

# **ANNUAL REPORT**

## **Developing and Demonstrating Community-Based Water Resources Management Approaches for Hill and Mountain Ecosystems in Nepal**

Submitted to:

**Asian Development Bank**  
**Regional and Sustainable Development Department**  
**(RSDD)**  
**Energy, Transport and Water Division,**

Submitted by

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## List of Abbreviations

ADB:	Asian Development Bank
CFUG:	Community Forest User Group
CMIASP:	Community Managed Irrigated Agriculture Sector Project
DADO:	District Agriculture Development Office
DLSO:	District Livestock Services Office
DOI:	Department of Irrigation
ECARDS Nepal:	Environment, Culture, Agriculture, Research and Development Society Nepal
FYM:	Farm Yard Manure
ICIMOD:	International Centre for Integrated Mountain Development
IWRM:	Integrated Water Resource Management
JFPR:	Japanese Fund for Poverty Reduction
MUWS:	Multiple Use Water System
NTFP:	Non-Timber Forest Products
PCC:	Project Coordination Committee
PDA:	Pilot and Demonstration Activities
RD:	Regional Director of Irrigation Central Development Region of Nepal
SALT:	Sloping Agriculture Land Technology
SISP:	Second Irrigation Sector Project

## Project Summary Sheet

- Funding Agency: Asian Development Bank
- Name of Fund: Cooperation Fund for Water sector, Pilot and Demonstration Activities (PDA)
- Executing Agency: Environment Culture, Agriculture Research and Development Society Nepal (ECARDS Nepal)
- Collaborating Agencies:
  - Community Managed Irrigated Agriculture Sector Project (CMIASP)
  - Regional Directorate of Irrigation, Kathmandu
  - International Centre for Integrated Mountain Development (ICIMOD)
- Activity Start date: 15 December 2007
- Completion date: 15 September 2008 (with extension 15 December 2008)
- Project Area:
  - Bhorlesiran Irrigation System: Dhaibung, Rasuwa
  - Kolputar Irrigation System: Duipipal, Nuwakot
- Project Beneficiaries:
  - Users of irrigation system and people less/least benefited from the irrigation system
- Project Cost: US\$ 48,350.00
- Project Expenditure: US\$
- Beneficiaries Contribution: 30% of total cost

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# **Developing and Demonstrating Community-Based Water Resources Management Approaches for Hill and Mountain Ecosystems in Nepal**

## **Final Report (Phase I)**

### **1. Background and Rationale**

Environment, Culture, Agriculture, Research and Development Society, Nepal (ECARDS-Nepal) was founded in 1991 to act as a Non-profit, Non-governmental, Non-sectarian social development organization. It was set up to foster sustainable community development through people's organization and leadership. The basic philosophy of ECARDS-Nepal is to create awareness and promote understanding of the dynamics of the development process by empowering the local community. People need to be involved in problem identification, planning, resource mobilization, implementation and evaluation of a program. ECARDS-Nepal strives to serve as a vital link in the dynamic process of environmental management that helps to enhance and sustain agricultural productivity and natural resource management. It provides attention to socio-cultural factors that are critical to project planning and execution. ECARDS-Nepal has a long experience of working in different fields of development, especially in social mobilization, agriculture, natural resource management and community development through skills development and their application for the beneficiaries of different parts of the country. ECARDS-Nepal has established itself as an institution that has good records in social mobilization. Apart from it, it has also worked in the management of natural resources at the grassroots level.

Rainfall, the main source of water, is both seasonal and erratic in distribution, duration and intensity. Water scarcity is therefore a problem in most parts of the Hindu Kush area, including Nepal. In a typical mid hill area, 80% of the rainfall falls during the monsoon period, the remaining eight months are more or less dry. Poor land management has led to increased water problems in the region; deforestation has increased surface runoff and decreased groundwater replenishment. For most people in Nepal, water is a scarce commodity and improved water management practices are critical for ensuring availability of drinking water, production of food, meeting the need for biomass and improved living conditions. Soil erosion, soil degradation and declining soil fertility are also regarded as major problems in Nepal, threatening the sustainable use of sloping agriculture in the hills. Land slides along the irrigation canal has created problems in maintenance of irrigation system in mid-hill and high hill regions of Nepal.

The International Centre for Integrated Mountain Development's (ICIMOD) Godavari Demonstration Site has developed a number of technologies and practices that are useful for water management, soil erosion and landslides control as well as increasing soil fertility and water retention capacity and income generation activities. ICIMOD demonstrated successfully the use of water collection reservoirs and gravity sprinkler irrigation, roof top rain water harvesting, stone lined and grass lined waterways (irrigation channels, contour hedgerows of nitrogen fixing plants to reduce run off and soil loss. Soil management activities of ICIMOD include agro-forestry and mixed hill farming system using the sloping agricultural land Technology (SALT) and conservation farming.

The ADB Project Completion Report of the Second Irrigation Sector Project (SISP) has pointed out that soil erosion and declining fertility were major problems the project faced during implementation.

The ADB funded Community Managed Irrigated Agriculture Sector Project (CMIASP), the successor project of the SISP implements farmer managed irrigation system improvements and micro irrigation. As CMIASP focuses on the improvement of the irrigation system, this project entitled "Developing and Demonstrating Community-Based Water Resources Management Approaches for Hill and Mountain Ecosystems in Nepal" is focused on testing of technologies developed at ICIMOD demonstration centre in the area of CMAISP (one Nuwakot, hill district and one Rasuwa, Mountain district) which will compliment the irrigation with activities to improve sloping agriculture, watershed management, Multi Use Water System (MUWS) and soil stabilising activities. It is envisaged that if PDA funds will still be available, a follow up to this could be developed to actually test and apply the models in selected sites, thus the activities to be carried under this PDA includes site selection for eventual testing of the models.

The project was approved by the ADB to be implemented in 12 months starting from 15 December 2007 and is completed in 15 December 2008. A short description of major activities completed during the project period is presented in this section.

## **2. Objective and Outputs**

The objective of the project is to develop and demonstrate approaches for community-based water resources management that will respond to the specific conditions of hill and mountain ecosystems.

The specific outputs will be the following:

- (i) Replicable approaches for community-based water resources management for hill and mountain ecosystems; and
- (ii) Informed and empowered communities to be more involved in water resources management whose impacts greatly affect their livelihoods.

### **3. Approach and Methodology of Implementation**

The demonstration project was based on the demonstration of different IWRM practices of the ICIMOD Demonstration and Training Centre in Godavari. Site specific approaches according to ecological vegetation zones, vegetation types and water availability were designed and models of IWRM for hill and mountain sites tested. The focused approach and methodology used for the implementation of this project includes:

- Participatory approach for selection of the project sites
- Establishment of Project Coordination Committee (PCC)
- Project inception workshop
- Social mobilization of beneficiaries
- ICIMOD Demonstration Farm Visit by Project Team
- Capacity Development by ICIMOD
- Baseline Survey of selected sites
- Field visit by expert team for identification of project location and activities
- Participative planning of project activities
- Field visit by expert team and finalization of activities
- Implementation of activities
- Monitoring of field activities
- Review, sharing of learning and reporting
- Development of proposal for next phase

### **4. Activity Target and Performance**

Overall achievement for this year is found to be encouraging despite the national situation such as national constitutional assembly election, residual effect of conflict. The achievement in farmer group formation and mobilization exceeded the target; demonstration of IWRM approaches (water management, landslides management, appropriate Technology, and income generation) has met the set target. The activity target and performance during the implemented period is presented in Table-1.

**Table-1: Activity Target and Performance During the Reporting Period.**

SN	Inputs / Expenditure Category	Unit	Target	Achievement
<b>1</b>	<b>Site Selection and Social Mobilization</b>			
1	Site selection	No	2	2
2	Formation of project coordination committee	No	2	2
3	Recruitment and mobilization of Field Team	Times	2	2
4	Baseline Survey	No	2	2
5	Group Formation and Mobilization	No	6	10
<b>2.</b>	<b>Water Management</b>			
A	Water Harvesting			
1	Multiuse Water System with overflow pond, Nuwakot	No	2	2
2	Roof Water Collection Tank construction, Nuwakot	No	1	1
3	Plastic Pond Construction (one overflow pond and one rainwater collection)	No	2	14
<b>3</b>	<b>Soil Conservation and Landslides Management</b>			
1	Landslide management: Bio Engineering demonstration	No	2	1
2	Watershed management for spring protection	No	2	1
3	Sloping Agriculture Land Technology: Hedgerow demonstration	No	2	3
<b>4</b>	<b>Income Generation Activities</b>			
1	Non Timber Forest Products			
1.1	Asparagus Species Demonstration for 1 Ropani (Nuwakot)	No	2	2
2	Production Demonstrations			
2.1	Rice Demonstration(Variety: Khumal 8) one	No	4	4
2.2	Maize demonstration	No	8	8
2.3	Bitter Guard Demonstration(White Long)	No	8	8
2.4	Cucumber (Bhaktapur Local)	No	10	10
2.5	Wheat Demonstration	No	6	0
2.6	Off-season vegetable demonstration	No	16	18
2.8	<i>Artocarpus heterophyllus</i> (Jack fruits) Demonstrations	No	2	0
1	Litchi Demonstrations	No	2	2
2.7	Lapsi Fruit Demonstration	No	2	2
<b>5</b>	<b>Use of Appropriate Technology</b>			
1	Improved FYM/Compost Demonstration		7	10
1.1	Vermi Compost Demonstration (Size of chamber : 3m*1.2m*1m)(1500 Earth Worms per Chamber)	No	4	5
2	Bio briquette ( Briquette making machine:3 and stoves :3)	No	4	4
3	Drip Irrigation demonstration (Cauliflower, Tomato and Cucumber hybrid)	No	9	11

SN	Inputs / Expenditure Category	Unit	Target	Achievement
<b>6</b>	<b>Training, workshop</b>			
<b>A</b>	<b>Community level</b>			
1	Project identification and Selection Meeting in the community ( 1 day per site)	No	2	2
2	Project Orientation meeting to the community ( 1 day per group)	No	2	2
3	Group formation/Reformation in the site ( 1 day per group)	No	6	10
4	Group Meeting	No	54	100
5	Training on Social Mobilization	No	2	2
6	Group management training (3 days per group)	No	4	4
7	Planning meeting with users' groups	No	2	2
8	Monitoring meeting with users' groups	No	6	4
9	Public audit meeting with user' committee	No	2	2
10	Off-seasonal vegetable training	No	2	4
11	Bio-briquette making training to the women members (with equipments for group)	No	2	2
12	Training on NTFP and other specific area	No	2	1
13	Training on Soil erosion and soil management	No	2	2
13	Exposure visit	No	2	2
<b>B</b>	<b>Staff level</b>			
1	Project inception workshop	No	2	2
2	Observation of ICIMOD Sites	No	2	2
3	Observation tour to MWUS sites	No	2	2
4	Capacity development by ICIMOD	No	2	2
6	Bio-briquette making training by ICIMOD	No	2	2
<b>C</b>	<b>Management Committee</b>			
1	Observation of ICIMOD Sites	No	2	2
2	Observation of MWUS at farmers field	No	2	2
3	Project completion workshop at community level	No	2	2
4	Project completion workshop at National level	No	1	

The district wise details of activities proposed and completed are presented in Annex-II of this report.

## 5. Major Activities

Implementation status of major activities is described hereunder.

### 5.1. Site Selection and Social Mobilization

#### 5.1.1. Selection of the Project Implementation Sites

A field visit was organized to Nuwakot and Rasuwa to observe the district and site for project implementation. The team was led by Mr. Babu Ram Adhikari,

Project Director of CMIASP. The other members of team were Mr. Madhukar Rana, Divisional Engineer of the District Irrigation Office, Nuwakot, Mr. Purna Chemjung, Consultant (JFPR) and Mr. G. R. Aryal, ECARDS-Nepal. Detail discussion on and visit to several possible sites resulted in the finalization of the project implementation site in Nuwakot. The final outcome of the field visit was that Kolputar area of Kolputar Irrigation System was taken as the project site in Nuwakot representing the hill region.

There was some delay in the field visit to finalize the next site due to some unavoidable reasons. A visit was made towards Rasuwa district on 27 and 28 February 2008. Extensive discussion was made with officers of Divisional Irrigation Office, Nuwakot and different alternatives were explored and Bhorlesiran Irrigation System was decided as the project site in Rasuwa district representing the mountain region.

Both the demonstration sites are accessible by all-weather roads. This was helpful to make the project implementation and its achievement, more efficient. It has been taken as an important condition that since there are existing water user associations (WUAs) of the farmers, the project activities were implemented with the participation of these WUAs.

### **5.1.2. Formation of a Project Coordination Committee**

Detail discussions were held regarding the need of a Project Coordination Committee (PCC) to help the project implementation team by providing necessary and useful guidelines in the project implementation. It was felt that coordination of the District Irrigation Offices would be of vital importance. So, it was proposed and finally decided to ask the Regional Director (RD) of Irrigation Central Development Region of Nepal as the Chairman of the PCC. Thus, The PCC was form on the chairmanship of Mr. Mahendra B. Gurung. The other members of PCC are Mr. Babu Ram Adhikari, PD of CMIASP (Member), Mr. Purna B. Chemjong, Consultant (JFPR) (Member), Mr. Samden Sherpa, Farm Manager of ICIMOD, Godavari (Member), Mr. Gokarna Raj Aryal, an executive and agriculturist of ECARDS-Nepal (Member) and Mr. Rudra P. Devkota, Executive Director, ECARDS-Nepal, (Member-Secretary). The Divisional Engineer of the project districts, Nuwakot is also the member of the PCC. Mr. Aryal of ECARDS-Nepal, has lead the project implementation team mainly at the field level. Reporting was jointly undertaken by Mr. Aryal and Mr. Devkota.

### **5.1.3. Recruitment and Mobilization Field Staffs**

As provisioned in the project proposal, two Field Officers and two Social Mobilizers were recruited for the project implementation. Thus, Mr. Padam Sapkota; Agricultural graduate and Ms. Parbati Lama, Forestry graduate, were

selected for the project and deputed as field officer in Rasuwa and Nuwakot district, respectively. Ms. Bhagawati Nepal and Ms. Tulasa Adhikari were involved as Social Mobilizer in Nuwakot and Rusuwa district, respectively. Mr. G. R. Aryal worked the Project Manager and led the team.

#### 5.1.4. Capacity Development by ICIMOD.

A team of ECARDS-Nepal along with field officers visited ICIMOD, Godavari and observed the Technology developed at the demonstration farm. The main purpose of the visit was to observe the Technology suitable to project conditions. Capacity development training was held in Godawari Demonstration Farm of ICIMOD in March 2008.

#### 5.1.5. Preparation for and Conduct Baseline Survey

The baseline information related to the status of IWRM at the project location and the status participating farmers was collected and compiled.

#### 5.1.6. Group Formation and Mobilization

Social mobilization is an integral component of intervention. The social mobilization process follows three basic steps namely: social preparation and group formation, enhancing capacity and institution building. Under social preparation, farmers are organized into groups; involved in identifying local resource potential, planning and prioritizing activities. In capacity building, groups are provided with various practical trainings and exposure visits. In the institutionalization process, these groups are organized into a larger organization and promote linkage with other service providers. The status of groups is given in Table-2.

**Table:-2: Present Status of Groups**

SN	Name of Group	No, of Members			No, of meetings	Savings NRS	Credit NRS	Remarks
		F	M	Total				
1.	Kankeshwor (Nuwakot)	38		38	8	15400	15400	Nuwakot
2.	Sundara Devi	40		40	8	32000	32000	Nuwakot
3.	Bachela Devi	20	10	30	4	3000	3000	Nuwakot
4.	Bagh BhAIRAV	30		30	7	4200	4200	Nuwakot
5	Sarasati Women Group	23	-	23	43	45000	45000	Rasuwa
6	Pragatishil Women Group	35	-	35	35	35400	35400	Rasuwa
7	Santoshimata Women Group	20	-	20	36	64000	64000	Rasuwa
8	Shreekrishna Women Group	18	-	18	45	74000	74000	Rasuwa
9	Durga Devi Women Group	25	-	25	46	85000	85000	Rasuwa
10	Shirjanshil Women Group	21	-	21	39	63000	63000	Rasuwa

The project intervention was started with Irrigation Water User Associations in each site. Two MUWS user groups, one watershed management group and 8 women groups were formed and were actively involved in implementing of the project activities (table; -2). These groups held regular group meetings and have started the planning and review of project activities. They have started savings and credit activities among the members. These groups are supported by women social mobilizers, one in each site. Some of the members of these groups have participated social mobilization (cornerstone) training and training on income generation activities. Two MUWS user groups (one in each site) have been formed and strengthened. These groups have actively participated in scheme construction and are active in maintaining and utilizing the MUWS schemes. The detail of group activities is presented in Annex-I of the report.

## ***5.2. Water Management***

### **5.2.1. Multiple Use Water Systems**

In most of mid-hill and hill region of Nepal, water is a scarce resource and improved water management practices are critical for ensuring availability of water for drinking and productive purposes as well as meeting the need for biomass and improved living conditions. The benefit of irrigation systems goes to the farmers who have land below the canal but the farmers having less land or having farming land just above the canal are lacking such benefits. Efforts to make efficient utilization of scarce water resource for domestic and productive purpose could be a major breakthrough for improving rural livelihood in Nepal. The water system designed and developed by incorporating domestic and productive needs using scarce water resource are called Multiple Use Water System (MUWS). ECARDS-Nepal with active participation of the users built two pilot MUWS systems (one in each working district) to test its effectiveness. Both of the systems have socio-economical, physical and natural specialities. The system feature of MUWS is as follows.

- Water supply from single system for multiple uses.
- Domestic use has priority with productive utilization of kitchen drain.
- Productive utilization of scarce water resources.
- Fit with micro-irrigation technologies
- Low cost for construction and maintenance
- Improved sanitation and hygiene condition
- Promote equity in water use

The spring head was also rehabilitated in this system. Both the systems tapped spring resources, used gravity to pipe the water to a domestic water Ferrocement tank, overflow is collected into a low cost plastic pond and use separate distribution pipe for domestic and productive purposes. The kitchen drain

collection ponds near the water tap were constructed to collect and use the water for home gardening during the scarce season.

#### **5.2.1.1 Multiple Use Water Systems, Nuwakot**

A total of 16 households residing in the Chhap area, same ward of Kolputar Irrigation System command area, used to collect drinking water from a spring in a small degraded watershed. The households residing above the watershed also collected drinking water and used water to wash clothes from the same spring. This drain was also used as drinking water by the households in Chhap area. This was clear that the scarce water was unsafe for drinking purpose. So, ECARDS-Nepal expert team with participation of community has developed a MUWS system in this area.

The physical work was completed on time but the social work for handing over with maintenance plan and the integration of drip irrigation for productive purpose took quite long. Now the users have developed the maintenance plan and the system is handed over to the users. The physical system designed is given in photograph 1 and 2.

Photograph: 1 and 2. Water source protection and part of MUWS in Chhap, Nuwakot

#### **5.2.1.2 Multiple Use Water Systems, Rasuwa**

A total of 26 *Dalit* households residing in the Itapare village, residing below the Borlesiran Irrigation System who were included as the user families during the construction phase of irrigation and drinking water system, but have no access to safe drinking and irrigation water. There is permanent drinking water system in the periphery of this area. However, these households used to collect drinking water from different spring sources of nearly half- an- hour in dry season. The other 10 households residing nearby the *Dalit* community also lack year round drinking water facilities. There is a permanent water spring within one kilometre distance and the next community is using this spring water for irrigation purpose. In this situation, experts of ECARDS-Nepal raised the issues on equity of deprived *Dalit* community for safe drinking water and water for productive purpose. The team in close consultation with and active participation of local community has developed a MUWS system in this area. The *Dalit* households

have no or less land for agriculture purpose. Poultry farming is becoming the main source of income for the *Dalit* households in this area. Thus, the availability of drinking water will also be used for their poultry birds. The overflow from collection tank and kitchen drain will be promoted to use for irrigation to the off-season vegetables, as an additional source of household nutrition and income.

The physical work has been completed and the community is using this water for drinking and productive purposes. The maintenance plan was developed later, with close participation of the beneficiaries and the MUWS scheme was handed over to the beneficiaries. The physical system designed is given in photograph 3, 4 & 5.

Photograph 3,4 &5: Multi use water system in Dhaibung, Rasuwa

### **5.2.2. Roof/Rain Water Collection**

Roof/rain water collection system has been developed in a highly water scarce household for demonstration. For this, a ferro cement tank (2,000 litre capacity) for productive purposes has been constructed in Majhgaun of Duipipal VDC. The kitchen drain collection and utilization through drip irrigation system for off-season vegetable cultivation, has also been started. The physical system designed for roof/rain water collection is given in Figure 6 and photograph 7 shows the local variety of cucumber (Bhaktapur Local) growing near the system by utilizing the kitchen drain.

### 5.2.3. Plastic Pond Construction

Water is scarce for domestic and productive use above the irrigation system in both the sites. The benefit of Irrigation systems goes to the farmers who have land below the canal but the farmers having less land or having farming land just above the canal are lacking such benefits. Low cost plastic ponds were constructed for harvesting rain water and overflow water from drinking water tap. The detail of plastic pond constructed is given in Table-3.

**Table-3: List of Low Cost Plastic Ponds Constructed for Water Harvesting**

S. N.	Name of Farmer	Address	Pond Size	Sources of Water	User HHs
1.	Krishna Adhikari	Belini (Nuwakot)	8.5m*5m*1.2m	Tap Water	7
2.	Ram K. Bhandari	Belini (Nuwakot)	4m*7m*1m	Tap Water	4
3.	Puahpa B. Tamang	Musure(Nuwakot)	6m*7m*1m	Spring Water	12
4.	Dhana Bdr.Magar	Archale (Nuwakot)	7m*6m*1m	spring water	8
5.	Binda Maya Nepal	Kolputar(Nuwakot)	7m*6m*1m	Canal water	20
6.	Babu Kaji Bujel	Tanki (Nuwakot)	7m*4m*1m	Tap water	6
7.	Netra Bdr Subedi	Todke Nuwakot	12m*15m*1m	Spring Water	10
8.	Rishi Ram Nepal	Todke (Nuwakot)	6m*4m*1m	Rain water	5
9	B.i Agasthi	Dhaibung-1 Rasuwa	4m*3m*1m	Waste tap	4
10	Lumadi P. Neupane	Betini Rasuwa	4m*3m*1m	Spring water	6
11	Indra D. Neupane	Dhaibung-1, Betini Rasuwa	4.5m*2m*1m	Waste tap water	5
12	Goma Neupane	Dhaibung-2 Rasuwa	3m*3m*1m	Spring water	5
13	Mrs. Ganga Neupane	Dhaibung-1, Betini Rasuwa	4m*3m*1m	Waste tap water Collection	3
14	Mr. Phanendra Gautam	Dhaibung-2, Dharapani Rasuwa	4m*2m*1m	Waste tap water Collection	4
15	Ms. Ganga Adhikari	Dhaibung-2, Dharapani Rasuwa	3m*2m81m	Waste tap water Collection	2

The project provided the plastic for pond and the users contributed other cost of ponds construction. Low cost drip irrigation sets were provided for use of the water from these ponds. The users have developed the water utilization plan for commercial purpose. Some of the progressive farmers have produced and sold the high value vegetables, utilizing the water from these ponds.

### **5.3. Soil Conservation and Landslide Management**

#### **5.3.1. Landslide Management: Bio-engineering Demonstration**

An unstable section of Kolputar Irrigation Canal near Andheri Khola (approximately 1,700m from intake) was moving downwards for the last few years and water supply was reported interrupted in every rainy season. The problem area is locally called Sajabot Pahiro, which is a landslide. ECARDS-Nepal expert team and the users of irrigation system jointly decided to stabilize it by using bio-engineering practices. To stabilise the canal segment across the landslide, civil engineering as well as bio-engineering measures were used. The land control measures applied are:

- Safe drainage of irrigation water and run-off from the catchments area above the landslide.
- Surface and sub-surface drainage construction and management inside the landslide.
- Slope correction of hanging parts/steep slopes.
- Construction of toe wall (stone filled gabion boxes-15cm X 15cm mesh size, 8 gauge)
- Bamboo plantation just behind the toe wall, below and above the irrigation canal
- Bains (*Salix spp.*) plantation in stream bank terrace, and
- Amliso (*Thysanolaena maxima*), kyuku and other grasses plantation below head scarp and along side scarp.

The photograph 8 and 9 show the landslide just above the irrigation canal, toe wall constructed at the base of landslide for landslide control and Figure 4 is the sketch map showing appropriate bio-engineering along the Kolputar Irrigation Canal.

Photograph: 8 Part of the landslide just above the canal.

Photograph: 9 Toe wall constructed at the base of landslide

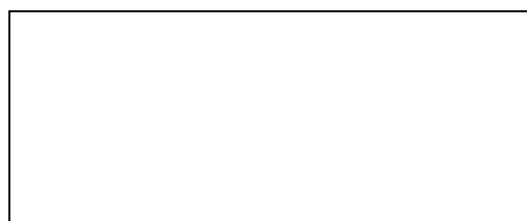
Figure:4 Sketch map showing appropriate bio-engineering measures to stabilise landslide in Kolputar

### 5.3.2. Watershed Management for Spring Protection, Nuwakot

The source of drinking water for the people residing in the Chhap area, is a small degraded watershed which is a part of Bagbhairab Community Forest registered in 1995. The forest was dense and well managed until 2000-2001. Then there was uncontrolled forest exploitation during political conflict in the country. Now, local people are trying to reactivate their water resources near-by the villages. The water users are now willing to manage the watershed in close collaboration with Bagbhairab Community Forest User Committee. As per the suggestion of expert team the following activities were carried out for watershed management.

- Reactivation of the Bagbhairab Community Forest User Group (CFUG)
- Formation of a watershed management users' group among the users.
- Development of a work plan and strict implementation of rules and regulations for the community forest management
- Putting of a live fence of Sajiwan (*Jatropha curcas*), Kettuke (*Agave spp*) and Simali (*Vitex negundo*) may between agricultural land and watershed to prevent cattle entering into the forest.
- Plantation of medicinal tree species such as Amala (*Phyllanthus emblica*), Bel (*Aegle marmelos*) on south/south-east facing slopes and fast growing tree species like Uttis (*Alnus nepalensis*) on north/north-west facing moist slopes to cover the open patches inside the watershed.
- Plantation of Bains (*Salix tetrasperma*) and Jamun (*Syzygium cumini*) in the moist stream sites will help to conserve water sources.
- Construction of a safe intake near the water source and collection of water in a treatment reservoir.
- Promotion of grass plantation (Babio, Napier or Amliso) on risers of cultivated land.

The present and envisioned condition of the watershed is given in photograph 10 and 11, respectively.



### **5.3.3. Sloping Agriculture Land Technology: Hedgerow Demonstration**

Sloping agricultural land is the common feature of hill farming. The sloping land is moisture stressed during dry season and erosion prone during rainy season deteriorating the land productivity. Four demonstrations were conducted (two in each side) by applying the following measures to promote bio-terracing, enhance soil fertility and increase moisture content of sloping agriculture land. The major activities conducted are:

- Safe drain of run-off water and roof water that enters into the sloping agricultural land from upslope area; it can be collected to a conservation pond.
- Plantation of double hedge row of legume species such as *Flemengia* (Bhatmase) in contour line for enhancement of soil fertility, moisture content and formation of bio-terracing.
- Plantation of Napier (*Pennisatum perpureum*) or Amliso (*Thysanolaena maxima*) grass on the edge of terraces.
- Plantation of Babio (*Eulaliopsis binata*) grass on raisers.
- Construction of inside ditches at the base of raisers to allow runoff water collection and infiltration.

### **5.3.4. SALT: Orchard demonstration in Contour System**

A demonstration orchard was established in a degraded community land in Bhorlesiran of Rasuwa. The Lapsi orchard was established with active participation of community. ECARDS-Nepal field team has facilitated to develop an orchard management plan so that the orchard could well be managed in the long run.

## **5.4. Income Generation Activities**

Different demonstration of agriculture based income generation activities were conducted in for both sites for better income of disadvantaged users of irrigation system. The major demonstrations conducted are Asparagus production demonstrations, Paddy: Variety Demonstration, Maize: Variety Demonstration, High value vegetable production demonstration and Litchi orchard demonstration (Table-4)

**Table-4: Types of Income Generation Activities and Number of Beneficiaries**

S. N.	Types of IGA	No./ quantity	No. beneficiaries	Remarks
1.	NTFP Demonstration ( <i>Asparagus</i> )	2	27	Nuwakot
2.	Rice demonstration	1	1	Nuwakot
3.	Maize Demonstration	2	2	Nuwakot
4.	Off Seasonal Vegetable Demonstration	8	8	Nuwakot
5.	Plastic Tunnel house for off seasonal vegetable Cultivation	3	3	Nuwakot
6	Rice demonstration	1	1	Rasuwa
7	Maize Demonstration	2	2	Rasuwa
8	Off Season- Vegetable Demonstration (Cauliflower)	6	6	Rasuwa
9	Off Season -Vegetable Demonstration (Tomato)	3	3	Rasuwa
10	Plastic Tunnel house for off seasonal vegetable Cultivation	3	3	Rasuwa

The women groups have conducted and managed the asparagus demonstrations in Kolputar site and have found promising indication at the preliminary stage. Some of the vegetables have yielded good results. Promotion of these commodity with special focus on market chain development will serve the main source of increasing family income, therefore, some intervention are needed in this matter.

### **5.5. Use of Appropriate Technology**

ECARDS-Nepal team in consultation with ICIMOD demonstration farm Godavari has identified different appropriate technologies to test in the field conditions. The technologies thus selected are improved FYM/vermi-compost preparation and use, Bio-briquette production and use, Drip Irrigation for high value vegetables. These technologies were demonstrated in the field. The major appropriate Technology demonstrated in the project sites in given in Table: -4.

**Table:-4: Type of Appropriate Technology Demonstrated and Number of Beneficiaries**

S.N	Activities	No.	Beneficiaries
1.	Drip irrigation system	11	11
2.	Kitchen drain collection plastic pond	18	18
3.	Bio-briquette production	2	103
4.	FYM/Compost	20	20
5.	Vermi-Compost	5	5

Farmers have shown more interest on drip irrigation, plastic tunnel for vegetable cultivation and bio-briquette production.

## **5.6. Training and Workshop**

### **5.6.1. Community Level**

Series of participative and interaction activities were conducted to develop the ownership feeling of the users in project activities. The interaction meeting thus conducted are project identification and site selection, project orientation, activities planning and monitoring meeting. An exposure tour was organized for the farmers of each site. The type of training/visit with number of participants is presented in Table-5.

**Table-5: Types of Training/Exposure Visit and Number of Participants in each Event**

SN	Name of Training and Exposure Visit	Participants		
		F	M	Total
1.	Exposure visit	40	5	45
2.	Hands on Training	8	1	9
3.	Corner stone Training	45		45
4.	NTFP Training	33		33
5.	Bio Briquette Training (Field)	55	1	56
6.	Bio Briquette Training (ICIMOD)	1	1	2
7.	Group Management Training	82		82
8.	Vegetable cultivation Training	80	7	87
9.	Soil Conservation & landslide management Training	48	45	93

A total of 9 different training/exposure visits were provided during the project period (Table:-5). A total of 45 beneficiaries were participated in exposure visit. This has help in developing local knowledge and capabilities in IWRM Management.

### **5.6.2. Staff Level**

A project inception workshop was organized at the organizational level to conceptualize the essence of the project. Several interaction meetings were held with different stakeholders especially the ICIMOD and CMIASP experts to identify the possible IWRM approaches for demonstration at the project location. The working team made observation visit to ICIMOD demonstration site Godavari to observe the Technology developed and tested. The team also visited the MUWS

operating system at Jaisi Danda of Kavreplanchok district. A training on Technology developed at ICIMOD site farm was provided to the project team. Two project staffs participated in bio-briquette making training at ICIMOD, Godavari.

### ***5.7. Program Mobilization and Monitoring***

ECARDS-Nepal is a learning organization and always promotes close monitoring of its staff and activities at the field level. ECARDS-Nepal implements its development programs through participatory group approach to promote meaningful participation of the people. A set of monitoring indicators was developed and used for monitoring. A series of expert visits along with the Project Manager were made at the working sites followed by interaction at field as well as at the centre for sharing of learning. The activities implemented were reviewed at field level and at the centre level.

### ***5.8 Public Audit***

A draft project completion report was jointly prepared by the project team with detail description of the process, total cost and share of cost contribution. A Public Auditing Expert was hired and deputed to field for public auditing. A gathering of all the beneficiaries was organized in each site and project implementation process and the cost detail were presented in the public gathering. Each of the participant beneficiaries were encouraged to ask their queries in the gathering and the members of construction committee presented the clarification. Rules of users' committee and role and responsibility of users along with water distribution and maintenance system were also approved by the gathering.

## **6. Major Achievements/Outputs**

The major achievements made from the implementation of project are as follows:

- Identification and testing of two farmers friendly MUWS; one in mid-hill and one in mountain district.
- Field testing of small and degraded watershed management technologies for spring conservation in water scarce area.
- Testing of roof/rain water collection system and its utilization for domestic and productive purpose in highly water scarce area.
- Testing of low cost plastic ponds for collection of overflow/rain water and its utilization in productive purpose.

- Identification and testing of low cost bio-engineering Technology at local conditions.
- Field trial of drip irrigation system in water scarce areas.
- Demonstration of different income generation activities
- Testing of improved FYM/Vermi-compost production Technology at the local level.
- Demonstration of bio-briquette production and utilization technologies.
- Capacity enhancement of ECARDS-Nepal and communities in promotion and use of IWRM technologies.
- Market oriented Technology introduced in the project area and farm income of some of leader farmers increased.

## **7. Lessons Learned**

The lessons learned from the implementation of this project are as follows.

- Testing and dissemination of IWRM approaches were found useful to poor and small farmers.
- MUWS schemes were found effective in water scarce area especially for poor and small farmers.
- Verification of diverse technologies in various socio-economic conditions is prerequisite for adoption.
- MUWS schemes have been found effective to reduce workload of women.
- Inclusion of hygiene and nutrition components in MUWS.
- Collaboration work with DOI is exemplary for project implementation and integration with other related agencies (DSWCO, DADOs and DLSOs) deemed necessary.
- Social preparation and technical capacity building of intended beneficiaries proved effective for sustainability of the program.
- Testing and verification of IWRM technologies require sufficient time.
- Strategic planning is important for further testing and scaling up of the technologies to a wider geographical area.

## **8. Suggestions**

The IWRM Project was for a very short period (9 months with extension for 3 months) and was completed on 15 December 2008. In this situation, few important activities were selected and tested at the field level. It is very hard to complete the activities cycle in an efficient and effective way within this limited time frame. Therefore, it was felt that the project should be for at least three years for testing and scaling up. Future strategic planning is needed to further testing and scale-up the technologies to a wider geographical area.

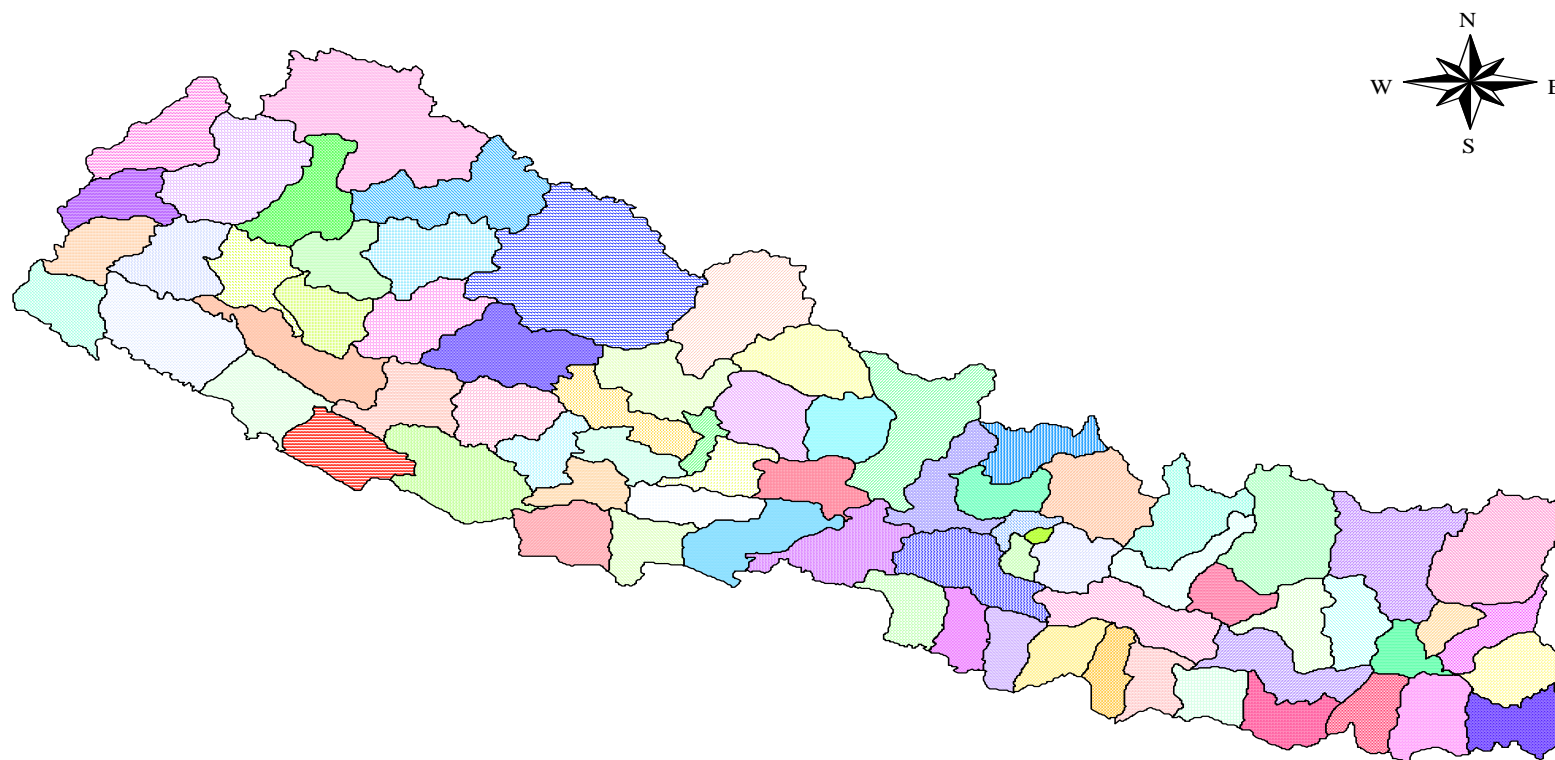
# **ANNEXES**

**Annex I: Map of Nepal showing the project districts**

**Annex II: District Wise Details of Activities Proposed and Completed  
During the Reporting**

**Annex III: Details of Training and Exposure Visits**

Annex 1a: Map of Nepal Showing Project Districts



**Annex-II: District Wise Details of Activities Proposed and completed during the reporting period.**

S N	Inputs / Expenditure Category	Unit	Target		Achievement		Total	
			Nurakot	Rasuwa	Nuwakot	Rasuwa	Target	Achievements
<b>1</b>	<b>Site selection and social mobilization</b>							
1	Site selection	NO	1	1	1	1	2	2
2	Formation of project coordination committee	NO	1	1	1	1	2	2
3	Recruitment and mobilization of Field Team	Time s	1	1	1	1	2	2
4	Baseline Survey	NO	1	1	1	1	2	2
5	Group Formation and Mobilization	NO	3	3	4	6	6	10
<b>2.</b>	<b>Water Management</b>							
A	Water Harvesting							
1	Multiuse Water System with overflow pond, Nuwakot	No	1	1	1	1	2	2
2	Roof Water Collection Tank construction, Nuwakot	No	1	0	1	0	1	1
3	Plastic Pond Construction (one overflow pond and one rainwater collection)	No	1	1	8	6	2	14
<b>3</b>	<b>Soil Conservation and Landslide Management</b>							
1	Landslide management: Bio Engineering demonstration	No	1	1	1	0	2	1
2	Watershed management for spring protection	No	1	1	1	0	2	1
3	Sloping Agriculture Land Technology: Hedgerow demonstration	No	1	1	2	1	2	3
<b>4</b>	<b>Income Generation Activities</b>							
1	Non Timber Forest Products							
1.1	Asparagus Species Demonstration for 1 Ropani (Nuwakot)	No	2	0	2	0	2	2
2	Production Demonstrations							
2.1	Rice Demonstration(Variety: Khumal 8) one	No	2	2	2	2	4	4
2.2	Maize demonstration	No	4	4	4	4	8	8
2.3	Bitter Guard Demonstration(White Long)	No	4	4	4	4	8	8
2.4	Cucumber(Bhaktapur Local)	No	5	5	5	5	10	10
2.5	Wheat Demonstration	No	3	3	0	0	6	0
2.6	Off-season vegetable demonstration	No	8	8	8	10	16	18
2.8	Artocarpus heterophyllus (Jack fruits) Demonstrations	No	2	0	0	0	2	0
1	Litchi Demonstrations	No	0	2	0	2	2	2
2.7	Lapsi fruit Demonstration	No	0	2	0	2	2	2
<b>5</b>	<b>Use of Appropriate Technology</b>							
1	Improved FYM/Compost Demonstration		5	2	5	5	7	10
1.1	Vermi compost Demonstration (Size of chamber: 3m*1.2m*1m)(1500 Earth Worms per Chamber)	No	2	2	2	3	4	5

S N	Inputs / Expenditure Category	Unit	Target		Achievement		Total	
			Nurak ot	Rasu wa	Nuwa kot	Rasu wa	Targ et	Achiev ements
2	Bio briquette ( Briquette making machine: 3 and stoves :3)	No	2	2	2	2	4	4
3	Drip Irrigation demonstration (Kauliflower, Tomato and Cucumber hybrid)	No	6	3	8	3	9	11
<b>6</b>	<b>Training, workshop</b>							
<b>A</b>	<b>Community level</b>						0	0
1	Project identification and Selection Meeting in the community ( 1 day per site)	NO	1	1	1	1	2	2
2	Project Orientation meeting to the community ( 1 day per group)	NO	1	1	1	1	2	2
3	Group formation/Reformation in the site ( 1 day per group)	NO	3	3	4	6	6	10
4	Group Meeting	NO	27	27	40	60	54	100
5	Training on Social Mobilization	NO	1	1	1	1	2	2
6	Group management training ( 3 days per group)	NO	2	2	2	2	4	4
7	Planning meeting with users' groups	NO	1	1	1	1	2	2
8	Monitoring meeting with users' groups	NO	3	3	2	2	6	4
9	Public audit meeting with user' committee	NO	1	1	1	1	2	2
10	Off-seasonal vegetable training	NO	1	1	2	2	2	4
11	Biobriquettee making training to the women members (with equipments for group)	NO	1	1	1	1	2	2
12	Training on NTFP and other specific area	NO	1	1	1	0	2	1
13	Training on Soil erosion and soil mangement	NO	1	1	1	1	2	2
13	Exposure visit	NO	1	1	1	1	2	2
<b>B</b>	<b>Staff level</b>						0	0
1	Project inception workshop	NO	1	1	1	1	2	2
2	Observation of ICIMOD Sites	NO	1	1	1	1	2	2
3	Observation tour to MWUS sites	NO	1	1	1	1	2	2
4	Capacity development by ICIMOD	NO	1	1	1	1	2	2
6	Biobriquettee making training by ICIMOD		1	1	1	1	2	2
C	Management Committee						0	0
1	Observation of ICIMOD Sites	NO	1	1	1	1	2	2
2	Observation of MWUS at farmers field		1	1	1	1	2	2
3	Project completion workshop at community level	NO	1	1	1	1	2	2
4	Project completion workshop at National level	NO					1	

**Annex-III: District Wise Detail Description of Training Activities**

SN	Name of Training and Exposure Visit	Participants		
		F	M	Total
1.	Exposure visit	23		23
2.	Hands on Training	2	3	5
3.	Corner stone Training	21	9	31
4.	NTFP Training	33		33
5.	Bio Briquette Training (Field)	25	1	26
6.	Bio Briquette Training (ICIMOD)	1	1	2
7.	Group Management Training (event I)	20		20
8.	Group Management Training (event I)	28		28
9.	Vegetable cultivation Training (Event I)	20		20
10.	Vegetable cultivation Training (Event II)	21	4	25
11.	Soil Conservation & landslide management Training	23	35	58
12.	Exposure visit	17	5	22
13.	Hands on Training	4	1	5
14.	Corner stone Training	24	-	24
15.	Bio Briquette Training (Field)	30	-	30
16.	Group Management Training	34	-	34
17.	Vegetable cultivation Training	39	3	42
18.	Soil Conservation & landslide management Training	25	10	35