

Linking Upstream and Downstream Landscape Communities for Integrated Land Resource Management



In Banganga River Basin of Arghakhanchi District, Nepal



Empowered lives.
Resilient nations.



SGP The GEF
Small Grants
Programme



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Photo Credit

Save the Banganga



Cover Page

1. Hedgerow/SALT
2. Bio-engineering
3. Hedgerow/SALT
4. Flood gauze orientation
5. Broom grass plantation

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Foreword

United Nations Development Programme



Empowered lives.
Resilient nations.

Foreword

The Global Environment Facility (GEF)-Small Grants Programme (SGP) of the United Nations Development Programme (UNDP) in Nepal has been supporting implementation of small community-led innovative projects that address both global environmental issues and local livelihood needs of the community. Among many, land degradation and climate change issues are most crucial for sustenance of local livelihood. It is therefore critical to communicate, inform and educate people about these issues and possible solutions.

Save the Banganga, an Arghakhanchi-based NGO, successfully implemented a project "sustainable land resource management initiatives in upstream and downstream communities" in Banganga watershed with financial support from GEF SGP of UNDP. Although, the project was implemented in a small area of Simalpani VDC (now Sitganga Nagarpalika Ward 13 & 14) of Arghakhanchi district, it represents the context of the entire Churia hills of Nepal which is extremely facing problems of land degradation and negative consequences of climate change.

A big learning from the project has remained as issues of land degradation and climate change are integrated in nature and should be addressed in totality where both upstream and downstream communities mutually agree on course of actions to be taken at the landscape. This book tries to capture those concerns and interventions undertaken by the project to address them, and makes recommendations for future.

Congratulations to the team of 'Save the Banganga' those who have worked tirelessly to achieve this level of progress. I would like to thank both: Mr. VivekDhar Sharma, National Programme Assistant of SGP and Dr.Dhruba Gautam, Advisor of Save the Banganga for their great efforts to this end.

I believe that this report is timely and the practices and approaches adopted by the project, which are highlighted in this publication, can be easily replicated elsewhere in Nepal's Churia region under similar context.

A handwritten signature in black ink, appearing to be 'Vijaya Prasad Singh', is written over a horizontal line.

Vijaya Prasad Singh
Assistant Country Director

PREFACE



Global Environment Facility Small Grants Programme

साना अनुदान कार्यक्रम

The project “Sustainable Land Resource Management Initiatives in the Upstream and Downstream Communities” was implemented in Simalpani VDC of Arghakhanchi District during 2014-2016 with the funding support from the Global Environment Facility Small Grants Programme (GEF SGP) of the United Nations Development Programme (UNDP). Implemented in two wards of Simalpani VDC, the demonstration project successfully mobilised local communities to address environmental as well as livelihood concerns of both upstream and downstream communities of the Banganga river basin.

Landslide, water scarcity and predominant slash and burn agriculture are major environmental challenges in the upstream whereas river cutting, flooding and siltation are main concerns of downstream communities in Simalpani. Further downstream to Kapilvastu, the silt deposits also affected the Jagadishpur reservoir, a human made Ramsar site posing threats to the wetland and thousands of migratory birds and other biodiversity.

This book carefully documented the issues of both upstream and downstream communities, its geology and different project interventions to amicably address these issues. This book also tries to quantify the results, describe how they were achieved and emphasize future intervention to work at the landscape level. As such, this book will be helpful to local government, academia and different development practitioners, who would be working at both the landscape level and local level.

On behalf of the UNDP/GEF-SGP, I would like to thank Save the Banganga, an Arghakhanchi based NGO for successfully completing the project and producing the project synopsis in this book form. I would also like to appreciate all the contributors to this report, in particular Mr. Vivekv Dhar Sharma and Dr. Dhruba Gautam, for all their penetrating insights, thoughtful critiques, and sustained support.

The good practice and learnings achieved through this small initiative would be instrumental for scaling up the project endeavors in other communities to claim sustainable land resource management by linking upstream and downstream communities.

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We would like to acknowledge the support of the UNDP/GEF Small Grants Program which helped us to carry out and publish this report on the project Linking Upstream and Downstream Landscape Communities for Integrated Land Resource Management in Banganga River Basin of Arghakhanchi District of Nepal (NEP/SGP/OP5/Y3/STAR/LD/14/04), a project which ran for 18 months between July 2014 and December 2015 in Simalpani VDC of Arghakhanchi District. The project was designed to introduce agroforestry initiatives on degraded land and in soil erosion-prone areas, to initiate small-scale construction initiatives designed to safeguard productive land, to enhance the livelihoods of marginalized communities by promoting eco-friendly initiatives, and to increase the awareness of local people about land. This report focuses on (i) the conservation of land resources, (ii) livelihood promotion, (iii) institutionalization and capacity building and (iv) policy advocacy and change.

While collecting primary information, we interacted with local-, district- and national-level stakeholders, including the members of three collaborative forest users' groups (Bhasme, Banchare and Pawora), sloping agriculture land technology and agro-forestry groups, cooperatives, women's groups, and community-based organisations as well as with school teachers, youth groups and students. We are thankful to all of these individuals for providing us with a wealth of information and data. We would also like to extend our sincere gratitude to the sundry other individuals who helped make this study a success by contributing their time, feedback, and suggestions. We are very thankful to everyone who supported us and helped us complete our report effectively and on time.

We wish to express our sincere appreciation for and thanks to all project staff, including the project coordinator, social mobilizers, and project accountant for their valuable time, relevant information and inputs. We are also indebted for the support (cash, kind, labor and materials) provided by Simalpani VDC, Heifer International, and The Leprosy Mission Nepal. Together, they created programmatic synergy. The support of two Bhasme and Pawora CFUGs was particularly instrumental in providing the labor needed for SALT, dewatering infrastructures, riverbank protection through bioengineering, women's empowerment, livestock vaccination, the installation of an early warning system for floods, school-based meteorological stations, organic vegetable farming, plantation and so forth.

We express our deepest gratitude to all project stakeholders, including local beneficiaries, for providing us with the opportunity to learn from their experience and motivation. We hope that the report will be beneficial to relevant stakeholders, academicians and policymakers.

Finally, we would like to thank Mr. Vivek Dhar Sharma and Dr. Dhruba Gautam for all their hard work in finalising this report in this form.

Thank you all.



Raju Poudel
Chairperson
Save the Banganga
2018

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Acronyms and Abbreviations

ASC	Agricultural service centre
CBO	Community-based organization
CFUG	Community forest users' group
DADO	District agriculture development office
DDC	District development committee
DFO	District forest office
DHM	Department of hydrology and meteorology
DMC	Disaster management committee
DPHO	District public health organization
DRR	Disaster risk reduction
DSCO	District soil conservation office
EWS	Early warning system
FGD	Focus group discussion
FOP	Forest operation plan
IEC	Information, education and communication
INGO	International non-governmental organization
MAP	Medicinal and aromatic plant
MBT	Main boundary thrust
MCT	Main central thrust
MFT	Main frontal thrust
NGO	Non-governmental organization
NTFP	Non-timber forest products
SALT	Sloping agriculture land technology
STDS	South tibetan cetachment system
UNDP	United nations development programme
VDC	Village development committee
WASH	Water, sanitation and hygiene

Linking Upstream and Downstream Landscape Communities for Integrated Land Resource Management

In Banganga River Basin of Arghakhanchi District, Nepal



1. The context

Managing watersheds in Nepal is a daunting task. Because terrain is hilly, local issues in the upstream and the downstream regions differ. In downstream regions, river-cutting, silt deposition, and flooding are such serious issues they even cause natural calamities, whereas in upstream regions, landslides and soil erosion pose the same threat of disaster. That threat is compounded by haphazard road construction on sloping terrain and the illicit extraction of silt, sand, and boulders from riverbeds. Water scarcity, trouble mechanizing agricultural work, and the lack of markets are other major local concerns for highlanders.

2. The project

In order to demonstrate that upstream and downstream issues can be addressed to the mutual satisfaction of people living in both regions, Save the Banganga, an Arghakhanchi-based NGO, implemented a project involving sustainable land resource management initiatives in upstream and downstream communities with financial support from the Global Environment Facility/Small Grants Programme of the United Nations Development Programme. The purpose of the project was to minimize the rate of land degradation through sustainable land resource management. Its specific

objectives were (i) to introduce agroforestry initiatives on degraded land and in soil erosion-prone areas; (ii) to initiate small-scale construction initiatives designed to safeguard productive land; (iii) to enhance the livelihoods of marginalized communities by promoting eco-friendly initiatives; and (iv) to increase the awareness of local people about land rights through advocacy and knowledge documentation. The project selected two



wards in Simalpani VDC, Ward No. 9, Rikot, in the upstream region and Ward No. 5, Pawora, in the downstream region of Banganga River Basin (now Sitganga Municipality ward- 13 and 14).



Table 1: Characteristics of the upstream and downstream communities

Characteristic	Upstream	Downstream
Ward	Wards No. 9, Rikot (Part of Sitganga-13)	Ward No. 5, Pawora (Part of Sitganga-14)
Population	12,312	9,453
Ethnic groups	Magar and Dalits	Magar and Dalits
Major problems	Landslides, flash floods, gullies, heavy soil erosion	Riverbank cutting, siltation, sedimentation, deposition on agricultural land
Practices contributing to land erosion	Farming on steep slopes, slash- and-burn practices, deforestation	Cultivation along the riverbank; extraction of silt, sand, and boulders from the riverbed

As seen in Table 1, the area is dominated by the Magar, an ethnic group which is both ultra-poor and marginalized. A wellbeing ranking of Sitganga-13 and 14 reveals that 57% and 19% of the population is poor and ultra-poor respectively and that the food sufficiency of these groups ranges from three to six months. For the rest of the year, they engage in off-farm activities to earn a livelihood.

Slash-and-burn practices are common in Rikot, where people rely on this technique to make temporary cow sheds every year and to farm the land after burning the vegetation. This practice is the main

reason for the high rate of soil erosion in the region. It degrades about 16 ha of land each year (DSCO Arghakhanchi, 2011).

Unscientific behavior in upstream regions can have an adverse effect on downstream regions. Landslides, heavy flooding, riverbank cutting, and the siltation of river and stream beds have made farmers' lives more difficult. The heavy deposition of debris and sediment on the Banganga river bank has caused the riverbed to rise so that it is level with the adjoining agricultural land and settlement areas. Small torrents have been widened too, so that even minor floods flow over onto agricultural land. The bed of the Banganga River is rising at the rate of 0.20 m per year (DSCO Arghakhanchi, 2011). Its rise also affected the Jagadishpur wetlands in Kapilvastu, a Ramsar site.

Sitganga-13 and 14 has very little forested area despite the fact that more than 88% of people depend solely upon traditional fuel to fulfill their household energy requirements. Clearly, pressure on forests is very high.

The frequency and intensity of disasters in the project area have been increasing in recent years, and the impact of these disasters has negatively affecting the lives and livelihoods of the people who live there. Droughts are likely to increase still further as temperatures continue



to rise and precipitation becomes more irregular. The resultant withering of crops will decrease grain production and results in greater food shortages. The incidence of wildfires is also expected to increase as water resources are depleted and wetlands dry up.

Heavy soil erosion is as result of (i) poor farming practices in upstream regions, (ii) the high rate of deforestation, (iii) reliance on wood for cooking, (iv) poor access to and control over financial resources, (v) poor livelihood practices, and (vi) the erosion of indigenous knowledge.

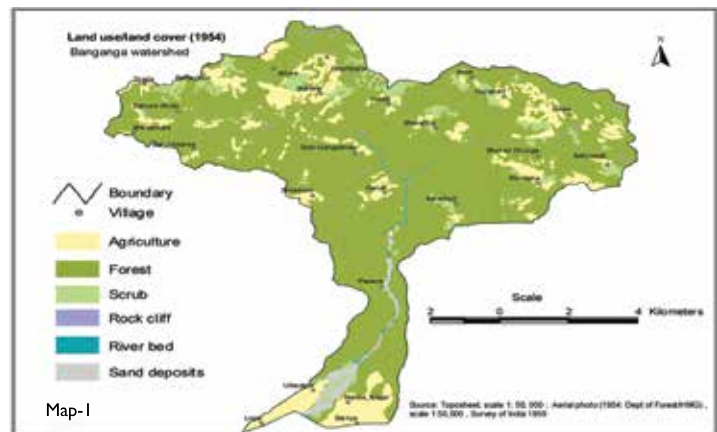
3. Land use in the Banganga River Basin

In 1954, forested and agricultural areas comprised 168.22sqkm (81.13%) and 26.23 sqkm (12.67%) of the total area of Banganga river watershed respectively (Map-1).

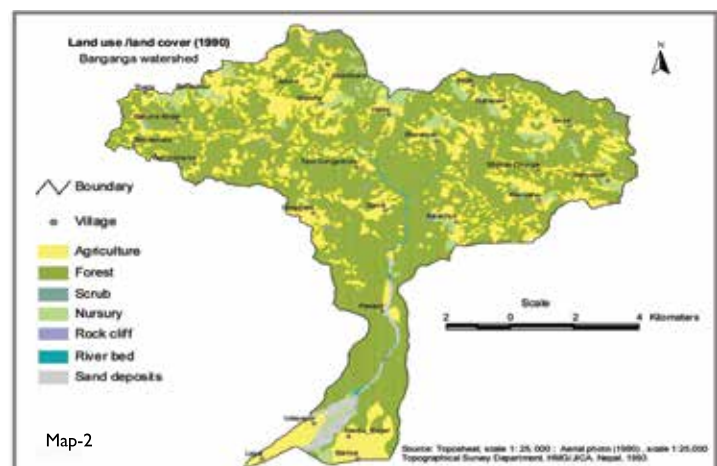
By 1990, these values had fallen to 146.08 sq km and 48.77sq km respectively, indicating that 22.46sq km of forested land was lost to agriculture (Ghimire, 2002), Map-2. By 1998, the area of forested land had further declined to 126.63 sq km and the area of agricultural land had further increased to 65.32 sq km. Maps 2&3 show the decline in forested land in Banganga watershed and the project site (Powara & Rikot).

4. Geology and landslides

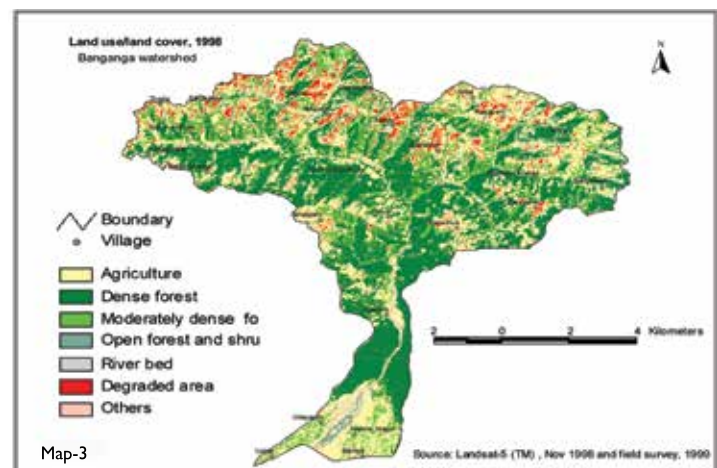
Most of Banganga River Basin lies on Siwalik rock but the northern part is formed on Lesser Himalayan rock dating to the Cambrian to Pre-Cambrian era (DMG 2007). The sedimentary sequences of the Siwalik Group consist of (i) the Lower Siwaliks (fine-grained sandstones with inter-beds of mudstone, shale, siltstone, and occasional marl, with mudstone dominating), (ii) the middle Siwaliks (medium- to coarse-grained sandstone, pebbly sandstone with inter-



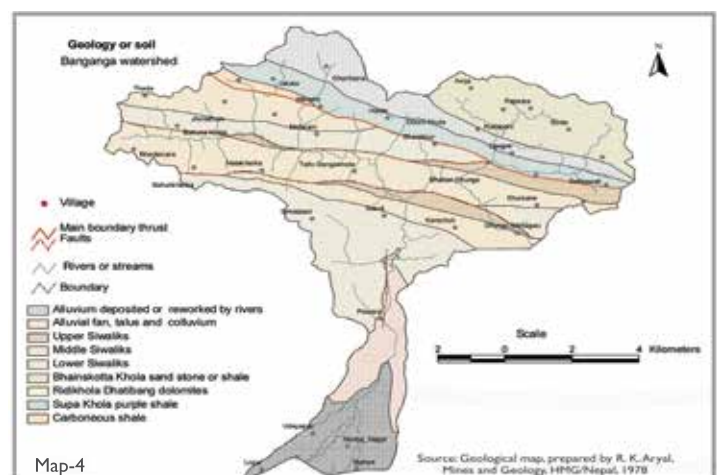
Map-1



Map-2



Map-3



Map-4

bed with siltstone and mudstone and some coal-like materials and plant fossils, with sandstone dominating) and (iii) the Upper Siwaliks (boulder, cobble, and conglomerate, with mud and silts and sand lenses dominating (DMG 2007). The northern border of the Siwalik Group is the MBT, which consists of medium-grade meta-sediments. This thrust traverses the northern boundary of Banganga River Basin. Along this zone, the Lesser Himalaya thrusts onto the Siwalik (Molnar 1990).

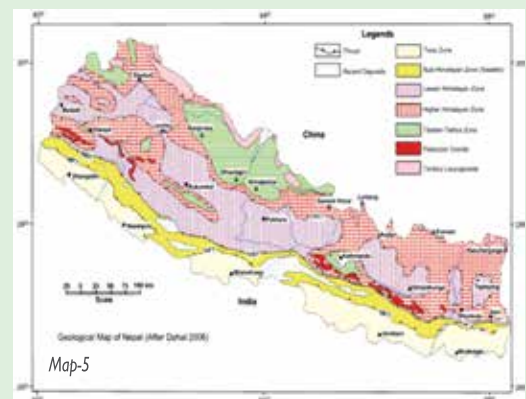
The fact that the tectonics underlying this zone is active is evidenced by geomorphic features such as wide valleys, uplifts and offsets of unpaired terraces, sharp scarps, and the warping and fitting of rocks (Valdiya 1992). In addition to the west-east MBT, there are two major northwest-southeast imbricate faults: the Ganga Khola-Bhartpur Fault and the Netakharka Bhakari Dhunga Fault. A third north-south fault follows the main channel below the confluence of the Banganga and Dhungre rivers (Map-4).

Box-I: Nepal Geology

Nepal occupies the central sector of the Himalayan arc. Nearly one third of the 2400 km long Himalayan range lies within Nepal. As is true in other areas of the Himalaya, from south to north, Nepal can be subdivided into five major tectonic zones: (i) the Gangetic Plain (Terai zone), (ii) the Sub-Himalayan (Siwalik) zone, (iii) the Lesser Himalayan zone, (iv) the Higher Himalayan zone, and (v) the Tibetan-Tethys Himalayan zone.

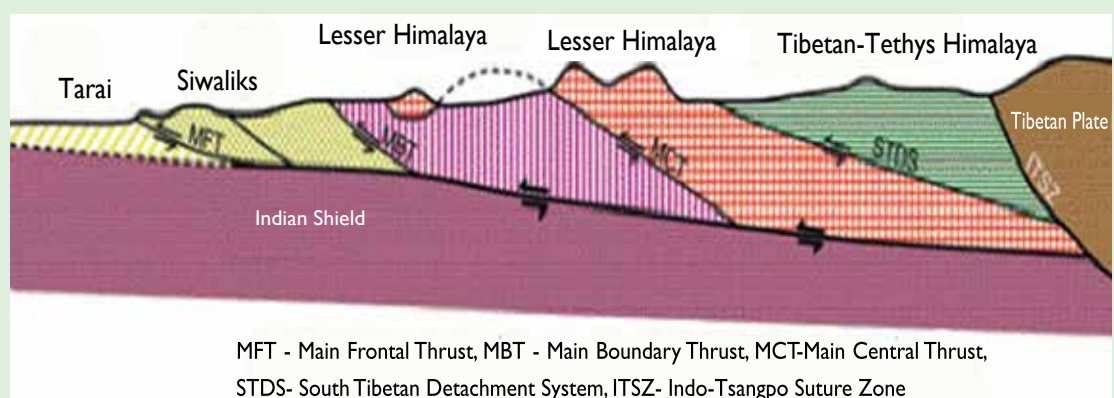
Each of these zones has a distinct lithology, tectonics, structure, and geological history. A geological picture is given in Map-5.

These five tectonic zones are separated from each other by several thrust faults. From the southern most fault to the northern most, the Main Frontal Thrust (MFT), separates the Sub-Himalayan (Siwalik) zone from the Gangetic Plains;



Map-5. Geological map of Nepal (modified from Dahal, 2006)

the Main Boundary Thrust (MBT) separates the Lesser Himalayan zone from the Siwalik; the Main Central Thrust (MCT) separates the Higher Himalayan Zone from the Lesser Himalayan Zone; and the South Tibetan Detachment System (STDS) marks the boundary between the Higher Himalayan Zone and the overlying fossiliferous sequence of the Tibetan-Tethys Himalayan Zone. The Indo-Tsangpo Suture zone is the contact knot between the Indian plate and the Tibetan (Eurasian) plate (Map-6).



Map-6 : Generalized cross-section of the Himalaya (modified after Dahal 2006)

5. Project's working approach

In order to achieve good results, the project adopted the following approaches:

5.1 Inception workshops:

To launch the project, inception workshops were organized in the district headquarters and in Simalpani VDC, Arghakhanchi. Project stakeholders, including government agencies, representatives from INGOs working in the area, and local people participated actively. The workshop was effective for developing linkages and engaging local people in participatory project planning.

5.2 Conservation awareness:

In order to sensitize local communities to conservation initiatives, the project showed documentaries, held conservation



Students' rally

rallies, campaigned against forest fires, and organized rallies and extracurricular activities for eco-clubs. These efforts supported the initiation of conservation activities at the local level.

5.3 Institution-building:

Once local communities had been sensitized, the project began re-establishing local community-based groups as well



Women at integrated agro-forestry training

as starting eco-clubs, fire control task forces, and sloping agriculture land technology (SALT) and agroforestry groups. All these groups were linked with three community forest users' groups (CFUGs) and local cooperatives where appropriate. These groups were socially inclusive and gender-sensitive so that they would be able to address the issues and concerns of the poor and marginalized.

5.4 Conservation initiatives linking upstream and downstream regions:

Various conservation activities were carried out. In upstream areas, the project managed plantation using SALT, promoted agro-forestry, controlled slash-and-burn practices, and constructed drainage outlets, whereas in downstream regions, it planted bamboo along riverbanks, introduced bio-engineering technologies to minimize riverbank cutting, and rehabilitated irrigation schemes.

5.5 Livelihood initiatives:

In order to retain farmers' interest in the project, livelihood initiatives including organic vegetable farming and irrigation were carried out simultaneously with conservation activities.



Organic vegetable farming

5.6 Partnership:

The project built meaningful partnerships with local governments, line agencies, and CFUGs and local cooperatives to ensure that its land resource management initiatives would be sustainable. Linkage and networking among stakeholders and local institutions also helped it to leverage resources through co-funding.

6. Project result and discussion



6.1 A total of 344 ha of forest and private land (169 ha in upstream and 175 ha in downstream) has been conserved by promoting agro-ecology benefitting 890 families (540 upstream and 430 downstream). Refer annex-I

Agro-ecological interventions in upstream area included (a) promoting agro-forestry, (b) managing water, (c) promoting climate resilient cash crops, (d) managing livestock, (e) initiating apiculture, and (f) establishing seed bank. In the downstream, the project focused on (g) maintaining irrigation system, (h) planting fodder trees and bamboo, and (i) conserving riverbank.

6.2 Community managed early warning system in place
(a) Safeguarding lives and property through early warning
(b) Establishing meteorological station

6.3 Income generation activities through conservation farming practice initiated
A total of 356 farmers had earned more than 15 million a year through conservation farming practices such as agroforestry, climate smart agriculture, animal husbandary and apiculture. Refer table 3.

6.4 Social capital enhanced
(a) 9 women groups having 241 members were remobilized having collected more than NPR 1,800,000.00 (b) 9 different functional organizations with 155 members in place for agroforestry promotion, irrigation management, fire control, bio engineering and marketing (Refer table 2) and (c) two saving and credit cooperative strengthened.

These results contribute to a number of SDG goal including goal 15, 13, 5 and 2.

6.1 Sustainable conservation of land resources

a. Promoting Agroforestry for agroecology

In coordination with Bhasme CFUG and Heifer International, the project conserved 129ha of land belonging to 102 families in the villages of Rikot and Banhunkharka through four agroforestry groups, two in each village. In the agroforestry, locals planted their preferred forage species such as, Dabdabe (*Garuga pinata*). Bakaina (*Melia*

azedarach), Khanyu (*Ficus semicordata*), Gayo (*Innula cappa*), Gindari (*Premna Integrifolia*), Foshro (*Grewia subinaequalis*), Kutmero (*Litsea monopetala*), Saajan (*Moringa oleifera*), Kusum (*Schleichera oleosa*), Kaalikath (*Milius avelutina*), Payyun (*Prunus cerasoides*), Phaledo (*Erythrina spp*), Koiraalo (*Bauhinia variegata*), Kabro (*Ficus lacor*), Bhutuk (*Ficus auriculata*), and grasses like, Khar (*Andropogon pumilus*), stylo, Babiyo (*Eulaliopsis binata*) and Amriso (*Thysanolaena maxima*). Likewise, SALT was introduced on a demonstration plot of 15 ha of land in Rikot (108 families) and promoted as an alternative to slash-and-burn or shifting cultivation. Together, the project's agroforestry initiatives directly contributed to sustainable agroecology and reduced the chances of crop failure by balancing crop diversity with the local ecosystem. The sequential or simultaneous production of different types of fruit, fodder, and grass increased household income and enabled farmers to purchase household goods, seeds, and agricultural tools as well as to meet the costs of education and health care.



Community plantation



SALT/hedgerow with banana and citrus

Box 2. SALT: A boon on sloping land

SALT is suitable for using on sloping land as this technique significantly curbs soil loss. Annual soil loss from sloping land farmed with SALT is only 3 mt/ha/yr, while that for sloping land farmed traditionally is 194 mt/ha/yr (Palmer 1991). SALT was introduced on a demonstration plot of 12 ha of land in Rikot and promoted as an alternative to slash-and-burn or shifting cultivation. Hedgerows of nitrogen-fixing species like bean, soil binding grasses like Khar, Amriso (*Thysanolaena maxima*) and



SALT/hedgerow with banana and citrus

stylo and forage tree like Bakaina (*Melia azedarach*) and Dabdabe (*Garuga pinata*) and, fruits like banana were planted using the alley-cropping system. Farmers

"I repaired thatch roof of my house with the money I earned from my agroforestry plots. I also bought five goats this year. I hope to have 12 more goats next year as I have plenty of grass to feed them from my efforts in agroforestry. I am happy that I was able to improve my economic condition in just one year."



Ms. Menuka Bhattarai, a woman group member

estimated that their soil losses in 2016 had decreased by 65-70% from the pre-SALT levels of 2013.

Once they were convinced that SALT technology works, 78 families began replicating SALT on their farm land as well as in private forests in the upstream regions. This step earned participating families an average of NPR 58,000 from the sale of the crop and MAPs they grew. Likewise, promoting SALT was not easy. After establishing the demonstration plot, two SALT promotional groups comprising 13 men and 11 women respectively were formed. A series of advocacy activities and campaigns on existing policy provisions, local-level issues, and policy gaps were initiated. Forest operation plans (FOPs) were also amended to address shifting cultivation and, for the first time, Arghakhanchi DDC included a program against slash-and-burn practices in its periodic plan. Likewise, Arghakhanchi DFO and the Ilaka forest office in Bikramsota also started to run awareness programs highlighting the flaws of slash-and-burn practices. As a result, slash-and-burn practices have declined by 80% since 2010 (Baseline Survey 2012).

b. Managing too much and too little water

Locals find it very hard to manage too much rain during the monsoon season and also too little water during periods of drought. To address this problem, the project supported the construction of four drainage outlets in strategic upstream areas so that rainwater could be safely disposed. Species of grass, forage, and fodder that have soil-holding capacities were planted in the lower parts of each drainage outlet to control potential gully formation. Bhasme and Banchare CFUGs led the construction efforts. The interventions not only helped 92 families to reclaim 40 ha of land but also helped to resolve decades-long disputes between upstream and downstream villages which stemmed from the erosion of downstream farmland due to upstream water run off. The initiatives are being replicated in the upperstream and downstream regions of Dohote village to resolve similar types of disputes.



Plastic pond

In order to manage water scarcity during winter, the project also supported the construction of two conservation ponds and three plastic ponds. Together, these water bodies irrigate 8 ha of land owned by 34 households.

c. Promoting climate-resilient cash crops on sloping land for economic prosperity

In villages like Rikot, Bahunkharka and Pawora, appropriate climate-resilient cash and horticultural crops were planted in place of traditional cereal crops such as maize, wheat, and barley. Twelve hectares on northern slopes were planted with citrus species, pineapples, and bananas as well as climate-resilient species of turmeric, sweet potato, taro and ginger. The 138 households engaged in this initiative earning an average of NPR 50,000 per year.



Banana cultivation



Broom-grass cultivation



Pineapple cultivation



Ginger cultivation



Turmeric cultivation

Box 3. Developing a Turmeric Pocket area

Simalpani VDC was developed as a turmeric pocket area after 17 farmers from the villages of Rikot and Bahunkharka started cultivating turmeric on more than 5 ha of land. Turmeric is an ideal climate-resilient crop for the region. Farmers like it as its yields are high and little labor is needed in its cultivation. In addition, because it is resistant to pests and diseases, it requires little tillage. The yield of turmeric per ha ranged from 42,000 kg to 50,000 kg. This yield is thrice that of cereal crops.

A turmeric promotional network was established and institutionalized and all small groups were federated within it. This network, with technical assistance from Arghakhanchi DADO and Thada Agriculture Service Center, Thada, provided farmers with knowledge and skills and good-quality seeds. It educated them about the do's and don'ts of turmeric cultivation, offered technical advice in response to the emergence of diseases and pests, and regularized sustainable marketing. The network established links with marketing suppliers in various locations, including Gorusinghe, Chandruta, Krishnanagar, and Butwal.

For the first time in my life, I earned NPR. 32,000 by selling turmeric. I am 59 years old and had never earned this much money before. Since I know I can benefit, I plan to scale up my cultivation of turmeric by renting land under the "adhiya" (contractual share cropping) system.



Mr. Ram Kumar Panthi, Chair, Bhasme CFUG, Rikot



"We used to be really frustrated by farming because it was often hard to recover the amount we invested. Crops would fail almost every year. Then we started climate-resilient crops. With this change, we are confident that we can achieve the levels of farm productivity we used to see two decades ago."

Ms. Dem Kala Bhusal, a woman group member



d. Managing livestock

Livestock management is an essential component of organic compost and pesticide production. The project encouraged fodder and grass plantation in four community forests and held several rounds of meetings with CFUGs to enforce a ban on freegrazing and instead initiate rotational grazing in the community forests. The project also ensured that animal feed would be abundant by supporting the plantation of fodder species in agroforestry blocks. In order to improve the health and sanitation of livestock, the project supported the construction of two improved livestock sheds to serve as demonstration. The improved shed had provisions for collecting urine and dung separately. Once they saw the improved conditions, 12 households constructed their own improved sheds. With their improved sheds, the 12 farmers not only earned an average of NPR 80,000 per year from the sale of milk and meat but also met their need for good-quality manure and pesticides, both required inputs for organic farming and agro-ecology. Cultivation of broom grass and napier held for improved animal husbandry.



"We are happy that the fodder and grass species selected were those that we wanted. All the selected varieties are very beneficial for us. In our opinion, "badahar" is the best fodder for increasing the production of milk by buffaloes and "bakaino" is best for goats. Our agroforestry plots help us meet our demand for these products. These species have improved the quality of our animal husbandry."

Mr. Amar Bdr Resmi, a forest user



e. Initiating apiculture

Given the abundance of bee flora in the upstream region of Simalpani, 20 household in the villages of Rikot and Bahunkharka began to raise bees. The project helped them improve traditional beekeeping practices and rear varieties of bees through improving traditional hives. Farmers claimed that integrating apiculture into their farming practices increased farm yields and maintained the quality of forests by promoting cross-pollination. Besides securing the ecological benefits of apiculture, the 20 families earned an average of NPR 20,000 per year from improved apiculture.



f. Establishing seed banks

The project supported the establishment of two seed banks in the upstream region of Simalpani. So far, more than 52 varieties of cereal, gram, pulse, vegetable, and oil seeds have been collected and stored in them. These banks strengthened local farmers' access to good-quality seed, thus replacing hybrid varieties, enhancing food security, and promoting the conservation of agro-ecology. A total of 182 families benefitted from this initiative. In addition, 38 farmers started to store seeds in their households once they learned the threats associated with hybrid seed varieties.

"We've been living here for generations and never realized that the command area of our irrigation system could be increased. The overhaul of the irrigation system has brought about a number of positive changes. First, the number of water management-related disputes related to water theft has declined drastically. Second, the price of land has increased because it is now irrigated. Third, the time we need to clean our canals each year has decreased from 29 to 7 days in Pawora and from 22 days to 9 days in Bhagola."

-Woman farmers during FGDs

g. Maintaining irrigation systems improved yields and social harmony

The project supported to the maintenance of two irrigation systems in the downstream region, one each in the villages Pawora and Bhogala. The effort enhanced the irrigation of 115 ha owned by 190 households. The 70% increase in irrigation efficiency increased cropping intensity and diversification. Farmers who



Irrigation canal maintenance

used to cultivate two crops and leave their fields fallow from March to July started to cultivate three crops a year. With irrigation water, the productivity of cereal crops increased significantly. Wheat yields rose from 14 to 20 quintal/ha; maize, from 20 to 40 quintals/ha; and paddy, from 40 to 70 quintals/ha. Farmers also switched from cereal crops to short-duration cash crops like vegetables, pulses, grams and spices. Sixty families in Pawora and 79 families in Bhogala earned between NPR 36,000 and NPR 41,000 each in a season by selling the garlic and onion they had cultivated with the support of irrigation water (FGD, 2016).



Installation of pipe aqueduct

Two socially inclusive water users' associations, one each in Pawora and Bhogala, were formed to regularize the distribution of irrigation water to the tail-ends of the command areas of the two irrigation systems. The new rules call for the collection of irrigation service fees on the basis of the size of each member's landholdings. The money generated from the water tax is used to operate and maintain canals. A chaukidar (watch-man) was appointed, and users themselves also helped enforce water management practices on a rotational basis. Both the water users' associations are now registered with Arghakhanchi District Irrigation Office. The incidence of water-related conflicts and the number of cases of water theft declined by 80% due to the strict enforcement of rules and regulations (FGD, 2016). Prior to the project's intervention, these associations existed only on paper and irrigation systems were run by a few elites without any rules and regulations.



"Until two years ago we had never imagined that we ourselves could grow vegetables on this scale, but we have come far despite receiving only minimal support from men. Now, we grow cauliflower, cabbage, bell peppers, pumpkins, tomatoes, potatoes, radishes, carrots, asparagus, bitter gourds, chayotes, and other vegetables on our farm. This is because of ensured irrigation facilities. We are happy that society sees us as lead farmers. It was the irrigation facilities that improved our status."

Ms. Pabitra Panthi, a woman group member

"We are glad that we have a 'chaukidar' for water management. Not having to go to the field at night to check if irrigation water is flowing is a huge relief for us. Night time is a risky time for women, especially with wild animals roaming around." -Woman farmers during FGDs

"Since our irrigation facility has become reliable, my husband has stopped going to Punjab. Instead, we cultivate vegetables together. We earned NPR 46,500 from the sale of garlic and NRS 68,250 from the sale of onions from 0.25 ha of land. This is an average production of this area after having irrigation facilities" -Woman farmers during FGDs



Seedling ready for plantation

h. Plantating fodder trees and bamboo

Three CFUGs with seedling support from the District Soil Conservation and Forest offices led the plantation of more than 7,000 seedlings of bamboo, Dabdabe (*Garuga pinata*), Bakaina (*Melia azedarach*), Khanyu (*Ficus semicordata*), Gayo (*Innula cappa*), Gindari (*Premna Integrifolia*), Foshro (*Grewia subinaequalis*), Kutmero (*Litsea monopetala*), Saajan (*Moringa oleifera*), Kusum (*Schleichera oleosa*), Kaalikath (*Milius avelutina*), Payyun (*Prunus cerasoides*), Phaledo (*Erythrina spp*), Koiraalo (*Bauhinia variegata*), Kabro (*Ficus lacor*), Bhutuk (*Ficus auriculata*), and grasses like, Khar (*Andropogon pumilus*), stylo, Babiyo (*Eulaliopsis binata*) and Amriso (*Thysanolaena maxima*). Plantation reduced the incidence of landslides and riverbank-cutting, conserving a total of 40 ha of community and public land. Farmers averred that riverbank-cutting had decreased by 80% and that 80 families had directly benefited (FGD, 2015).

i. Conserving river bank

The Banganga River has destroyed many lives, houses, and cattle and swept away many hectares of land and crops. Locals claimed that, over the last 60 years, it had eroded a quarter of the land in Pawora. They had earlier tried everything, from the construction of raised embankments to the plantation of besarmi plants along riverbanks, but all in vain.

To overcome the menace of the Banganga River, the project supported the introduction of bio-engineering technology along 800m of riverbank and conserved 33 ha of riverine land. Two CFUGs, one each from the villages of Bhasme and Pawora, took the lead role in bioengineering work. Arghakhanchi DFO and DSCO provided both technical and seedling support. The CFUGs were also successful in obtaining funding support worth NPR 40,000 and NPR 284,000 from Arghakhanchi DDC and the Member of Parliament Development Fund respectively for constructing vegetative and bio-engineering structures.

More than 260 families have increased their incomes by growing vegetables on land reclaimed by introducing bio-engineering along riverbanks. Inspired by the many benefits of bio-engineering work, people from Sagrahawa have also initiated bio-engineering work.



Orientation to local about flood gauge

6.2. Community managed early warning system

a. Safeguarding lives and property through early warning

The lower basin of the Banganga River used to be severely impacted by flash floods every year, and the annual loss of both lives and physical assets was large. That scenario has changed somewhat.

Locals said that they felt more confident after they learned that warnings about floods can be broadcasted by local radio stations. Women in poor and vulnerable communities, traditionally the most marginalized of groups, are now able to identify risks and implement risk reduction plans. Training, awareness campaigns, FM radio broadcasts, and street dramas helped to raise awareness among locals and increase their understanding.

"Thanks to the project's initiatives, we are now familiar with flood based early warning systems (EWs)- the warn about floods. We know what to do and what not to do. We used the skills we acquired through training, orientation, street drama and drills in the last monsoon. We are prepared: when water levels rise, each institution assumes its allotted roles and responsibilities. In the past, when we had to watch the river at night, we often encountered wildlife and poisonous snakes. Now the things are very easy and we got information related to flood through FM Radio. The water gauge installed in the riverbank showed the level of flood."

-Woman farmers during FGDs, 2016



Riverbank protection through bioengineering in the Banganga River



Box-4: Forewarned is Forearmed “Community-Managed EWS” Boosted the Confidence of People Living along Riverbanks

‘This is our fate-watching floods wreak havoc, stealing lives, houses, cattle and crops, and often leaving us with nothing. Our family lost over a half of our farmland due to flooding and riverbank erosion,’ once was the common refrain of people living along the Banganga riverbank.



Orientation to students about flood gauge

The mindset of local is however slowly changing, with the project’s introduction of a community-managed early warning system (EWS).

This system helped boost the confidence of people living along the Banganga riverbank. Before it established the EWS, the project organized various formal and informal meetings and showed videos of EWS models used in other countries. Later, it formed two disaster management committees (DMCs), one in the upstream and one in the downstream regions, and installed a flood gauge at Pawora (upstream). The flood gauge was painted white (safe), yellow (caution) and red (danger) to show different levels of flood likelihood. The project organized separate training sessions for each DMC as well as a combined training for all DMC members.

A list of telephone number of DMC officials and the members of the district DMC was also distributed. A simple communication channel was developed and used to transmit flood-related information between the upstream and downstream communities. For mass communication, local Buddha Awaj FM was used. After many drills, the DMCs realized that the people and livestock and other important assets can be saved with the advance notice delivered by the EWS.

In 2014, we had participated in numerous drills on EWS, which made us confident that this life saving system will work during crisis. It actually worked during flood of 2015 and 2017. We are now able to sleep soundly at night as well.

-Mr Lok Nath Khanal, Chairperson, Simalpani DMC

Riverbank protection through bioengineering in the Banganga River



"Now that I have a toilet in my home, I do not feel ashamed when a guest comes to stay with us. We do not have to fear wildlife at night as the toilet is within our house. We can use the toilet at any time and no longer need to wait until dark to relieve ourselves. Wild boars, which like to eat human feces, will not enter the village because feces are managed inside pits. Compared to 2014, before the project came, there are now very few cases of diarrhea, dysentery, and worm infestation. I think this is a huge success and the best indicator of improved environmental sanitation"



Ms. Dil Maya Bhattarai a woman group member

"None of the 32 households in Rikot village that had toilet facilities before. We feared slipping on the wet terrain during the monsoon season and being mauled by wild animals at night while going out to relieve ourselves. Fortunately, our fears have been eliminated because toilets were built in each house with help from Rikot Eco-Club and the district WASH coordination committee under the project's initiation. This was an excellent achievement."

-Woman farmers during FGDs

b. Establishing meteorological station

Since students serve as "agents of change," link knowledge built at school with that acquired at home parents, and can enhance conservation activities, the project established two eco-clubs, one in Rikot Lower Secondary School (in the upstream region of Banganga River Basin) and one in Pawora Secondary School (in the downstream) following a series of consultations. In the two ecoclubs, the project engaged a total of 670 students, 360 girls and 310 boys. Each club is managed by an 11-member executive committee with a science teacher serving as mentor.

Once the two eco-clubs were sufficiently capacitated through drills, training, and orientation, the project helped establish simple meteorological stations in the two schools. Each school was provided with a rain gauge, a barometer, and a thermometer (worth NPR 25,000). Simple forms and tables were produced using a participatory approach and students and teachers were taught how to fill them



Students at extracurricular activities

in. Students at each school now record maximum and minimum temperatures, wind pressure, and rainfall data.

"Before this initiative, we had never seen a big thermometer which records both maximum and minimum temperatures, and we did not know rain gauges existed. We used to hear weather bulletins on the radio or television and often ignored what they said because we did not know the significance of the measurements cited. Now things have totally changed. Weather-related messages interest us greatly."-Students during FGD (January 2017)

School students and local youths also developed their capacity to deal with environmental stresses such as forest fires and water-induced disasters as well as bad practices such as cultivating steep slopes through rallies, periodic interactions, and meetings. Under the leadership of Bhasme CFUG and eco-clubs and in coordination with the village water and sanitation and hygiene (WASH) coordination committee, 32 households of Rikot built toilets and declared the village an open defecation-free zone.

Sanitation around Rikot and Pawora also increased because 131 households improved their dish-washing practices by diverting waste water into kitchen gardens. Data from Simalpani Health Post reveals that the incidence of communicable water-borne diseases decreased by 60% after latrines were constructed and dish-washing managed.



Students at conservation rally



Debate and discussion after rally

6.3 Conservation farming practices also give economic return

As already discussed in the subsequent topics (6.1 Sustainable conservation of land resources), conservation farming practices had also given economic return. In fact, linking these practice with income generation activities sustain the conservation effort and also enhance the well being of the locals.

As seen in the table, a total of 356 farmers were engaged in different income generation and farming activities earning more than NPR 1,50,00,000 in a year.



Women after training program

Table 2: Details of income from different livelihood schemes

S.N.	Particular	Members	Mean income (NPR)	Total income (NPR)
1	Turmeric farming	17	46,000	230,000
2	Animal husbandry	12	80,000	960,000
3	Apiculture	20	20,000	400,000
4	Agriculture	169	38,500	6,929,000
5	Climate smart agriculture	138	50,000	6,900,000
	Total	356		15,419,000

Source: Project records 2018

6.4 Social capital enhanced and women empowerment

To enhance social capital the project supported to the formation and mobilisation of different women groups, functional organisation and co-operatives.

a. Empowerment of woman's groups

The project formed/mobilized nine woman groups having 241 members. The groups were able to save nearly NPR 1.8 million through their regular saving (Table 3).

Table 3: Details of savings groups (the CBOs)

SN	Group name	Total number of members	Savings per month	Rate of interest	Total funds	Funds on loan
1	Swasthya Mahila Aama Samuha	30	100	18%	130,000	120,000
2	Machhapuchhre Mahila Samuha	42	100	24%	200,000	180,000
3	Multipurpose Agroforestry Woman's Group	29	150	24%	250,000	240,000
4	Sagarmatha Mahila Samuha	19	100	24%	300,000	290,000
5	Pragati Woman's Group	26	200	24%	124,000	122,000
6	Purano Goan Woman's Group	21	100	24%	500,000	500,000
7	Woman's Group	30	100-500	24%	250,000	250,000
8	Bhirkuti Woman Farmers' Group	24	100	24%	60,000	60,000
9	Woman's Agriculture Group (FAO- supported)	20	50	24%	45,000	40,000
	Total 9 groups	241			1,859,000	

Source: Project records 2018

Although the CBOs (Table 2) were formed before the project was initiated, they were not active. To reactivate them, the project provided a one-day orientation to each group on administrative management and record keeping. The project also provided NPR 40,000 as seed money to six groups-Swasthya Mahila Aama Samuha, Machhapuchhre Mahila Samuha,

Multipurpose Agroforestry Women's Group, Sagarmatha Mahila Samuha, Pragati Woman's Group, and Purano Goan Women Group to promote their role in community development and small-scale entrepreneurship as lenders of microcredit. In order to systematize microcredit, the project provided each group with basic office supplies such as

a tin trunk, ledgers, letter pads, stamps, and other stationery. Group management training for CBO members helped them to learn about the reasons for establishing CBOs, group management procedures, keeping minutes of meetings, networking and coordinating with other institutions, and simple book- and record-keeping systems.

Following careful capacity-building, coaching and institutional development, five women's groups registered with the district women's and children's office and started to access government services. Likewise, 13 women held key executive roles in committees of six community-based organizations (CBOs) and four women were being nominated in village development council. Thanks to their mobilization under the project, CBOs have become gender- and socially

inclusive and harmony among various caste groups and individuals has increased and the frequency of community-level conflicts over the use of natural resources has declined drastically.

b. Re/formation of functional organizations

The project also formed nine functional local committees and re-mobilized two local committees so they would be able to manage various development and conservation initiatives. All the groups are socially inclusive and gender-balanced. As a result, there is increased harmony among various caste groups and between men and women. About 53% of members are male and 47%, female. Brahmin and Chhetri members comprise 25% of the total, janajati 54%, Dalits 14%, and others 7% (Table 4).

Table 4: Details of functional organisations

SN	Name	Total members	Gender		Caste and ethnic composition			
			Male	Female	B-C	Janajati	Dalits	Others
1	Paworatar irrigation Committee	21	12	9	3	14	2	2
2	Bhogala irrigation users' committee	15	7	8	2	10	2	1
3	Bioengineering committee	17	10	7	5	8	3	1
4	Rikot agroforestry groups (2)	30	16	14	8	15	5	2
5	Bahunkharka agroforestry groups (2)	26	10	16	6	16	3	1
6	Bhasme fire control teams (2)	22	11	11	6	10	5	1
7	Rikot SALT group	13	7	6	4	5	2	2
8	Bahunkharka SALT group	11	6	5	3	6	1	1
9	Bahunkharka turmeric marketing committee	15	11	4	6	7	1	1
	Total	155	90	80	43	91	24	12
	Percent		53%	47%	25%	54%	14%	7%

Source: Project's record, 2016, Note: B-C=Brahmin and Chhetri

c. Strengthening of small-scale enterprises through cooperatives

Two savings-and-credit cooperatives, one in the upstream and one in the downstream region, have helped strengthen small-scale enterprises by providing loans at much lower interest rates (12-18% per year) than private moneylenders charge (36-60%). Each of the 134 families that received a loan



Women during monthly saving collection

earns a monthly income between NPR 12,000 and NPR 24,000. Institutional loan-taking increased from 14% (baseline) to 65% (end-line) and borrowing from private moneylenders decreased from 85% (baseline) to 18% (end-line).

The work efficiency of savings-and-credit cooperatives increased after the project conducted refresher training on cooperative management and orientation. Trained cooperative members now work as local resource persons to plan and monitor small-scale enterprises in the project villages.

Savings-and-credit, women's groups and functional groups were linked with the two cooperatives as part of their institutionalization. These linkages have made it easier for farmers to get loans. Farmers are now more likely both to save their income as well as to apply for a loan. Small-scale enterprises that they contribute to land resource management are selected.

d. Increased awareness about land and tenancy rights

Before the project, none of the people in the project areas were familiar with either land or tenancy rights and more than 60% reported having had these rights violated. Because people in the Banganga sub-watershed had no right to the land they lived on, they used it in unsustainable ways, including practicing slash-and-burn. Now, people are aware about land and tenancy rights, the policy provisions of the government, and the adverse consequences of shifting cultivation. As a result, no one now builds temporary cow sheds within forest areas. The complete elimination of this practice is the outcome of policy advocacy, periodic interactions, and review-and-reflection sessions. People organized three delegations to

Arghakhanchi Land Revenue Office to ensure that their land was surveyed and that they were issued land registration certificates.

"We are thrilled to be linked with a cooperative. Five of us women's groups had lending microcredit long ago, but our savings were too stagnant to be able to support substantial loan disbursement. Now it is easy to get a loan from our groups as well as the cooperative in order to set up small-scale enterprises."

Ms. Radha Poudel, a woman group member



"Before the project, we were totally ignorant about legal matters related to land, forest, and water and the provisions spelled out in various laws. Now we are familiar with simple legal provisions which we can use on a day-to-day basis. Now that we have learned about legal matters and participated in many capacity-building initiatives, we are vocal and confident. We are no longer an ignorant mass of backbenchers at public meetings. We have realized that we can do anything. The project was special in that it brought us women to the forefront in all activities. We are quite happy that it has also given women a platform for working together to earn income and become empowered."

Ms. Dil Kumari Bhattarai, a woman group member



7. Resource mobilization

The project successfully generated NPR. 3,599,650 (Table 5) in the form of co-financing from the following groups. The involvement of different types of groups helped to sustain the project's initiatives.

Table 5: Details of resource mobilization

SN	Groups/agencies	Key theme/ Task	Cash/cash equivalent to kind (NPR)
1	Simalpani VDC	Livelihood promotion/ Irrigation and bioengineering work	328,850.00
2	Bhasme CFUG	Labor contribution /broom grass collection and plantation	520,000.00
3	Banchare CFUG	Labor contribution / Broom grass collection and plantation	310,000.00
4	DADO	Seed (mini-kit) and training support	116,000.00
5	DSCO	Construction of bioengineering work and plantation of bamboo	287,500.00
6	DFO	Seeding support, plantation, and safeguarding	190,800.00
7	Sabhasad Bikas Kosh	Irrigation and drinking water schemes	523,000.00
8	Heifer and The Leprosy Mission to Nepal	Health camp, animal husbandry, grass and fodder plantation	1,323,500.00
Total			3,599,650 USD 35,996

Source: Project records 2015

8. Gender status in the project

Based on indicators and sub-indicators, the project was categorised as 'direct gender responsive' (code of 1) as it scored 53, which is more than 50 (refer annex-2). The participation of women in groups and committees is 47% and participation of women in the project's activities is 35% (refer annex-2). Inclusion of women is more than 33% in staffing, management and coordination committees including decision making positions.

Similarly, the provision of stakeholder's/women's participation in the executive committees and other committees including major posts was good because this participation is more than 33% in user's committee and less than 33% in decision making positions.

The project had a compulsory provision in presence of women staff/member in project management or implementation meetings. Similarly, the participation of women staff and member in orientations, seminars, workshops, skill development programs and training was excellent because their presence is more than 33%. The project also maintained sex disaggregated data on benefits in the program and reviewed the budget allocated for gender specific program. There was no discrimination in terms of job employment and equal wage to men and women. Adequate budget (53% of the total budget) was allocated for programs promoting gender equality and equity (refer annex-3).

The project helped to reduce gender inequality through involving women and men in every stage of project cycle.

9. Sustainability of project achievements

In order to sustain project initiatives, activities were carefully planned, the capacity of local people was built, local intuitions were set up to take the project forward, relevant local policies were formulated, and conservation activities were linked with livelihoods, income generation, and markets. Table 6 summarizes the various aspects of the sustainability of major project achievements.

Table 6: Sustainability of major project achievements

Sn	Particular	Capacity-building	Institutional set-up	Link to income generation/ livelihoods	Relevant policy	Market linkage
1	SALT and agro forestry initiatives	Yes	Yes	Yes	Yes	Yes
2	Climate-resilient agriculture turmeric cultivation	Yes Yes	Yes Yes	Yes Yes		Yes Yes
3	Improved livestock sheds	Yes		Yes		Yes
4	Seed bank	Yes		Yes		
5	River training	Yes		Yes		
6	Water management	Yes	Yes	Yes	Yes	
7	Disaster mitigation initiative	Yes	Yes	Yes	Yes	

Local people are still undertaking major project initiatives because the project deliberately worked to build the likelihood of their sustainability.

10. Good practices

The project undertook a number of diverse but inter-related agroecological activities connecting upstream and downstream communities. The project was successful in addressing the environment concerns and enhancing local livelihoods and income generation in both the communities. Different activities such as SALT, agroforestry, the construction of drainage system and conservation ponds were initiated in upstream areas whereas interventions such as irrigation canal management, river training through bioengineering technology, and riverbed farming were conducted in downstream areas. Activities such as climate-resilient agriculture, livestock shed management, seed bank management, and the establishment of meteorological stations were carried out in both the upstream and the downstream communities.

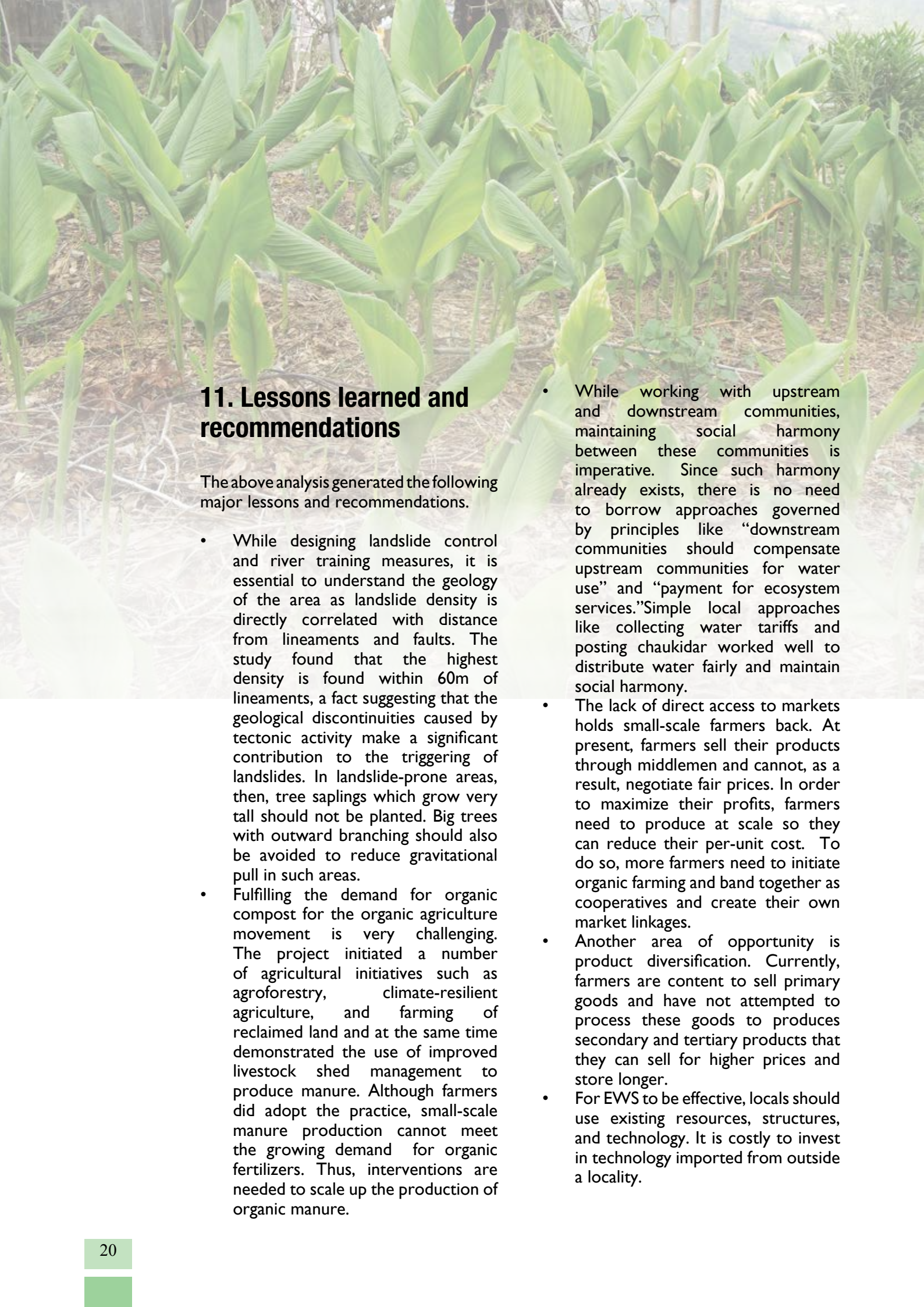
These activities were undertaken after seeking farmers' consent through extensive meetings and community-based planning. Once activities were agreed to, farmers' capacities were built, institutions setup, and local rules and regulations established. For example, to promote SALT, interested farmers were organized into two SALT promotion groups, a demonstration site was developed, and farmers were trained to carry out SALT. Then agroforestry initiatives were introduced. While selecting species for

SALT, many farmers were consulted and those species preferred by locals and both environmentally and economically viable were selected.

Another good practice is the maintenance of irrigation canals. Improving canals increased agriculture productivity and social harmony by controlling water theft and unfair distribution of water. The two water users' associations formed oversee regular maintenance and the collection of water tariffs.

The integration of a community-based EWS and river training through bioengineering is another good practice. Through the bioengineering work, locals not only reclaimed land but also earned income by the establishment of riverbed farming on the reclaimed land. With the EWS at place, locals were confidence that they can cope with the menace of flooding and that their crops will be safe.

Mobilizing local students and eco-clubs to carry out conservation activities and organize rallies not only enhanced their environment stewardship but also helped ensure the success of a number of initiatives, including the establishment two meteorological stations, the construction of 32 toilets, and the initiation of 131 household waste water management systems.



11. Lessons learned and recommendations

The above analysis generated the following major lessons and recommendations.

- While designing landslide control and river training measures, it is essential to understand the geology of the area as landslide density is directly correlated with distance from lineaments and faults. The study found that the highest density is found within 60m of lineaments, a fact suggesting that the geological discontinuities caused by tectonic activity make a significant contribution to the triggering of landslides. In landslide-prone areas, then, tree saplings which grow very tall should not be planted. Big trees with outward branching should also be avoided to reduce gravitational pull in such areas.
- Fulfilling the demand for organic compost for the organic agriculture movement is very challenging. The project initiated a number of agricultural initiatives such as agroforestry, climate-resilient agriculture, and farming of reclaimed land and at the same time demonstrated the use of improved livestock shed management to produce manure. Although farmers did adopt the practice, small-scale manure production cannot meet the growing demand for organic fertilizers. Thus, interventions are needed to scale up the production of organic manure.
- While working with upstream and downstream communities, maintaining social harmony between these communities is imperative. Since such harmony already exists, there is no need to borrow approaches governed by principles like “downstream communities should compensate upstream communities for water use” and “payment for ecosystem services.” Simple local approaches like collecting water tariffs and posting chaukidar worked well to distribute water fairly and maintain social harmony.
- The lack of direct access to markets holds small-scale farmers back. At present, farmers sell their products through middlemen and cannot, as a result, negotiate fair prices. In order to maximize their profits, farmers need to produce at scale so they can reduce their per-unit cost. To do so, more farmers need to initiate organic farming and band together as cooperatives and create their own market linkages.
- Another area of opportunity is product diversification. Currently, farmers are content to sell primary goods and have not attempted to process these goods to produce secondary and tertiary products that they can sell for higher prices and store longer.
- For EWS to be effective, locals should use existing resources, structures, and technology. It is costly to invest in technology imported from outside a locality.

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Annex

Annex-1: Areas conserved in upstream and downstream and HHs benefitted

S.N.	Location	Area (ha)	Benefitted HHs
1	Upstream area		
1.1	Argo-forestry promotion	129	102
1.2	SALT	15	108
1.3	Construction of drainage outlets	40	92
1.4	Climate resilient crops	12	138
	Sub-total	196	440
2	Downstream area		
2.1	Irrigation facilities	115	190
2.2	River bank protection through bioengineering	33	260
	Sub-total	148	450
	Total	344	890

Annex-2: Calculation of gender responsive budget based on indicators and sub indicators

S.N	Major indicators and sub indicators	Checklist for assessing the indicators and sub indicators	Given Score	Score*
1.0	Women's participation in planning and implementation		20	16
1.1	Provision of women's participation in program planning and budget formulation	If following is provisioned in planning and budgeting from ministerial to district levels • Excellent (Participation of women and gender focal person in decision making level at the ministry level and participation of 33% or above women representatives from stakeholders' group) • Good (Participation of women officer or gender focal person in decision making level at the ministry level or participation of 20-33% women representatives from stakeholders' group) • Fair (Participation of women staff from non decision making level at the ministry level or participation of 5 to less than 20% women representatives from stakeholders' group)	4 3 2	3
1.2	Ensuring women's participation in implementation		12	
1.2.1	Provision of women's participation in the implementation (at the project or district level)	Inclusion of women in staffing, management and coordination committees including decision making positions • Excellent ($\geq 33\%$) • Good (20-<33 %) • Fair (5-<20 %)	5 4 3	4

1.2.2	Provision of stakeholders and women's participation in the implementation (users' committee and other committees).	Provision of stakeholders/women's participation in the executive committees and other committees including major posts (president, general secretary, treasurer) - Excellent (>33 including decision making posts and users committee) - Good (<33% in decision making positions but >33% in users committee) - Fair (10-<33 % in decision making positions and users committee)	4 3 2	2
1.2.3	Provision of compulsory presence of women	Provision of compulsory presence of women staff/member in project management or implementation meetings	3	3
1.3	Provision of women's participation in monitoring	Provision of women stakeholders or gender expert's participation in project monitoring	4	4
2.0	Capacity enhancement of women		20	10
2.1	Provision of capacity enhancement of women at the decision making and implementation levels	Provision of capacity enhancement of women staff and members who are at the decision making levels	6	2
		At least one training on decision making skills	2	
		Provision of refresher training	2	
		Targeting women from special groups in such training	2	
2.2	Provision of participation of women staff and members in capacity enhancement programs	If participation of women staff and member is provisioned in orientations, seminars, workshops, skill development programs and training in following manner - Excellent (> 33 %) - Good (20-<33 %) - Fair (05-<20 %)	7	5
			7	
			5	
			3	
2.3	Gender sensitive and context specific contents	Ensure gender sensitive in the contents of the training, workshops, orientations and skill development programs	7	3
		Gender sensitive contexts	4	
		Context specific gender sensitive delivery provision	3	
3	Ensure benefits and control of women over the program (including targeted programs)		30	12
3.1	Ensuring benefits to women (target groups)	Provision of direct benefits to women from project/program as per the following: - Excellent (> 50 %) - Good (30-<50 %) - Fair (05-<30 %)	8 8 6 4	6
3.2	Identification of gender gaps, women's special needs, and barriers and programs to address these gaps, barriers and needs.	Provision to identify gender gaps (lack of access to economic resources, e.g. lack of resources for health checkups; lower educational levels, e.g. lack of awareness on health services; and barriers in mobility, e.g., travel to the health facilities for health checkups) and to address them - Excellent (if the programs address all the three barriers mentioned above) - Good (if the programs address only two barriers mentioned above) - Fair (if the programs address only one barrier mentioned above)	6 6 4 2	2
3.3	Provision of gender friendly implementation mechanisms and work place environment to ensure benefits to women	Besides women's participation as provisioned above in criteria (I) if following are provisioned: Provision to review and make acts and regulations gender responsive (promoting gender equity and removing discriminatory laws) and to address gender based violence at work place (code of conduct, complaints hearing, women friendly office layout)	7 3	2
		Provision of the physical facilities to address the needs of women (separate toilet, breast feeding room, workplace layout to address the women's special needs).	2	
		Provision of activities to increase gender responsive service delivery (exposure visits, citizen charter, sensitization trainings, etc)	2	
3.4	Ensuring budget for programs to benefit women	Ensure the following: - Adequate budget allocated for programs promoting gender equality and equity - Provision of non-transferability of the amount allocated for gender equality and equity related activities	2 1 1	1

3.5	Provision of the gender monitoring and impact evaluation systems to ensure benefits to women	Provision of gender disaggregated information/data collection and recording system at all levels of project / programs and in the impact evaluation	7	
		Maintain sex disaggregated data on benefits in the program	2	
		•Provision for incorporating gender disaggregated information in (the Ministry and projects/programs)in the annual progress report by ✓ Critical review of the provisions made under 1 to 3.2 points above addressed or not Review of the budget allocated for gender specific program	1 1	
		Provision of next year's planning based on the review findings of this year's program and budget.	1	1
		Provision of gender audit and impact evaluation of implemented program/projects	2	
4.0	Promoting employment and income generation for women		20	9
4.1	Provision of employment opportunities for women	Provision to guarantee employment for women in the jobs created by the current projects and program (reservation, employment priority, specifically for women in construction works, etc)	8	
		o Excellent (≥ 33 %) o Good (20-<33 %) o Fair (05-<20 %)	8 6 4	4
4.2	Create alternative opportunities for income generation or career development	Provisions to create alternative opportunities for women's employment and higher income or career development	7	
4.3	Equal wage	Provision to ensure equal wage to men and women in the created job, e.g., construction works	5	5
5.0	Qualitative improvement of women's time use or reduce workload		10	6
5.1	Improvement in the working process and save time	Provision of new time saving technology and working procedure in women's work with direct benefits to women (e.g, mobile bank, road, irrigation, out of school programs, mobile clinics, new women friendly technology, etc.)	4	
5.2	Long term result oriented efforts to change the traditional roles of women	Discussions of the importance of the non-paying jobs of women and their household role in text books/training material/communication material etc	2	2
		Positive examples of work sharing by men/boys.	2	2
		Provision for transformation in women's traditional labor role by the program/project	2	2
	Total		100	53

GRB Rank		
Direct Gender Responsive		1
• If score is = > 50, i.e. rated as direct gender responsive and give code of 1.		
Indirect Gender Responsive		
• If score is > 20 to < 50, i.e. rated as indirect gender responsive and give code of 2.		
Gender Neutral		
• If score is < 20, i.e. rated as direct gender responsive and give code of 3.		

Annex-3: Distribution of budget by gender

General category of expenditures	2014		2015		Total	
	Male	Female	Male	Female	Male	Female
Manpower/labor	988	1120	14	18	1002	1138
Training/seminar/ workshops etc..	1050	1740	156	200	1206	1940
Land degradation, livelihood/contracts	14600	16031	1640	1923	16240	17954
Equipment/furniture	28	43	32	46	60	89
Total	16666	18934	1842	2187	18508	21121
Percent	47	53	46	54	47	53

Source: Project's record, 2015

Annex-4: Gender and Social Inclusion Matrix

S.N.	Activities	Beneficiary	Hill Dalit		Hill Janajati		Hill BC		Hill Other		Total		Youth (15-29 Yrs)	
			M	W	M	W	M	W	M	W	M	W	M	W
1	Conserve the land through Sloping Agricultural Land Technology	Community	21	12	117	81	20	6	3	3	160	102	34	23
2	Run campaigns to control slash and burn practices	Community	123	23	689	260	23	33	5	4	840	320	234	98
3	Initiate agro-forestry training with hedgerow	Community	3	1	45	32	5	2	2	3	55	38	12	8
4	Plantation of bamboo along the river bank and steep slope	Community	123	87	1064	796	168	12	34	2	1389	897	521	231
5	Construct drainage outlet/dewatering for safe disposal of water	Community	213	123	1123	634	226	34	3	1	1534	823	435	198
6	Support to promote riverbank conservation	Community	123	45	1023	704	245	12	32	4	1423	765	543	212
7	Construct and maintain small scale irrigation schemes	Community	32	12	709	487	43	32	2	1	786	532	123	97
8	Install metrological station at community and school level	Community	32	21	361	188	25	21	2	1	420	231	78	56
9	Plant pineapples, banana and citrus plants in sloping land	Community	123	65	987	876	191	43	23	2	1324	986	653	234
10	Establish seed banks through biodiversity fairs	CBOs	98	43	1398	684	234	56	4	3	1734	786	654	239
11	Establish/strengthen a cooperative	CBOs	12	9	416	198	34	23	3	4	465	234	123	87
12	Policy advocacies for land and tenancy rights	Community	123	23	1576	593	123	36	12	2	1834	654	965	213



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