineering system by selecting non-timber vegetation, which may help in income generation, are to be taken up as well.

In order to implement soil conservation and watershed management activities in line with the policies, principles, and objectives of the government, the following programs have been identified by the Department: land use development and planning; land productivity conservation, and infrastructure protection; natural hazard prevention, and community soil conservation extension. Various specific activities have been implemented under these programs.

The infrastructure protection program includes those measures which protect and stabilize basic development infrastructures such as reservoirs, irrigation systems, trails, and roads in order to prevent losses to the national economy. Bioengineering measures are usually used.

In Nepal, while developing multipurpose projects by the private sector, the process and mechanism to provide the down-stream benefit has not been mentioned (see NPC 1998). However, the long-term policy concept of the Government is to give emphasis to implement small hydro- projects with the help of local inhabitant's participation and through NGOs at local level.

During the Ninth Plan period, one of the objectives of the energy sector is to develop hydropower with minimum adverse impact on the environment. Some of the policies and strategies to achieve the objective of the Ninth Plan are rural electrification and watershed management.

To make rural electrification financially more productive, projects are to be designed and implemented to utilize electricity for cottage industries, ground water irrigation, drinking water and other commercial purposes. User groups are to be involved in planning, implementation and maintenance for making electrification more effective. Emphasis is to be given to implement small and micro-hydro projects in remote hill areas. Such projects are to be implemented with the help of people's participation and NGOs at local level and the grant systems are to be reformed to make them financially sound. Steps are to be taken to establish a local grid and supply electricity through it in some hilly areas, if found feasible.

During the Plan period, special attention is to be paid to the preservation and management of watersheds, and to maintain reliable power supplies generated from hydropower projects. Water resource development programs are to be implemented with watershed management to minimize adverse impact on the environment. However, no clear policies have been formulated to implement such activities for hydropower projects.

3. On going or recently completed watershed management projects:

3. 1. US assistance

Resource Conservation and Utilization Project

The Resource Conservation and Utilization Project (RCUP) began in 1980 with the design and initial approval of a five year, US\$ 32million project. The objective was to assist the Government in the protection and restoration of the soil, water, and plant resource base upon which the rural population is totally dependent. With multiple objectives and efforts, the project included 17 components, 7 line agencies, involving 4 ministries plus Tribhuvan University. The project focussed on a range of field activities including river training, building construction, small-scale irrigation development, gully and landslide rehabilitation, livestock management, and water supply in two major watersheds, the Daraundi (795 km²) in Gorkha District, and the Kali Gandaki (4,120 km²) in Mustang and Myagdi Districts. These are large basins with a wide range of ecological zones from middle hill zones to very high elevation snow-covered regions.

The objectives of the watershed management component were to: reduce soil erosion, improve water quality, reduce flooding, sustain stream flow, improve agricultural productivity, reduce landslides, develop and disseminate resource information. The specific practices involved in the watershed management/soil conservation components were: terrace improvement; trail improvement; community water source protection; major gully control; catchment pond development; road slope stabilization; stream bank stabilization; flood plain tree plantation; community nursery; community forest plantation; community fish pond; canal improvement; and landslide stabilization.

The mid-term evaluation (1985) focussed on project implementation and recommended a major shift in the project's resources to a small watershed approach. In this approach project implementors selected small watershed units based on the seriousness of soil and water conservation problems, a high level of interest by local people, and the condition that RCUP-built facilities would be used.

Lessons learned:

The small watershed approach was found to be more successful than the large watershed approach in terms of incorporation of user group demand and input into planning and implementing an activity, use of appropriate (low cost, locally available) materials in the design and construction of infrastructure, local cooperation for long term protection of an area, evidence of visions of a future that included awareness of the need for resource conservation, and more focus on fewer objectives for smaller activities within more limited geographical areas (TRD 1988).

RCUP was to develop an *integrated approach* involving the key natural resources, involving local people, and using the catchment as the management unit. The approaches were to be developed and refined so that they can have an impact beyond the target watershed. However, the attempt failed because the project had adopted a "village dialogue" method to involve local

people which led to the development of Plans according to Government line agency's target without integration. Each participating agency was working on its own and only rarely did two agencies work together at the same site (ISTI 1985).

Besides its recommendation on small watershed approach, the final evaluation of the project (1988) recommended the following:

- High priority should be given to protect and manage existing natural forests and grazing lands with the cooperation of local people.
2. District Forest Offices should closely work with the local people in the preparation and implementation of sustained yield forest management plans.
3. Gully rehabilitation: Site selection and planning should include an economic analysis; an alternative method, including a variety of vegetative and structural combinations, need to be evaluated at the planning stage for each check dam under consideration; appropriate materials to be used in the cheapest, technically effective solution; and water diversion and protection from grazing at gully sides and headcuts to be mandatory part of rehabilitation.
4. Move as rapidly as possible to turn over as much forest land as possible to local communities.
5. Ensure, at a minimum, that the elements for more local participation, particularly women, are planned for and implemented for future projects (bottom-up approach).
6. Biological diversity is and should continue to be linked to USAID's initiatives in natural resources management.
7. PVOs and NGOs can work effectively and collaboratively with Government as implementing agencies at the local level. Foster and support user groups in all phases of project conception, initiation, planning, implementation, evaluation, and long term maintenance.

RCUP evaluation of 1985 (ISTI 1985) concluded that although the project made significant contributions in many of the components, no model for integrated watershed management was developed. A plan for integration was not included in the project design. The concept of a watershed as an integrating unit was not used, rather Government line agency programs were implemented within a designated watershed with only minimal integration. Another reason why this integration was not included was that too many components were tried over too large an area too quickly.

Rapti Development Project:

The purpose of the Rapti Development Project (1980-1995) was to improve production levels, income and other measurable quality of life indicators of Rapti Zone (Rukum Rolpa, Salyan, Pyuthan, and Dang Districts) families and to improve local demand for and control of delivery systems, including those of agriculture, education, and resource management. After the completion of Phase I in 1985, an evaluation of the project was carried out and the team took into account serious concern about the effectiveness of multi-sectoral or integrated area approaches to development and assessed each component of the project in terms of output, impact, manageability, and sustainability. The project was found to be overly complex and disparate, its components remained separated rather than strongly linked and focussed upon

project purposes. The team recommended Phase II of the project with some changes in the programs. Most of the soil conservation and watershed management activities were similar to those in RCUP. However, the scope of soil conservation work was very limited in relation to the dimensions of the soil erosion problem.

The purpose of the soil conservation program in Rapti was to alleviate and check environmental degradation by treating the most critically affected sites and launching an extension and education program for the people.

Lessons learned from the evaluation of Phase (1985)

Local participation, local leadership, and local energies need to be enlisted in support of essential soil conservation work based on practical plans.

Village use of land must be carefully examined and the interrelated problems of soil conservation, forestry development, pasture development, irrigation improvement, fodder production, soil fertility, and field cropping addressed.

The protection of land with trees and ground cover should be an integral part of all development activity.

4. Soil and water conservation work, especially grass, shrub, and tree planting for the prevention/control of splash, sheet, rill, gully, torrent, and landslide problems cannot be carried out successfully without people's participation, as well as "ownership" of the local people in general and women in particular. Women should be empowered to internalize the benefits.

The final evaluation of the Project was carried out in 1995. Though the team visited limited site of soil conservation work, it suggested the following:

USAID should recognize that soil conservation work has an important forestry element, and therefore needs to be part of further forestry work and furthermore that knowledge acquired during the Rapti Project could be used for future project design. The soil conservation and forestry work has assisted by providing intense production on formerly eroded lands.

2. Integration of forestry, soil conservation, and animal husbandry needs continuing attention.
3. RDP's highly successful soil and water conservation efforts demonstrated that conservation user groups can be formed and can function effectively if they focus on short-term benefits like fodder along with long-term benefits of trees, increased water availability, and reduced siltation; and that soil and water conservation activities can be introduced through entry points of urgent local demand, such as drinking water, farm/livestock ponds, and irrigation. If their results are to be effective, it is also necessary for soil and water conservation activities to follow an integrated approach in geographically focussed areas of a micro- or sub-watershed.
4. It is also possible to make the soil and water conservation package sustainable, if the benefits from the program are marketed properly not only among the people within the watershed but also among those outside, including the downstream communities (John Mellor Associates, Inc and IIDS 1995).

Environment and Forest Enterprise Activity

One of the activities of USAID Strategic Objective Grant Agreement is the Environment and Forest Enterprise Activity (EFEA), which builds on the experience and success of the Rapti Development Project (Appendix 1).

The purpose of EFEA (1996-2002) is “to facilitate local control and management of local resources in the Mid and Far Western Development Regions, to improve forest productivity and sustain the environment”. EFEA is designed following USAID/Nepal’s SO1.

Under the Soil Conservation and Watershed Management Program in EFEA, five District Soil Conservation Offices (Rukum, Rolpa, Salyan, Pyuthan, and Dang with funds of approximately US\$10,000 per district per year) are working to manage natural resources at the sub-watershed level involving soil conservation user groups. Their mandate is to work on highly erodible sites in the most degraded environments. Some of the on-going activities are:

1. Land management planning, implementation, and monitoring through sub-watershed management plan preparation; Community Development Groups/Soil Conservation Users Groups; photo-point monitoring.
2. Land productivity conservation through terrace improvement, degraded land stabilization, conservation plantation, fodder/grass plantation, fruit tree plantation.
3. Water management through conservation pond construction, water source protection, irrigation canal improvement, and flood diversion channel construction.
4. Natural hazard prevention through landslide control, stream bank protection, torrent and gully control.
5. Community soil conservation and extension through training, workshop, study tours to user groups; conservation education in schools; conservation day celebration; extension materials production and distribution.
6. Income generating activities: These activities are linked with the Ninth Plan of the Government. The major objective of the Ninth Plan is to alleviate poverty from the country. The Forestry Sector Master Plan supports the principal objective of this Plan by including employment and income generation, and sustainable management of forests to provide timber, fuelwood, and fodder requirements of the local people. Development of medicinal and aromatic plants and other non-timber forest products (NTFP) through planting, harvesting, and marketing contribute to poverty alleviation. The Ninth Plan emphasises the continuation of community forestry development and management and promotion of forest user groups entrepreneurship for income generation. In EFEA area also such activities have been implemented. Conservation-based income generating activities such as cultivation of ginger, cardamom, and medicinal plants; molasses production; and bamboo, broom grass, stylo grass, and Napier grass plantation; non-timber forest product-based enterprise activities such as aromatic grass distillation plant; funds mobilization as well as saving and credit schemes in community forestry users groups, soil conservation users groups, and community development groups.

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3.2 Dutch assistance:

Begnas Tal Rupa Tal Watershed Management Project:

The Department of Soil Conservation and Watershed Management and CARE/Nepal jointly implemented the Begnas Tal Rupa Tal Watershed Management Project (1984-1997) in Kaski district. The objective of the project was: "To stabilize the physical environment and increase the productivity of the project area through sustainable community management of its human and natural resources".

The final evaluation concluded that the project has been successful in integrating community forestry, conservation farming, bio-engineering, community organization, and extension.

2. The project has become a prototype for community based watershed management, and many aspects of its strategy can be replicated in other watershed management projects (CARE 1997). The Project gave highest priority to the involvement of people, particularly women, in the execution of soil conservation and watershed management activities to empower communities to assume responsibility for their own development process. Over the 12 years, the project approach fundamentally shifted from a focus on technical activities (gully protection, landslide prevention, forest plantation, and drinking water systems) to more participatory approach that balances social, environmental, and economic objectives. In Phase I the role of the community in planning and implementing was marginal. Community consultations took place primarily with formal local leaders, while women and disadvantaged groups were left out of the process. Project activities did not always synchronize with the priorities of the average community member. Towards the end of Phase I this level of community participation was recognized by the Project as insufficient for the community to develop a sense of ownership and responsibility to oversee the operation of a completed activity. Realizing that labor contribution itself is not a reliable indicator of community commitment, the Project focus shifted to cost sharing and capacity building. The planning and control shifted from central authorities to community organizations. Project functions expanded to respond to the needs of the communities. Towards this end the formation of Community Development Conservation Committee as a village level institution to coordinate the activities of user groups, and to elicit community participation in identifying problems, planning, and implementation of local activities was found to be appropriate. The team recommended the following:

- Integrate and consolidate the various kinds of soil conservation works on sub-or micro-watersheds and relate them closely with conservation farming, forestry, and other natural resources management.

Tackle gullies, torrent, stream banks, landslides, trails, and road stabilization problems with more of the vegetative and bio-engineering approaches of soil and water conservation, together with good land husbandry practices in the catchment area.

Initiate proper soil and water conservation measures in the upper catchment areas, where the occupational caste groups predominantly live, in the form of less expensive vegetative measures.

Control simple problems of splash, rills, sheet, and inter-rill erosions on all land use categories including farm lands and the uncultivated lands.

Retain and conserve as much of water in the upper catchment areas as possible.
Enhance capacity of Community Development Conservation Committee for approaching resource providers by utilizing local NGOs.

3.3 Danish assistance:

Nepal-Denmark Watershed Management Project:

The Nepal-Denmark Watershed Management Project (1996-2001) is a pilot project, allowing the program to develop modalities and systematize and institutionalize strategies for formulation and support mechanisms necessary for the implementation of Natural Resource Management Sector Assistance Program (NARMSAP). The function of this project has been integrated as a part of NARMSAP. The Project is being implemented in Rasuwa, Dhading, and Nuwakot Districts (Appendix 1).

The immediate objectives of the project are:

- Increased involvement of the communities and their organizations in planning, execution, and maintenance of watershed management projects in the three selected districts.
- Increased management capabilities of Government and private organizations concerned to respond to the requirements of the farming communities and their groupings for organizations in the field of watershed management.
- Increase capabilities of resources users (women, landless, and underprivileged in particular) in decision-making concerning all aspects of natural resource management.

The Project facilitates the establishment of community groups and the preparation of those groups's plans, following a participatory approach. These groups are receiving support on formation and registration as legal entities, capacity to plan, manage, and administer themselves, and strengthening of their technical, understanding to allow improved implementation of activities. The advanced groups have begun to generate savings and manage those as revolving credit facilities. In Dhading support was given to a community for their preparation of a proposal to the Danish Embassy for joint funding of a micro-hydro scheme, which was subsequently approved. The programs to be implemented by the Community Development Committee (CDC) are usually planned and budgeted for as "Community Soil Conservation" Packages, one for each Committee at an estimated Rs. 50,000 each. CDC operational plans, with the activities specified in detail, will have to be completed before project finance for these packages. The most acceptable and verifiable indicators of the impact and sustainability of processes which rely on community mobilization are considered to be (1) number of groups formed and having plans which are being implemented, (2) the percentage of the sub-watershed coming under community management, (3) changes in the group's saving, and (4) changes in household incomes of the group members (NDWMP 1998).

Having delineated sub-watershed units and prioritized them according to how critically they are in need of intervention, the next step prerequisite to implementation is the preparation of sub-watershed management plans. Traditionally these plans were, by and large, bio-physical statements of the status of the sub-watershed, indicating the areas – from a biophysical point of

view – requiring attention. Prescriptions of proposed land use were offered. The District Soil Conservation Office staff seldom referred to these plans because they were not particularly relevant to their daily operations. Therefore, it is proposed that the planning process be simplified, that it take more account of the human resource side of the participatory equation, and that plans be prepared only when implementation is programmed i.e. in the year before implementation is to start. This is particularly important when the people of the local communities are the major stakeholders in the implementation of the plan. The DSCWM promotes the application of a five year cycle in each sub-watershed targeted for implementation (Year 1: sub-watershed plan preparation, sensitization, group formation and community operational plan preparation; Years 2,3 and 4: implementation of the plan and re-planning as necessary; Year 5: withdrawal). The experience is that for a given sub-watershed, to apply participatory implantation methodologies that are now advocated as being the most secure route to sustainable impact, a minimum staff of one officer and eight mid-level technicians is required. Given the general level of staffing, the implication of this is that at any one time, a the District Soil Conservation office can only operate in a single watershed. The sub-watershed management plans as they are presently prepared in various districts provides a detailed statement largely in biophysical terms of the watershed condition and do not present detailed socio-economic information. These plans offer generalized prescriptions of “proposed land use” for each of the mapping units, on a macro-basis. However, it has been realized that mapping units are generally too large to consider the micro or on-farm situation. This lesson has been wisely used in NARMSAP.

Natural Resource Management Sector Assistance Program:

Being implemented from 1997/98 Natural Resource Management Sector Assistance Program (NARMSAP) covers 19 hill districts of Nepal, and has a Soil Conservation and Watershed Management Component. This component focuses on developing the capacity of communities to manage the natural resources based on sub-watershed units. The approach involves Government and other service agencies responding to demands expressed by communities, which plan, implement, and monitor their own activities. High priority is given to increasing the benefits accruing from improved land use. Since the project is in an early stage, not much work has been done yet. DANIDA policies aim at poverty alleviation, women in development, environmental conservation, human rights, democratization, and popular participation. The immediate objective of the Soil Conservation and Watershed Management Component is the increased benefits accruing to the communities from improved, sustainable and integrated watershed management and increased income from farming systems. Some of the verifiable indicators of NARMSAP output are number of user groups formed, sub-watershed management plans prepared (NARMSAP 1997).

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Upper Andhi Khola Watershed Management Project

The Department of Soil Conservation and Watershed Management (DSCWM) and CARE initiated the Upper Andhi Khola Watershed Management Project in Syangja in 1992. The project

design was based on the experiences from the successful implementation of the DSCWM/CARE watershed management project in the Begnas Tal and Rupa Tal area in the Kaski District. The watershed was to have the third highest potential for erosion based on a study of 36 catchments in the Western Development Region by the DSCWM-FAO Integrated Watershed Management Project (1978) and one of the seven districts classified having "very poor" watershed condition by the Forestry Sector Master Plan (1988). The Project area spans 180 km² of the sub-watershed of Upper Andhi Khola and Bhar Khola.

The final evaluation of the Project Phase I (1992-97) concluded that the project has successfully directed the energies of the community to undertake watershed management activities such as foot trails, gully control, improved irrigation system, drinking water supplies, stream bank protection, landslide treatment, and water source protection which has contributed to produce sustainable improvements in their quality of life.

Lessons learned (CARE 1997):

- The Project objective of enhancing the participation of women through the formation of Mother Groups, provision of non-formal classes, and mandatory inclusion of women on executive committee was found to be effective. The Mother Groups have provided a focal point for increased participation of women and facilitated a greater degree of organizational coordination and cooperation between organizations.
2. To build self reliant institutions, Community Development Conservation Committees formed with members at community level, who share common objectives and benefits and have developed a feeling of ownership, are found to play an important role in the initial stages of project implementation. It is the key link between the community and the village Development Committee.
 3. To implement watershed management activities, community forestry concept can be utilized very well.
 4. For Phase II, the evaluation recommends that it should be spelled out more clearly whether the first priority is watershed management or rural development. It can be done both ways but with a clear prioritization.
 5. Future emphasis for landslide and gully control measures should be put on low cost vegetative measures stressing the necessity of taking preventive steps to avoid or limit the impact of landslides and gully developments. More expensive and labor intensive heavy structural measures should only be applied after a critical review of the B/C analysis. Larger landslide intervention should be limited to run-off drainage, restricted grazing, and planning and sowing of appropriate tree seedlings and grasses.
 6. 50% representation of women in executive committees should be required. Of these, at least one woman should hold a position of authority. Since disadvantaged groups generally tend to function in the context of authority/dependency relationship, interactive group activities (once a week) that allow individuals to express themselves should be promoted. A disadvantaged member should occupy at least one position of authority.

The development objective of the Phase II (1997-2002) of this project is "Improved watershed conditions and productivity of the resource base in the project area". The projects aims to address community needs in the area of community organization/capacity building, agro-forestry and

bio-engineering. Specific strategies to achieve the development objective include: increased attention to women's participation, special efforts to involve disadvantaged groups in the decision making process; focus on sustainable farming practices, bottom-up planning, involvement of Village Development Committee in the planning process, use of participatory approaches, increased use of low cost vegetative measures (CARE 1997).

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Churia Watershed Management Project

CARE/Nepal is designing this Project. Project area: Sarlahi, Mohottari, and Dhanusha Districts
Donor agency: CARE/Denmark. *(Contact person: Mr. Robin Needham, Lalitpur
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3.4 Japanese assistance:

Community Development and Forest/Watershed Conservation Project

With support from JICA/JOCV, the Community Development and Forest/Watershed Conservation Project (1999-2004) has been implemented in Kaski and Parbat Districts. The project includes three types of programs: Community Development and Forest/Watershed Conservation; Greenery Co-operation Promotion; and Western Hill Integrated Watershed Management.

This project has gained useful and valuable experiences in participatory soil conservation and watershed management in Nepal. It has been realized that the essential measures of halting deforestation and restoring the degraded natural environment are secured through community development activities for the upgrading of living standards of rural communities based upon their needs and initiative, with promoting participatory decision making processes and paying due considerations to women and poor people. The activities supported by the project are called "sub-projects", which are implemented by the concerned group (user group) based on the needs and capacity of these groups at community level and inter-community level. The social/gender issue was one of the concerns from the very early stage of the project preparation.

Lessons learned:

Community development and forests conservation depends much upon women's participation. Women are the main users and managers of such community facilities as drinking water system and foot trails, as well as the community and private forests. The project in its project guidelines specified that 50% of the user group committee of each sub-project should be women; 50% of the participants of the training, workshop and study tours should be women, including occupational castes; and income-generating activities should specifically focus on women and the occupational castes.

Planning process: Since the project approaches are to be community-based and need-driven at the grass-roots level, the project concept/approach was disseminated to all people in the

target area. Collection of local information of the target wards focussed on the socio-economic conditions of the target beneficiaries, overall situation of the natural resources, problems of the target groups, existing infrastructure development and different income generating potentialities. This information is used for identification/ formulation of each sub-project. Any need identified is forwarded to ward-wise priority process and project staff identify the user group and encourage the group to form a committee. After submission of the request by the user group, the project conducts a feasibility study from social and technical aspects and simple cost-benefit analysis. The feasible request is then forwarded to the process of design and cost estimation. The user groups and the project share the cost. After approval from the central level, the request is called a "sub-project". An agreement is signed between the project and the sub-project user group. Then the user group implements the sub-project and the project does monitoring (HMG and JICA 1999).

Some activities were implemented through NGOs (e.g. TOLI). Evaluation of the project showed that NGO/CBO could be good development partners to carry out Integrated Watershed Management Plan. The counterpart NGO launched a micro-credit program of its own for financial sustainability. After the termination of the sub-project some user groups also started community development activities themselves such as construction of drinking water facilities, river bank training, and duck-raising with their own resources or locally available government resources.

4. The key factors for sustainable development through people's participation are: awareness creation and education of the people; identification and facilitation to the key persons at users group level; community organization through group formation; institutional development and capacity building of the groups; establishment of financial basis of users groups; participation of the people in all phases of project (planning, implementation, and evaluation); maintenance and follow up of the sub-projects; and quality of project personnel and approaches to support users.
5. Need/demand driven approach is one of the basic principles of the project and it proved to be highly effective to get people's participation and to empower them. However, accepting requests from people without a plan could result in the scattering of a number of activities with random impact and contradict the holistic approach for integrated watershed management.
6. Community level sub-projects have been found more effective from the perspective of empowerment and social capitalization, inter-community level sub-projects have their own advantages in enhancing community infrastructure and resources development though some of them do not fit the participatory approach.
7. Governance: The Project gained strong trust of user groups because of its transparency in cost-sharing, estimation of sub-projects, and funds management. Accessibility of the users to the project information and their feed back is an important factor for enhancing community participation.

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Watershed Management Project:

The objective of the project is to provide technical and managerial support to all District Soil Conservation Offices (55 districts), when necessary, through the Department of Soil Conservation and Watershed Management. Some funds come from KR II, JICA

(Contact persons: Mr. H. Tonokawa and Mr. N. K. Gurung, Tripureshwar Tel: 977 1 260236/260199/ 261190)

3.5 UNDP/FAO and Finnish assistance:

Integrated Watershed Management Project: Phewa Tal and Kulekhani Watersheds

UNDP/FAO funded for Phewa Tal Watershed from 1974 to 1986 and from 1981-1986 for Kulekhani Watershed.

Integrated Watershed Management Project (1987-1994) funded by FINNIDA contributed to the objectives of the management of national priority watersheds by reducing rate of siltation and improving environmental condition of the areas by conservation plantations, gully and landslide treatments, and various other soil and water conservation measures. In addition, the Project increased awareness and participation of the local people (especially women) in environmental issues by community mobilization and extension program and improved the quality of life of the local people. The project has several components:

Information Promotion: Formulation of management plans for 10 years and collection and analysis of spatial information of land use.

Natural System Monitoring: To monitor erosion in various land uses and effects of intervention measures on siltation of the lakes, a program for natural systems monitoring was developed including the activities such as pair catchments with hydromet stations, agromet stations, siltation surveys of the lakes.

Community mobilization and extension: demonstration (e.g. rehabilitation of degraded land, agro-forestry, on-farm conservation, bamboo planting), women program, user group and conservation committees, school program, extension materials, energy saving cooking systems.)

4. **Preventive Measures:** Seedlings production, conservation plantation and seedlings distribution, user groups, conservation ponds, water source conservation and gravity water supply, terrace improvement, and on farm conservation.
5. **Rehabilitative Measures:** Landslide stabilization, gully control, road slope stabilization, irrigation improvement, and trail improvement.
6. **Income generation:** micro-enterprises (e.g. mushroom growing, bee keeping, duck/pigeon, and jam making.)

Lessons learned:

People's participation as an approach was built in the project document. However, there were many administrative and practical reasons why the project activities were implemented either by contractors or the project itself and the involvement of local people (target group) was very minimal. At a latter stage, it was tried to implement activities through user groups. However, lack of recognition of user groups as an implementation partner officially caused financial irregularities. After changes in Government policies, these irregularities were cleared. A participatory approach was demanding also for the project staff. Changing the role from implementors to facilitators does not happen suddenly and the support requirements for increased field working time faced administrative and financial constraints.

In 1994, it was mutually agreed to hand over the FINNIDA funded project activities to the HMG. Now Kulekhani watershed is a part of a large Bagmati Integrated Watershed Management Project supported by EU.

Inter-Regional Project for Upland Conservation and Development:

The Inter-Regional Project for Upland Conservation and Development (PUCD) was implemented in Gorkha District from 1991 to 1997. The purpose was of this project was to develop a model that could be implemented to other countries as well, by involving local people in formulation, implementation, monitoring, and evaluation of the programs suitable for upland areas.

Lessons learned (Basanta Rimal, pers. communication):

1. Local level capacity building process at settlement level was found to be more effective, appropriate for bottom-up planning, and implementation with minimum support with high degree of transparency and accountability.
2. The Groups should be made functional and capable of undertaking responsibilities for natural resource management and development activities. The six month to one year should be kept for local level capacity building before executing physical activities.
3. Women and under privileged groups must be considered separately to increase their participation in decision making.

3.6 EU assistance

Bagmati Integrated Watershed Management Program:

The Bagmati Integrated Watershed Management Program follows on from the Bagmati Watershed Project, which started in 1975 under the Government management.

Phase I (1986-1996) developed a "technical soil conservation package" consisting of terrace improvement, catchment ponds, gully and landslide control. It was recommended that in future

the project adopt a more holistic approach for the management of watersheds. To achieve this, Phase II (1997-2003) was designed based on an integrated community based approach. The Middle Bagmati Watershed also covers the Kulekhani Sub-Watershed. The objective of the Project is to improve watershed management systems within the targeted sub-watersheds of the Bagmati catchment in order to promote increased productivity and improve the livelihoods of the local people. Past efforts were mainly concentrated on soil conservation neglecting the welfare of the people or land users in the area. This approach was unsustainable. The need to integrate social and economic development was deemed indispensable for sustainable watershed management. Now the Project is operational in 5 districts (Kathmandu, Lalitpur, Kabhre, Makawanpur, and Sindhuli Districts)

(Contact persons: Mr. Peter Moss and Mr. Mike Hawkes, Babar Mahal. Tel: 977 1 246763/ 248954/ 248885)

3.7 Australian assistance:

Nepal Australia Community Resource Management Project - Soil Conservation and Watershed Management Component

The Project builds and expands on a concept developed during earlier phases of Australian project, first begun in 1966, to the forestry sector of Nepal. For Soil Conservation and Watershed Management, the current Project (1997-2002) has identified two sub-watersheds and aims at developing methodologies that enable the application of participatory resource management and watershed management principles to a wider range of ecological and social situations. The Project area includes two sub-watersheds in Sindhupalchowk and Kabhre Palanchowk Districts.

(Contact person: Mr. Steve Hunt, Sanepa, Lalitpur. Tel: 977 1 524725/ 528493)

3.8 German assistance:

Churia Forest Development Project - Soil Conservation and Watershed Management Program

This project area is under implementation in three districts: Siraha, Saptari, and Udaypur. Major activity is river training, *Churia* range is not a good source of water. *(Contact person: Mr. Peter Laubmeier (Team Leader), Lalitpur. Tel: 977 1 261404/ 262106)*

3.9 Government's own funds:

Soil Conservation and Watershed Management Program:

Over 10 districts, Government has implemented soil conservation and watershed management activities. These districts include: Ilam, Panchthar, Taplejung, Terhathum, Khotang, Dolkha, Ramechhap, Mustang, Gulmi, and Arghakhanchi. The Government funds for activities according to the Ninth Plan.

*(Contact persons: Mr. R.B. Bista, Secretary Ministry of Forests and Soil Conservation
Tel: 977 1 220067 Singh Durbar; and 2. Mr. Mohan Wagle, Director General, Department of
Soil Conservation and Watershed Management, Tel. 977 1 220828/ 220857, Babar Mahal)*

4. Projects under extension/formulation:

Shivapuri Integrated Watershed Management Project:

The FAO funded Shivapuri Integrated Watershed Management Project is located in Kathmandu, Nuwakot, and Sindhupalchowk Districts.

Once the Shivapuri Watershed was densely forested and was a major source of drinking water to Kathmandu. Later, over-exploitation of forests led to serious forest degradation. To prevent further degradation of forests, HMG initiated the Shivapuri Watershed Development Project in 1976. The main objective of the project was to increase the supply of high-quality drinking water through the conservation and rehabilitation of the watershed, and to develop Shivapuri as a recreational area. This project implemented various programs such as afforestation, construction (roads, buildings, foot trails, boundary wall, check dams), fencing, terrace improvement and private land acquisition. After the project intervention, the watershed is being restored, a good forest cover has been established and the supply of drinking water has been increased (See Acharya 1999).

Since 1992, biodiversity conservation and eco-tourism have been emphasized 'to ensure environmental protection and sustainable management of the natural resources in the project area with emphasis on safeguarding the biological and scenic values of the natural forest and the water supply to the Kathmandu Valley'.

Discussion is going on for the extension of the project to the third phase.

*(Contact person: Mr. Sharad Rai, Joint-Secretary, Ministry of Forests and Soil Conservation,
Tel: 977 1 223862, Babar Mahal)*

Kaligandaki Basin Watershed Management Project

ADB is conducting a study for designing this project. Discussion is going on between the ADB and the Department of Soil Conservation and Watershed Management.

Project area: Kaligandaki Basin

*(Contact persons: 1. Ms. Sumitra Gurung, Deputy Team Leader (DEVTEC office, Rani Pokhari.
Tel: 2. Dr. S. H. Achet (National Coordinator), Department of Soil Conservation and
Watershed Management, Tel. 977 1 220828/ 220857, Babar Mahal.)*

Other watershed management projects were also implemented in Nepal such as Tinau (SATA/GTZ) and Trishuli Watershed Projects.

5. Watershed management in relation to hydro-power development:

Environmental degradation not only leads to erosion, flooding, and sedimentation in catchment of origin, but can have serious downstream consequences as well. It is believed that deterioration in the hills has contributed to flooding and siltation in the *Terai* with adverse consequences on agricultural production there. The flood waters and sediments produced in the catchment flow into down stream reservoirs. The problem even has an international dimension. In Nepal, it has been generally believed that the increased flooding and siltation are partly attributable to the deforestation in catchment area. Therefore, improved watershed management in the catchments could probably increase the chances of channel stability and reduce the flooding and sedimentation problems in reservoirs.

Phewa Tal and Kulekhani Watersheds are of national importance due to a major hydro-electric power stations. Protecting these lakes from siltation is therefore considered a national priority.

Phewa Tal Watershed: Located in the Western part of the Pokhara Valley in Kaski District, this watershed covers some 122.5 km² and is a home to a population of about 31,000 (5,600 households). Most of the population depend on agriculture and services, including tourism. The watershed surrounds the Phewa Lake, a reservoir of a major hydro-electric power station. Soil conservation activities date back to the mid-seventies featuring gully control, landslide stabilization, stream bank protection, and conservation plantation.

Kulekhani Watershed: Located at about 20 km South-West of Kathmandu in Makawanpur District, this watershed covers some 125.5 km² and is a home to a population of about 29,000 (4,400 households). Agriculture is the main source of income, with vegetable and potatoes as principal cash crops in Bajrabarahi and Palung Valleys. Watershed management programs for the protection of the reservoirs were launched in the early eighties.

The construction of a 114-meter high rock-filled dam to make a 2 km² reservoir was an important step to tap 92 MW (Kulekhani Phase I and II) of hydro-power. The reservoir was designed with a gross capacity of 85.3 million m³ of which 73.3 million m³ is live and 112 million m³ is dead volume. The designed life span of the reservoir is 50 years. However, the expected life period is 100 years, with an anticipated annual sedimentation rate of 7m³ per hectare.

After a sedimentation study in Kulekhani, Sthapit (1996) estimated that the life-span of the reservoir has been reduced to 20-26 years. Since the construction of the reservoir, gross capacity has been reduced by more than 14.5 million m³ of which about 5.2 million m³ was contributed by the freak rainfall of July 19-20, 1993, which resulted in disastrous floods. There were numerous slope failures in the catchment. The slope failure in the forest mainly occurred where the forests were extensively over-used in fulfilling basic needs such as fodder and fuelwood. However, the dense well-protected forest areas were least affected. Similarly, the pits resulted from the clay quarrying for the dam construction and later reclaimed and conserved with the bio-engineering measures, were also least affected by the rainfall. This indicates that proper conservation measures can reduce the damage considerably.

Slope failures and stream bank cutting contributed tremendously to the sediments in the reservoir. Sthapit (1996) recommended that the implementation of soil conservation activities through people's participation should be the main strategy, and productivity conservation should be the main theme of the soil conservation program. However, local people were not keen to participate in stabilizing landslides and stream-bank erosion, as these activities were found to be very expensive. Implementation of such activities needs to be done by the project.

6. Discussions and Conclusions:

The paradigm of integrated watershed management is firmly entrenched in Government policies. However, in terms of practice, the institutional and operational capacity in watershed management is still in an early stage of development; similar to where community forestry was 15 years ago. Because of human and financial constraints, one District Soil Conservation Office can implement soil conservation and watershed management activities in only 2-3 critical sub-watersheds. Thus, even if District Soil Conservation Offices have been established in 55 districts, the coverage of conservation activities in Nepal is quite low. Moreover, the Government's normal pattern of implementation is that most of the programs are undertaken in the last quarter of the fiscal year when there is a rush to fulfill targets. From a management perspective this is undesirable for quality output. Implementation of activities by the communities provides an opportunity to spread the work program out over a larger part of the year by better utilizing unused labor available from the agricultural cropping calendar.

Participatory and integrated watershed management appears to be a good approach for watershed management programs in Nepal (see also Warren 1998, and Ohler *et al.*, 2000). These programs have been found to be more successful if a demand-driven approach is followed.

Watershed management projects implemented so far in Nepal have focussed on rural development and not on the protection of watersheds for hydropower development as the primary objective. However, in Kulekhani and Phewa Lake Watersheds, watershed management activities have been linked with hydropower development. This review found that community forestry and income generation programs are the key programs as an "entry point" whatever the primary objective of watershed management is. Lessons have been learned that the essential measures of halting deforestation and restoring the degraded natural environment are secured through community development activities for the upgrading of living standards of rural communities based upon their needs and initiative, with promoting participatory decision making processes and paying due considerations to women and the rural poor.

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Appendix 1: Profile of Soil Conservation and Watershed Management Projects in Nepal (projects, their duration, donor agency and total project cost)

S.No	Projects	Duration	Starting Date	Completion Date	Donor Agency	Total US\$('000)	
	Ministry of Forests & Soil Conservation						
1	Natural Resources Management Sector Asst. Program Central support	5 Years	Feb. 98	Jan-03	DANIDA	1458	Support to Dept. of Forest, Soil Conservation
	Environment & Forest Enterprise Activity	6 Years	July-96	June-02	USAID	8840	Dept. of Forest, Soil Conservation, and Parks Covers 9 Districts
3	Shivapuri Integrated Watershed Project (Phase II)	5 Years	Jan-92	Dec.99	FAO/NORWAY	115	Extended up to Dec. 99 as a bridging phase. Discussion going on for extension (III Phase)
	Nepal Australia Community Resource Management Project	5 Years	May-97	April-01	AUS/ AUSTRALIA	6200	Dept. of Forest, and Soil Conservation Covers 2 districts
5	Churia Forest Development Project	3 Years	July-01	Jul-01	GTZ	4200	Support to Dept. of Forest, Soil Conservation
	Department of Soil Conservation and Watershed Management						
6	NARMSAP - Central Level Support	5 Years 5 Years	July-98 July-98	July-03 July-03		4656 990	
7	Nepal Denmark Watershed Management Project	5 Years	July-96	July-01	DANIDA	2680	A pilot project. Comes Under NARMSAP after July 2001
8	Watershed Management Project	Annual	July-99	July-00	KR-II/JICA		As agreed annually
		4 Years	July-97	March-02	CARE	12,00	
10	Bagmati Watershed Project	6.5 Years	July-97	July-03	EU	225,00	
11	Community Development and Forest/ Watershed Conservation Project II Phase	5 Years	July-99	July-04	JICA		
		2 Years	Feb-98	Jan-00	FAO / Italy	2058	Participating Countries: 3

(Source: MFSC)