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वन तथा वातावरण मन्त्रालय
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Ministry of Forests and Environment

GREEN CLIMATE FUND

Food and Agriculture Organization of the United Nations

Critical Ecosystem Restoration Plan (CERP)

of

Tawa South River System

Building A Resilient Churia Region in Nepal
(BRCRN)
Project Management Unit, Babarmahal, Kathmandu

Building a Resilient Churia Region in Nepal (BRCRN)

National Project Director

मिति २०७८।०२।२७ को वन तथा वातावरण मन्त्रालयको श्रीमान् सचिवस्तरीय निर्णयबाट स्वीकृत भएको Critical Ecosystem Restoration Plan (CERP) Preparation Manual को बुँदा नं. ४ को प्रावधान बमोजिम PPMU हरुको सिफारिशमा PMU को मिति २०८०।०२।२३ को निर्णयबाट प्रारंभिक स्वीकृत (Initially Approve) भएको यस नदी प्रणालीको CERP मिति २०८०।०२।२६ मा बसेको आयोजना निर्देशक समिति (Project Steering Committee) को निर्णय बमोजिम अनुमोदन (Endorse) भएको ।

2020/2/24

National Project Director

Disclaimer:

This CERP report has been prepared based on the extensive field consultations, onsite visit and applying the RS/GIS tools and technologies. This report contains data and information collected and collated from the field applying CERP steps and methodology spelled -out in MOFE approved CERP manual. The draft report was shared in three provincial and one national validation workshops organized from December 2022 to February 2023 and incorporated the suggestions obtained from the workshops.

 As the CERP is public property, therefore, any plans or activities prepared under this report can be implemented by any organizations and institutions. The report attempts for higher precision, however, there may be areas for improvement. Intervention site locations and budget estimations mentioned in report are based on field consultation and observations. During the time of implementation, they are subjected to change based on the changes in field condition at the time of implementation. Considered as the lively planning instrument, the CERP has the window open for the revision along with its implementation at the river system.

Date: June 2023

GRID CONSULT (P) LTD.

APPROPRIATE TECHNOLOGY DEVELOPMENT AND RESEARCH

Reg. No.: 56920/065/066
VAT No.: 302983230

Date: 27th March 2023

DECLARATION OF AUTHENTICITY

We the following team members of CERP formulation process from Grid-ECN-Sunakhari JV hereby declare that the data and information provided in the CERP reports of Koshi province are correct to best of our knowledge and duly in-line as per MOFE approved CERP manual, using participatory approach with sample site verification. Thus, this document is our original outcomes of local, river cluster, province and federal level consultations/ validations. We hereby verify to prove its originality and authenticity; we will not allow our team and other sources to make it copied resources in one way or the other without citing copyright that is GoN-BRCRN project. We duly acknowledge BRCRN'S FAO-TA for their active involvement in every stage of CERP development..

Thanking you
Sincerely,
Angishor Shrestha
Director – Grid Consult (P) Ltd
On behalf of GRID Consult– ECN Consultancy – Sunakhari Research Consult JV

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ACRONYMS AND ABBREVIATIONS

AKC	:	Agriculture Knowledge Center
ANR	:	Assisted Natural Regeneration
BRCRN	:	Building a Resilient Churia Region in Nepal
CBFMG	:	Community Based Forest Management Groups
CBO	:	Community Based Organization
CBS	:	Central Bureau of Statistics
CCA	:	Climate Change Adaptation
CCM	:	Climate Change Mitigation
CERP	:	Critical Ecosystem Restoration Plan
CF	:	Community Forest
CFUG	:	Community Forest User Group
CRLUP	:	Climate Resilient Land Use Planning
D&FD	:	Deforestation and Forest Degradation
DFO	:	Division Forest Office
DFPSC	:	District Forest Products Supply Committee
DHM	:	Department of Hydrology and Meteorology
DMG	:	Department of Mines and Geology
DoS	:	Department of Survey
DRR	:	Disaster Risk Reduction
EIA	:	Environment Impact Assessment
FECOFUN	:	Federation of Community Forests Users Nepal
FFS	:	Farmer Field Schools
FGD	:	Focus Group Discussion
FOP	:	Forest Operational Plan
FPIC	:	Free, Prior and Informed Consent
GESI	:	Gender Equity and Social Inclusion
ha	:	hectare
ICIMOD	:	International Centre for Integrated Mountain Development
IEE	:	Initial Environment Examination
IP	:	Indigenous People
IPPF		Indigenous Peoples Planning Framework of BRCRN Project
IPacks	:	Intervention Packages
IPM	:	Integrated Pest Management
Km	:	Kilometer
LRP	:	Local Resource Person
m	:	meter
MCA	:	Multi Criteria Analysis
MoFE	:	Ministry of Forests and Environment
MoFESC	:	Ministry of Forests, Environment and Soil Conservation
PCTMCDB	:	President Chure Terai Madhesh Conservation Development Board
PCTMCMMP	:	President Chure Terai Madhesh Conservation and Management Master Plan
PPMU	:	Provincial Project Management Unit
RS	:	River System
SDFO	:	Sub-division Forest Office
SDG	:	Sustainable Development Goals
SFM	:	Sustainable Forest Management
SNRM	:	Sustainable Natural Resource Management

SWMO	:	Soil and Watershed Management Office
TOF	:	Training of Facilitators
VDC	:	Village Development Committee

EXECUTIVE SUMMARY

The project entitled "Building a Resilient Churia Region in Nepal (BRCRN)" aims to promote widespread adoption of climate-resilient land use practices; confront the challenges of deforestation and forest degradation (D&FD); better maintain the forest ecosystem in the Chure hills; and build resilience to climate-induced hazards by linking the Chure hills, Bhavar and Terai. BRCRN has adopted the river system-based approach and follows boundaries earlier identified and delineated by President Chure Terai Madhesh Conservation and Management Master Plan 2017. The said master plan projected integrated conservation plan on the basis of river systems. The Critical Ecosystem Restoration Plan (CERP) is prepared to foster Climate Resilient Sustainable Natural Resource Management (CR-SNRM) in the river system so that this CERP will be launched to implement the concept of upstream-downstream linkage based on perspectives of the ecosystem services. The CERP process has followed participatory rural development planning approach including civil society organizations (CSOs), community-based organizations (CBOs), women lead organization, and groups, and government entities at different levels. It is based on 'Theory of change' approach integrating problem and solution tree analysis that explains how a given intervention, or set of interventions, is expected to lead to specific development change, drawing on a causal linkage based on available evidence. From problem and solution tree analysis the main problems along with their causes and effects are recorded, to come up with clear and manageable goals and the strategies to combat them. There are two main stages to this process: (1) the identification of negative aspects of existing situations (or key challenges) in the form of problem trees, and (2) the change of the problems into objectives leading to solution trees showing potential solutions or strategies that respond to the main drivers and underlying causes. In addition, the integrated and gender-specific approach was adopted during the process to ensure gender equality and women empowerment in sustainable natural resource management. The integrated approach adopted gender-inclusive actions such as ensuring equal participation, gender prospect in problem-solution analysis, and ensuring participation of women lead organizations in the consultation workshops. However, due to the limited involvement of women in the integrated approach, a gender-specific approach was adopted, and a separate study focusing only on women and women lead organizations was conducted during the process. In addition, the approach adopted particular research tools such as seasonal calendars, problem and solution community workshops, and focus group discussions among women, Dalits, IPs, women, and other marginalized communities. Also, the consultation process includes a consultation with women and women lead organizations.

Tawa South river system is the southern hillslope of greater Tawa watershed that covers almost 17.5% area of total watershed. It is north-facing Chure hill and inner river valley. The built-up area has increased at the annual rate of 4.78% per year from 2000 to 2019. It appears that the total forest area decreased by 35.04 ha at the annual rate of 0.03% during these 19 years. The ecosystem degraded areas termed as "hotspot" areas are identified initially by spatial analysis of 16 different variables from secondary spatial data sources. The variables were categorized into adaptation and mitigation themes and Geographical Information System (GIS) based Multi-Criteria Analysis (MCA) was used to identify preliminary hotspot areas. The maps generated from spatial analysis were taken to problem and solution workshops that took place at the local level. Participants from Community Based Organizations (CBOs) user groups- with a focus on women, indigenous people, poor and Dalit (community and collaborative forest user groups, farmer groups, and climate-induced disaster management groups, soil and water conservation groups) as well as government organizations (forest sub-division offices and local government at community level) were represented in the workshops. Identification of key drivers, problem analysis, solution analysis, and hotspot map delineation were done in two thematic groups of climate change adaptation and mitigation. The mapped hotspot locations were verified/updated in workshops and

visited-verified in the field followed by discussions with the local communities. Additional two-day expert planning workshop in the river system discussed and validated the findings, focusing on identifying drivers and underlying causes of the two thematic problems.

Deforestation and forest degradation are related to climate change and pose threats to biodiversity and livelihood of forest dependent local communities. Forest degradation relates to loss of biomass (carbon) and reduction in the capacity of forests to produce ecosystem services on longer terms. The findings from local stakeholder and expert consultations indicate that forest fire, unsustainable/illegal harvesting of forest products, open/uncontrolled grazing, adopting inappropriate cropping systems, encroachment of forestlands, ineffective forest management practices, and infrastructure development are major drivers of deforestation and forest degradation in Tawa South River System. Climate-led hazards like erosion/landslide and flood are other drivers contributing to forest loss and degradation. These drivers are the results of several underlying causes- high forest resource dependency; poverty and limited livelihood opportunities available to local communities; ineffective forestry sector governance; weak law enforcement; ineffective sustainable forest management; financial and human resource constraints in CFUGs and forest offices; and weak coordination and cooperation among concerned agencies.

Climate induced disaster and climate impact on agriculture productivity are two key challenges representing vulnerable ecosystem and community in the river system. Erosion/landslide, flood and weak disaster risk management are major drivers, and are triggered by both natural and anthropogenic factors. Inappropriate land use practices like cultivation in slope areas more than 30 degree and forest degradation are main human-induced factors. Heavy/erratic rainfalls, steep slopes and other topographic conditions are major natural causes. Climate stress on agriculture productivity has direct impact on people's livelihood especially women, elderly and children through low family income and food insecurity. It eventually makes forest ecosystem vulnerable through increased burgeoning pressure on forest resources. The major drivers identified are inadequate farm skills and financial resources; insects, pests and diseases; insufficient irrigation; soil quality degradation; and loss and damage of agricultural lands and crops.

The strategic actions identified to reduce deforestation and forest degradation include reducing forest dependency by addressing poverty and alternative livelihood issues; promoting agroforestry, livestock management and private forestry; promotion of alternative energy sources; strengthening forest fire control system; controlling open grazing; improving law enforcement and overall forestry sector governance; promoting sustainable forest management; controlling further encroachment of forestlands; and capacity enhancement of user groups and government forestry staffs. Afforestation and reforestation activities are proposed to enhance forest density and species richness for improving ecosystem services. One of the important aspects of enhancing adaptation/resilience of ecosystem and community would be climate resilient farming practices and enhancing agricultural productivity. Increase in agriculture productivity will improve livelihood of small holding farmers and at the same time, it will decrease forest pressure and dependency on nearby natural resources. Strategic actions proposed for disaster risk reduction are landslide treatment, erosion control, riverbank stabilization and strengthening disaster risk management.

Based on the activities and key results identified from local stakeholder workshops via problem tree and solution tree analysis, six intervention packages (IPacks) have been developed. This CERP only covers those key results and IPacks that correspond to local level interventions. CERP brings out issues on a number of vital areas of interventions that can take place at national level such as- resolution of land tenure issues and interventions to regulate infrastructure development in forest area, however does not

suggest specific interventions as guided by CERP manual. Feasibility analysis is used to assess the strengths and weaknesses of the IPacks where risks and obstacles to implementation of each IPacks were assessed. Safeguard analysis is done to identify social and environmental risks or threats, as well as to identify where CERP interventions can contribute to significant social or environmental co-benefits. The measures to mitigate risks and enhance benefits are also assessed. Budget plan and monitoring protocol for CERP are also prepared adopting several matrixes. This CERP is based on multi-stakeholder engagement process in the field.

The IPacks developed mainly focuses on reducing deforestation and forest degradation; enhancing resilience of vulnerable ecosystem and local communities; and integrating gender and social equity issues. The IPacks provide activities for forest management and subsequent carbon enhancement; climate resilient agriculture and land use practices; and reducing ecosystem and community vulnerability to climate-induced disasters. The activities are also designed with focus on upstream-downstream linkages. The activities such as agroforestry, plantation within national forest, gulley control, landslide treatment, and climate resilient land use practices to build resilience of smallholder farmers against climate change impacts in Chure hills are intended to enhance resilience against climate-induced soil erosion, reduce runoff and enhance infiltration thus reducing risks related to sedimentation and flooding in inner river valley plains. However, geographic focus of activities are not considered as a primary criterion for activity grouping during IPack formulation, as river systems such as Tawa South, that entirely fall in upstream Churia region, has similar terrain, topography and geological variations throughout, where similar problems and solutions apply across the entire river system area.

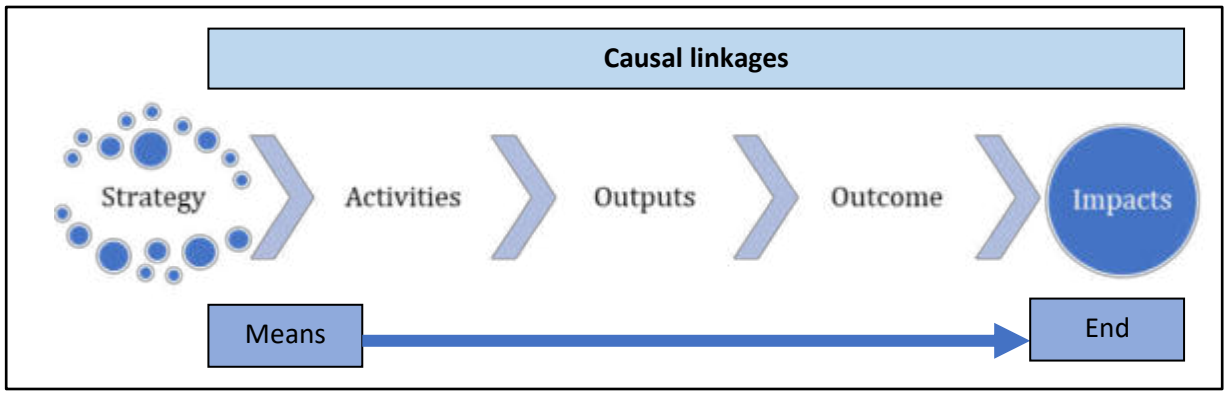
CHAPTER I : INTRODUCTION TO CRITICAL ECOSYSTEM RESTORATION PLAN

1.1 Background

The project entitled "Building a Resilient Churia Region in Nepal (BRCRN)" is implemented in 26 critical river systems (RS) in the southeast region of Nepal, covering parts of Provinces 1, Madhesh and Bagmati. The project will be linking the Chure hills, Bhavar and Terai, and aims to promote widespread adoption of climate-resilient land use practices, confront the challenges of deforestation and forest degradation (D&FD), better maintain the forest ecosystem in the Chure hills, and build resilience to climate-induced hazards so that the ecosystem services perpetuated in the longer terms.

The Chure Hill is an ecologically highly sensitive and risk-prone landscape due to complex geology, tectonics, climate, hydrology, and biodiversity. Ecologically Churia is an integral part of Terai, thus, it should be considered as a landscape. Watershed level institution building and its well-functioning including upstream and downstream stakeholders can contribute in conservation and management of upstream watershed resources. This CERP has been planned in a way which ensures protection of upstream areas and hence downstream will have perpetuated ecosystem services on longer terms. The region is particularly vulnerable to erosion, landslides, drought and flooding due to ongoing tectonic processes, fragile geological composition, and prolonged and intense rainfall during monsoon (Ghimire, 2011). A changing climate is further contributing to landslides, erosion, and flash floods in the hills. These processes in the hills have shaped the active geomorphological activities in the Bhavar region through aggradation and transportation of sediments. Over the last half-century, Bhavar have undergone tremendous changes in demography, land use, settlement and urbanization, and road infrastructures, which have extremely altered the landscape. Moreover, haphazard extraction of the riverbed material has altered the geomorphic processes in the Bhavar (Dahal & Paudyal, 2022). Higher sediment yield in Chure hill and alteration of geomorphological processes in Bhavar have profound impact on the morphology of the river and related disaster in the downstream area of Terai flood plain (Ghimire, 2020). The agricultural land of Bhavar and Terai are already in stress of climate variability, further jeopardizing the livelihoods of the inhabitants.

In these connections, Critical Ecosystem Restoration Plan (CERP) has been prepared to foster Climate Resilient Sustainable Natural Resource Management (CR-SNRM) at river system level. CERP activities are designed with focus on upstream-downstream linkages based on perspectives of the ecosystem services The CERP has followed a participatory rural development planning approach including civil society organizations (CSOs), community-based organizations (CBOs) and government entities at different levels. This methodology and process is based on international best practices, including the 'Theory of change' approach to planning, implementation, monitoring & evaluation and impact assessment in different time intervals.



(Source: CERP manual, 2021)

Figure 1: Establishing casual linkages with theory of change analysis.

The "Theory of change" approach explains how a given intervention, or set of interventions, is expected to lead to specific development change, drawing on a causal linkage based on available evidence. It includes an understanding of the desired activities, outputs, outcomes and impacts of the project as well as the current situations and dynamics including their incentives for change towards expected results.

1.2 River System Concept: Holistic Approach of Integrated Watershed Management

The President Chure Terai Madhesh Conservation and Management Master Plan 2017 projected integrated conservation plan based on river systems. A river system is a land mass of drainage basin where all river and its tributaries meet to have a common outlet. BRCRN follows the river system boundaries earlier identified and delineated by President Chure Terai Madhesh Conservation and Management Master Plan (PCTMCDB 2017). It is a part of watershed system that should ideally follow hydrological boundary, however, river system delineation in PCTMCMMP also considers land mass as a management unit that is delineated based on the geographical and socio-ecological variability.

Tawa South can be divided into two zones based on the landform and river geomorphic behaviors as shown in Figure 2. In upstream region (Chure hill), weathering and erosion processes are intense and active, which contributes to high sediment, yield in the rivers and thereby has a profound impact on the morphology of the river and related disasters in the inner river valley. Agriculture is the predominant land use of inner river valley, which is the alluvial apron of sediments washed down from the Chure/Siwaliks to the south. Hence, flood and bank erosion risks, which can lead to loss of land and damage to the properties, are high.

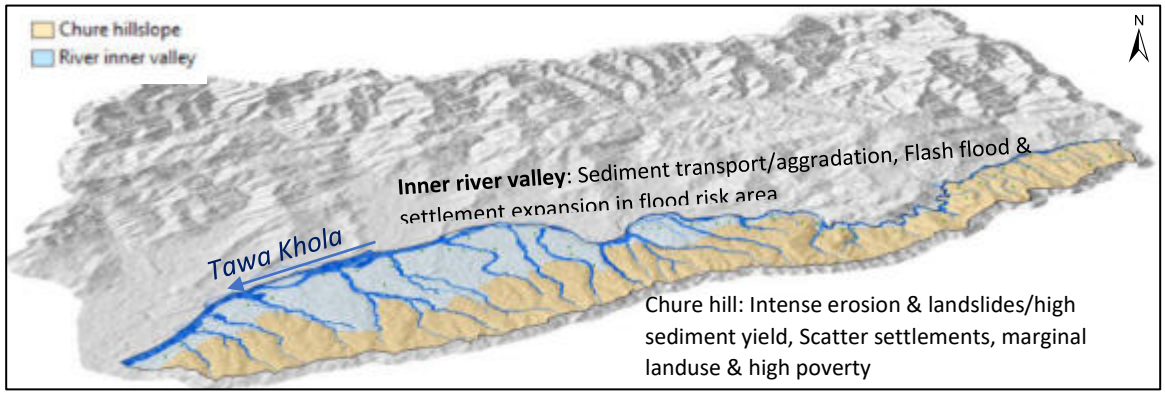


Figure 2: Upstream-midstream linkage in Tawa South river system

1.3 Ecosystem Restoration

Ecosystem degradation is a negative trend in ecosystem condition, caused by direct or indirect human-induced processes including anthropogenic climate change perpetuated by anthropogenic factors, expressed as long-term reduction or loss of at least one of the following: biological productivity, ecological integrity, or value to humans in one way or the other.

Ecosystem restoration is any intentional activities that accelerate the recovery of degraded, damaged, or destroyed functional services that an ecosystem provides. The restoration planning requires multi-dimensional observation and analysis of core problems followed by a multi-stakeholder engagement and decision-making process. Relating ecosystem services with relevant stakeholders for their perceptions of the services is vital for informed decision making about land use changes and resource management. Likewise, the site-specific information on land use and their changes is equally important. Hence, CERP processes have ensured rigorous field level discussions and consultations in each river system as well as exercised tools and techniques of land use and change dynamics to accommodate all the aspects of ecosystem restoration. The findings of the processes at multiple levels are then turned into the intervention packages of the CERP so that the specific ecosystems are restored.

In fact, CERP focuses on river system scale intervention planning to achieve ecosystem restoration at landscape level. Moreover, the CERP is guided by and perfectly in-line with the principles of ecosystem restoration of United Nations decade 2021-2030 that highlights following 10 principles that underpin ecosystem restoration:

- Ecosystem restoration contributes to the UN SDGs and goals of Rio conventions.
- Ecosystem restoration promotes inclusive and participatory governance, social fairness and equity from the start and throughout the process and outcomes.
- Ecosystem restoration includes a continuum of restorative activities.
- Ecosystem restoration aims to achieve the highest level of recovery for biodiversity, ecosystem health, integrity, and human wellbeing.
- Ecosystem restoration addresses the direct and indirect causes (drivers) of ecosystem degradation.
- Ecosystem restoration promotes knowledge generation and exchange throughout the process.
- Ecosystem restoration is based on well-defined goals.
- Ecosystem restoration is tailored to the local ecological, cultural and socio-economic contexts, while considering larger landscape.
- Ecosystem restoration includes monitoring, evaluation and adaptive management throughout and beyond the lifetime of project.
- Ecosystem restoration is enabled by policies and measures that promote its long term progress, replication and scaling-up.

1.4 Rationale of CERP

Most part of Churia is covered by forests while some parts are inhabited and cultivated. Increasing human interferences and expanding infrastructures coupled with climate vagaries on top of its own fragile-composition are causing serious threats to this region and downstream also. It has varying elevation, climate and vegetation from one to another part. Churia (upstream) area has been considered to be very important for conservation to protect downstream Terai and its agriculture land. CERP has been formulated in a way which implements the concept of upstream-downstream linkage based on

perspectives of the ecosystem services. The development of CERPs will contribute to the provision of climate-informed extension, leveraging the resources and advisory services. It ensures that adaptation to climate change (CC) and Disaster Risk Reduction (DRR) has been integrated into provincial and local development planning cycle. The project achieves this through promotion and integration of climate resilient land use practices in agriculture and forestry, subsequently integrating them into local decision-making processes. This will ultimately guide the adoption of prioritized low-carbon and climate resilient – integrated Sustainable Natural Resource Management in the Chure region.

The goal is that government and development partners together improve local and provincial service delivery through river system interventions in CR-SNRM sector. The CERP is also the basis for monitoring and evaluation (M&E) of ecosystem restoration actions at the landscape scale as well as outreach and targeted budgeting on local level. Additionally, the data generated in the annual follow-up of the CERP intervention packages, and their success or failure will inform government reporting on climate change related international commitments and instruments. The reports on the cumulative impacts of the CERPs can also inform country's overall Nationally Determined Contributions (NDC) reporting on land use change and greenhouse gas emissions at a national scale.

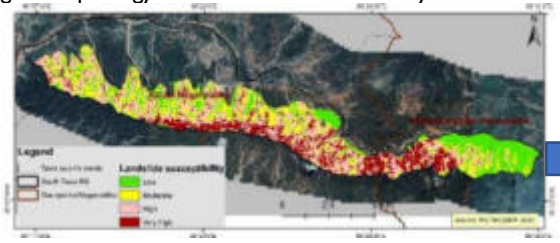
CERP is envisioned at a river system scale to foster upstream-midstream-downstream connectivity by analyzing complex inter-linkage of cause and effect dynamics of climate vulnerability over the specific geographic regions and interventions to help build the climate resilience with interlinked and cascading impact from head to tail of the river systems. In this sense, it adopts a holistic integrated watershed management approach.

CHAPTER 2 : METHODOLOGY AND THE PROCESS

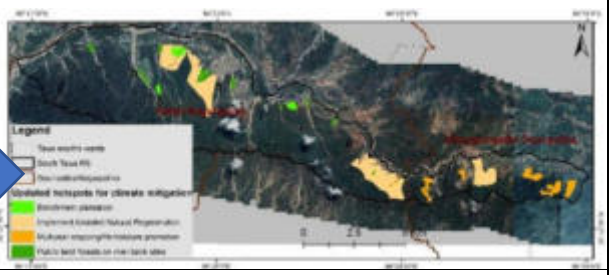
2.1 CERP Development Phase

Following nine steps were followed during the CERP development phases:

Step 1: Preparatory spatial analysis of land cover change, forest loss/gain, forest fires, slopes, landslide, flood, river geomorphology and settlement vulnerability



Step 2: Spatial Multi-criteria Analysis (MCA) to identify problem hotspots

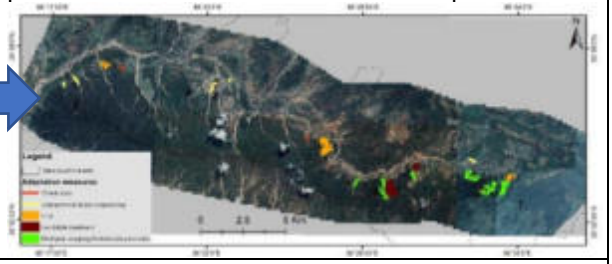


Step 3: Participatory spatial planning using hotspot map for prioritization of drivers, barriers, and identification of specific problem locations

Step 4: Formulation of problem and solution trees, identification, and mapping of solutions

Step 5: Field visits to verify locations of problem-solution

Step 6: Compilation of information and desk verification on problem-solution locations and interventions planned

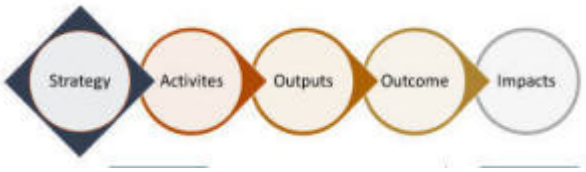


Step 7: Expert planning workshop for finalization of ips & analysis of risks & benefits

Step 8: Finalizing monitoring mechanism and budgeting of intervention through expert consultation

Monitor Budget

Step 9: Development of workflow and finalization of intervention packages



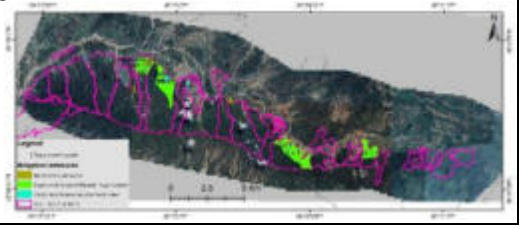


Figure 3: Steps of spatial analysis for CERP development

2.1 Spatial Planning as a Base for CERP

Mapping and spatial analysis have a vital role in the CERP development process. Maps and spatial analysis are generated by a combination of geospatial tools (i.e. GIS, Remote Sensing), desk-based research and fieldwork. Relevant analogue maps and data prepared by national and international agencies were collected and reviewed for the inclusion of the information in the digital spatial data as well as integration in the GIS.

Table 1: Data types, acquisition and their processing methods

Themes	Parameters	Data types	Sources	Processing methods
Climate mitigation	Deforested area	Forest loss (2000-2020)	Global Forest Watch data.globalforestwatch.org	- Revised & update from temporal Google earth images
	Degraded forest	Open forest (Canopy <20%)	Sentinel image, 2021	- NDVI and supervised classification - Inputs, revised & update from temporal Google earth images
	Forest fire	Fire incident	NASA's Website (https://firms.modaps.eosdis.nasa.gov)	- Overlay analysis on temporal GE images and draw tentative burnt area which will verify during participatory workshops
	Potential enhancement area	Private land/Public land forest (Proxy indictors)	Cultivated land & Riverbed (DoS, 1996)	- Abandoned agricultural land (Cultivated land in the 1990's/2000's and barren/bushes in 2020's): Google earth overlay & Mapping - Abandoned river/reclaim (River in 1990's/2000's and other land use in 2020's): Google earth overlay & Mapping
	Firewood consumption	Household using firewood for cooking	CBS, 2011	- Household using firewood attributed in then VDCs and transferred into RS
	Landslide on forest area	Landslide	PCTMCDB (TU-CDG, 2021)	- Landslide distribution in forest
	Road network on Chure hillslope	Road network on Chure hillslope	PCTMCDMP (PCTMCDB, 2016)	- Updated form Google earth
Climate adaptation	Agricultural land in slope area	Agricultural land Slope (Digital elevation model)	ALOS DEM (12.5m) (asf.alaska.edu)	Overlay analysis
	Agricultural land exposed to landslide hazard	Landslide hazard	PCTMCDB (TU-CDG, 2021)	
	Agricultural land exposed to Flood hazard	Flood hazard	PCTMCMMP (PCTMCDB, 2016)	
	Land capability	Land capability	Soil and Terrain Database (SOTER) (FAO, 2009)	
	Landslide hazard	Landslide hazard	PCTMCDB (TU-CDG, 2021)	Overlay analysis

Themes	Parameters	Data types	Sources	Processing methods
	Flood hazard	Flood hazard	PCTMCDMP (PCTMCDB, 2016)	Flood hazard is revised and updated based on recent geomorphic change in flood plain using the temporal images of GE
	Settlement exposed to landslide hazard	Settlement	Land cover, 2015 (PCTMCDB, 2016)	Overlay analysis
	Settlement exposed to flood hazard	Settlement	Land cover, 2015 (PCTMCDB, 2016)	
	Wetland/water recharge	Wetland/water recharge	Wetland (DoS, 1996 & PCTMCDB, 2016)	
	House structure	Indices	CBS, 2011	Spatial representation was created on then VDCs and transferred into river systems
	Ethnicity			
	Female literacy (Gender)			

CERP is core process of the project in identifying the problems and solutions that lead to project interventions (activities). The CERP objectives were to balance both mitigation and adaptation for sustainable resilience building of local vulnerable communities. Hence, mitigation and adaptation potentials of the project are considered as primary entry points for MCA to identify hotspot sites and considered as major themes. Mitigation potential is addressed through identifying areas (hotspots) where BRCRN interventions have potential to reduce emissions and enhance the subsequent carbon stock. Similarly, Adaptation potentials are addressed through identifying areas (hotspots) where BRCRN interventions have potential to address vulnerable ecosystems and vulnerable local communities.

Following graphics demonstrate adaptation and mitigation logic adopted for which careful choice of themes, variables, process and results were:

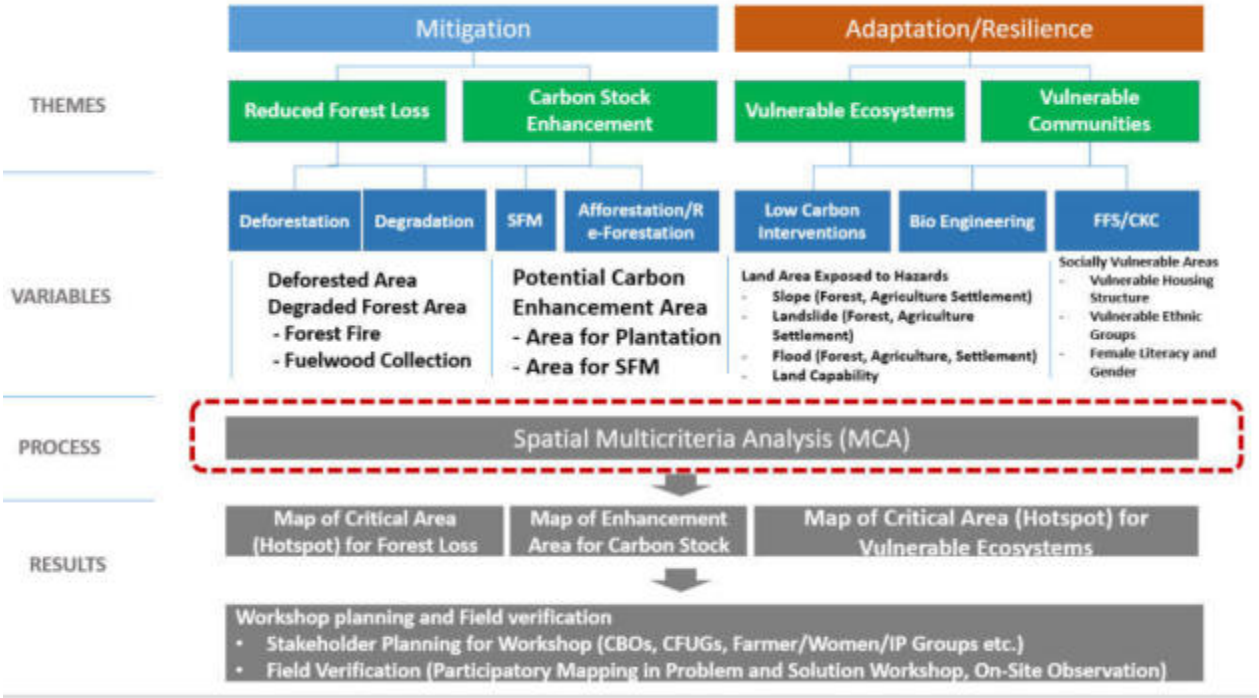


Figure 4: Multi-criteria analysis

2.2 Local Stakeholder Consultation

2.2.1 Selection of Participants

The selection process of participants for the two consecutive workshops i.e. Problem Analysis and Solution Analysis was vital for the validity and quality of critical ecosystem restoration plan (CERP) process. The selection process was carried out in collaboration with Division Forest Office (DFO), Katari, Udayapur district. The selection process prioritized to include women and women lead organizations including Indigenous Peoples and their institutions at the river system level. The DFO informed respective sub-division offices to support in selecting participants, who are well informed about the issues of Tawa South River System. Similarly, the study team coordinated with local government (P*alika*s and wards) to trace out the representatives who are directly associated with the agriculture and disaster issues. The participants are from Division Forest Office, Sub-division Forest Office, Community Forest User Groups (CFUGs), Federation of Community Forestry Users Nepal (FECOFUN), Farmers Group, Farmers' Network and Community Seed Bank while considering social inclusion i.e. representatives from women, poor, Indigenous Peoples (IPs) and Dalits. There were 37 participants in total. Among the participants, 16 were from IP groups, and altogether 10 females and 27 males (Annex 2).

2.2.2 Workshop

The two-day workshop was organized on 5 and 6 January 2022 at Om Shanti hall at Katari Bazaar, Udayapur. The day one of the workshop was focused to prepare problem tree while day two was dedicated to develop solution tree as per the problem tree developed in day one.

A. Problem Analysis (Day One)

The workshop facilitators firstly briefed about introduction of the BRCRN and the objectives of the workshop. This session was followed by the discussion on the topics of 'Climate Change Mitigation' and 'Climate Change Adaptation'. The aim of this session was to bring common understanding among the participants, facilitators regarding the concept of 'Climate Change Mitigation' and 'Climate Change Adaptation' that would be instrumental to bring clear, and precise local issues associated with Tawa South River System. This would be robust basis to design intervention packages for the BRCRN.

The participants were divided into two groups viz. 'Climate Change Mitigation (CCM)' and 'Climate Change Adaptation-(CCA). Each group nominated their spokespersons for the documentation of thematic issues and women were encouraged to be a spokesperson. Adding to this, CCM group was requested to discuss on the issues of deforestation and forests degradation whereas CCA group was focused on the issues of agriculture and disaster. Participants were asked to identify the key problem, their drivers and underlying causes and their impacts. The participants were also oriented about mapping of hotspots for interventions. For this map of the river system, overlaying boundary and satellite image were displayed through projector. Printed maps were also used for orientation. Participants were oriented about the features of maps like forest area, cultivated area, river/streams, roads etc.

All issues of four thematic areas (deforestation, forest degradation, agriculture and disaster) were documented in the meta cards. Meta cards were displayed on the walls of the workshop hall in a sequence of key problem/challenge at the top, the drivers in the middle and then meta cards with underlying causes at the bottom to develop a problem tree.

- **Group Exchange**

The problem trees prepared by each groups were displayed and group exchange was done for verification and inputs. The spokespersons of respective CCM and CCA groups were assigned to present their problem trees. During the presentation, CCM groups received inputs from participants of

CCA groups and vice versa. This process provided ample space to refine the local issues on case to case basis mutually.

B. Solution Analysis (Day Two)

On the second day, same participants were asked to remain in their respective groups of CCM and CCA. As informed them on the day before each group was asked to prescribe solutions of respective issues identified in problem analysis. They were asked to identify activities against problems, output of the activities, outcomes and finally impacts. The facilitators played same role as in Problem Analysis. All solutions were documented in the meta cards and displayed for the group exchange. Meta card with outcomes was pasted at the top followed by outputs and activities at the bottom to develop a solution tree.

- **Group Exchange**

The group exchange processes were carried out same as in Day One.

2.2.3 Identifying and Mapping of Hotspots

In the problem analysis day, the map of Tawa South River System was displayed in both hardcopy and power point presentation including interactive Google Earth Images and carried out participatory discussion to identify hotspots of the respective River System. These participatory discussions were instrumental to trace out the hotspots of Tawa South RS in terms of their severity, which would be basis for designing intervention packages for the BRCRN project with reference to climate change mitigation and climate change adaptation discussed in the problem and solution analysis. The study team noted the name and physical location of the hotspots identified by the participants for field verification.

2.2.4 Field Visit and Focus Group Discussions (FGDs)

The study team went to the field after the two-day workshops to verify identified hotspots. Focus group discussions (FGD) were carried out with the local communities who reside near the hotspot. FGDs were conducted at Giddhabar and Dadariya of Katari -2; and Lamiduwali of Katari-6. The study team had also conducted key informant interview to understand the depth of the problems in the respective hotspots. In the FGDs, the study team discussed on the major problems of the hotspots and potential interventions to address the problems along with the local safeguard information. In the FGDs, representatives from community managed forest groups, farmers groups, victims of disasters from Tawa South RS, local leaders and other concerned individuals participated. The study team was quite attentive to ensure participation of indigenous people (IPs), Dalits social groups, and women to make the FGDs more inclusive, encourage them for their meaningful participation, and insist them to be vocal on their problems in the face of climate change mitigation and climate change adaptation. The study team documented all the issues raised in the FGDs, which would be reflected in the CERP.

2.3 Expert Planning Workshop

2.3.1 Expert Planning Workshop Participants

The experts from Division Forest Offices, Sub-division Forest Offices from respective river systems, Province Forest Directorate, Ministry of Forests Environment and Soil Conservation, Koshi Basin Management Center, President Chure Terai Madesh Conservation Development Board, Soil and Water Management Office, and Agriculture Knowledge Center participated in the two-day workshops. Experts were invited in collaboration with BRCRN-PPMU and FAO-TA and Province ministries. All participants were informed though formal letter from Ministry of Agriculture and Ministry of Forests Environment and Soil Conservation at provincial level.

2.3.2 Workshop

The two-day expert planning workshop was conducted at Gaighat of Udayapur district on 21st and 22nd of August 2022. The workshop was conducted for Tawa South, Adheri-Baruwa-Dwar, Gideri and Sunkoshi river systems of Udayapur district. The workshop was intended to validate the preliminary CERPs prepared based on local stakeholder consultations. In the workshop, BRCRN-PPMU firstly briefed about the BRCRN project and the objectives of the study. This session also included study process followed. In the workshop, detailed outcome derived from problem analysis, solution analysis and hotspot verification were shared. Issue related with deforestation, forest degradation, agriculture and disaster raised in local stakeholder workshops were shared with respective experts. Problem tree, Solution tree, Hotspot map, intervention packages, activities, safeguard analysis matrix, benefit enhancement activities were shared and discussed/verified in the workshop for each individual river system. Comments and suggestions collected from the workshop are incorporated in relevant sections for improvement of the Critical Ecosystem Restoration Plan.

CHAPTER 3 : INTRODUCTION TO TAWA SOUTH RIVER SYSTEM

3.1 Physiography, Land Cover and Hydrology

Tawa South is part of Tawa watershed, with coverage of 17.5% area of total watershed. It is north-facing Chure hill and inner river valley, extended over 86.276195° to 86.581808°E and 26.882885° to 26.961677°N.

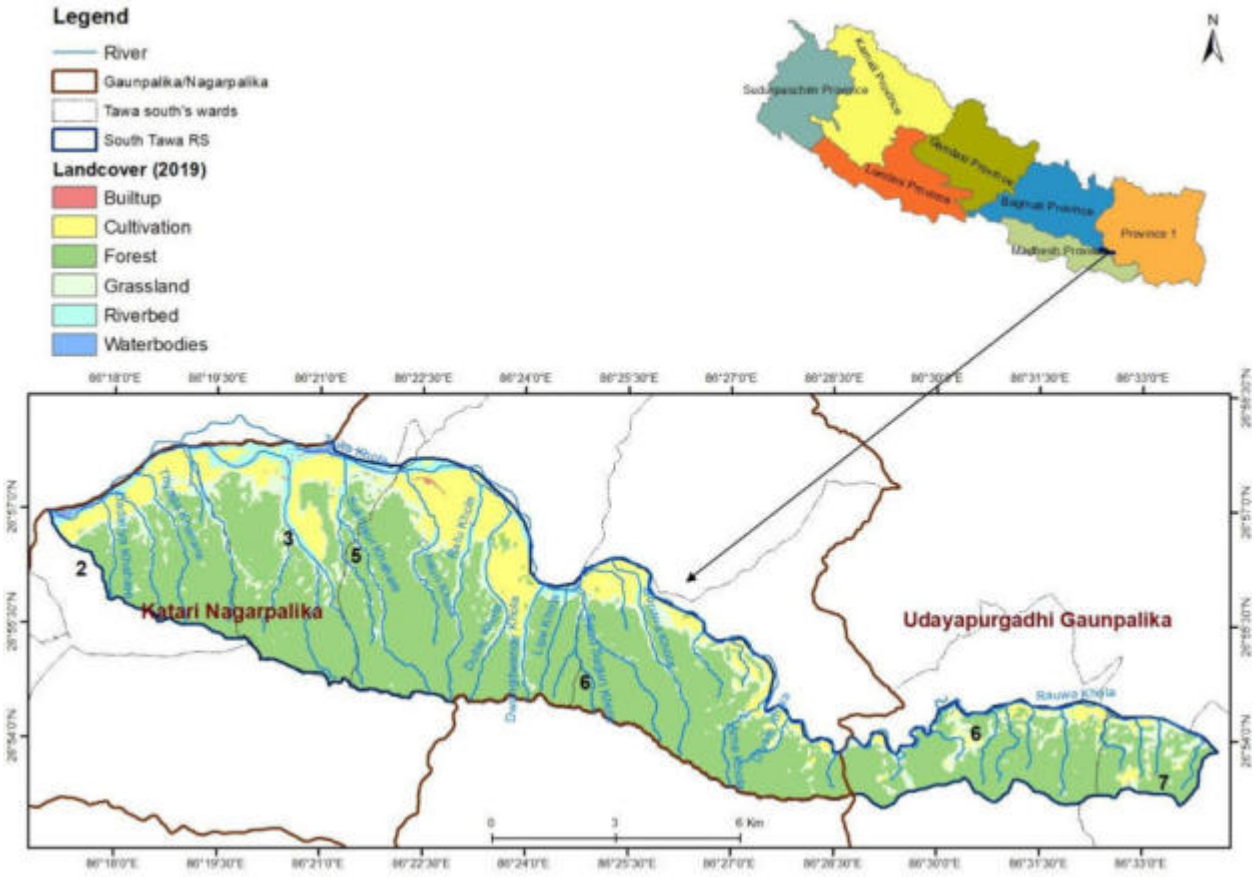


Figure 5: Location of Tawa South river system

Inner river valleys are generally quaternary terraces, composing of alluvial fan, river terraces, and flood plain with coarse to fine sediments. This region is generally flat or rolling plains and characterized by areas of population concentration. Whereas, hillslope is composed of Lower Siwaliks (LS) and Middle Siwaliks (MS) (DMG, 2007). The LS is dominant in the western part of river system which consists of interbedded mudstones and fine sandstones or siltstones. Similarly, MS comprises higher proportion of sandstone in a sequence of interbedded sandstone and mudstone. Sharp topography with high relief, steep slopes and escarpments are formed on the Middle Siwaliks, which is attributed to a higher proportion of beds of thick massive hard and resistant sandstones. The RS lies in-between of Kamala-Tawa Thrust to the south and Marin Khola Thrust to the north. This has shaped complicated geological structures such as complex folds, faults or thrusts, different types of joints and fractures, and varying bed orientations and inclinations.

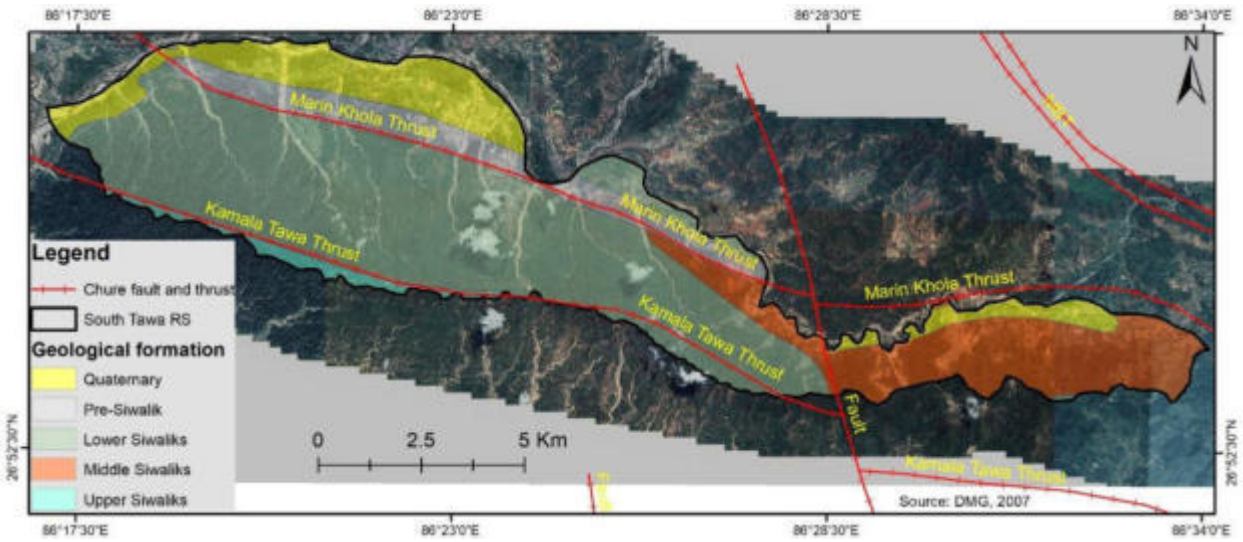


Figure 6: Geology of Tawa South River system

Forest[1] is the pre-dominant land cover of RS, covering 67.22% of the total area, which has decreased at the rate of 0.03 percent per year during 2000-2019. Increasing urbanization with the built-up area expansion of 8.6 ha at the rate of 4.78 percent per year is another key characteristic of this river system. Rapid growth is observed along the Madan-Bhandari highway, resulting the conversion of fertile land to built-up area.

Table 2: Land cover change in South Tawa River system

Land cover	2000		2019		Change area (ha)	Rate of Change (%/yr)
	Area (ha)	Percentage (%)	Area (ha)	Percentage (%)		
Built-up	6.07	0.07	14.73	0.16	8.66	4.78
Cultivation	1415.59	15.68	1412.03	15.64	-3.56	-0.01
Forest	6103.44	67.61	6068.40	67.22	-35.04	-0.03
Grassland	958.99	10.62	1011.91	11.21	52.92	0.28
Water bodies	12.30	0.14	50.41	0.56	38.11	7.71
Riverbed	531.20	5.88	470.11	5.21	-61.09	-0.64

Source: (ICIMOD & FRTC, 2021)

The Hydest WEC-DHM method estimated that overall discharge at the driest month (March) is 5.0m³/s and high discharge (85.4m³/s) occurred on August (Table 3).

Table 3: Average monthly discharges in Tawa South and its tributaries

Month	Average Discharge (m³/s)
January	6.4
February	5.5
March	5.0

[1] Land with tree crown cover of more that 10 percent and area covering more than 0.5 ha, with minimum height of the trees to be 5 m at maturity and in-situ conditions. The land may consist either of closed forest formations where trees of various storied and undergrowth cover a high proportion of the ground, or of open forest formations with a continuous vegetation cover in which tree crown cover exceeds 10 percent.

Month	Average Discharge (m^3/s)
April	5.4
May	7.7
June	23.1
July	72.0
August	85.4
September	64.8
October	28.5
November	11.9
December	7.7
Annual average	27.0

Surface water in small tributaries flowing south to north are very minimum except for few hours in storm period. Flash floods are very common on these streams, which are typically associated with short, high-intensity rainfall. The erosion and landslide are not only causing loss and damaged in the upstream but also increasing risk on cultivated land and settlement in the downstream through excessive sedimentation. Some of the settlements such as Nepaltar, Bihibare and Simanpur are extended in the previous flood plain and are in similar elevation level of the riverbed.

3.2 Climatic Conditions

The RS has subtropical climate and is heavily influenced by the monsoon (June-September), with an average annual rainfall of 1892 mm (DHM, 2021). Moreover, Climate change scenarios analysis performed for National Adaptation Plan (NAP) process indicated that average annual mean temperature of Udyapur district is likely to rise, Representative Concentration Pathway (RCP) 4.5 projected that increased by 0.81^{0}C and 1.17^{0}C in medium-term and long term respectively. The highest rates of mean temperature increase are expected for the post-monsoon season followed by the winter season (MoFE, 2019). Rising temperature further will create water stress during the dry months through decreasing agricultural production and thereby increasing food insecurity. Increasing temperature is also likely to contribute for spread of the crop diseases, insects and pest, weeds and alien invasive (Pandey, 2012; Bhandari et al., 2019).

Table 4: Climate change scenario (MoFE, 2019)

Temperature	**^{0}C**	**Change (^{0}C)**			
	RCP 4.5			**RCP 8.5**	
	Reference Period (1981-2010)	Medium Term (2016-2045)	Long Term (2036-2065)	Medium Term (2016-2045)	Long Term (2036-2065)
	19.9	0.81	1.17	1.02	1.72
Precipitation	**mm**	**Change (%)**			
	RCP 4.5			**RCP 8.5**	
	Reference Period (1981-2010)	Medium Term (2016-2045)	Long Term (2036-2065)	Medium Term (2016-2045)	Long Term (2036-2065)
	1653	3.37	4.58	3.55	7.93

Source: (MoFE et al., 2019)

Similarly, average annual precipitation is likely to change in both the medium-term and long-term periods. It is likely to increase by 4.58% and 7.93% in the long period based on RCP 4.5 and RCP 8.5 respectively.

3.3 Socio-ecological Process

According to the participants of local stakeholder consultations, residents of the RS have generally migrated from adjoining districts and northern part of Udayapur and thus composition of the community is heterogeneous. The Janajati/ethnic (Danuwar, Magar, Tamang, Rai Newar etc.) are the main indigenous groups in RS comprising more than 65% of the total households. The settlements are scattered; however, cluster settlements are increasing because of emerging markets along the Madan Bhandari highway. Emerging economic nodes/markets such as Bijanbari, Nepaltar, Geruwa, Giddhabar, Tribenighat and others are also causing forest encroachment and as well as building pressure on riverbed materials.

During local consultations, it was realized that more than 80 % population are practicing subsistence farming, especially women and marginalized communities. Small landholding together with issues on land registration has exacerbated the vulnerability of the farmers in RS. Moreover, only terraces adjacent to Tawa, Baidyanath and Rauwa Khola have surface irrigation facilities, while the rest of other are rain fed. Water scarcity has limited the agriculture production in dry upland/Tar. Whereas productivity of steep cultivated land in Chure hill are naturally less and thus those lands are increasingly kept fallow in the recent years.

CHAPTER 4 : PROBLEM AND SOLUTION ANALYSIS

4.1 Problem Analysis

Theme 1: Climate Change Mitigation

4.1.1 Drivers and Underlying Causes of Deforestation and Forest Degradation

The major challenges of the forest sector identified at Tawa South River System are deforestation and forest degradation. Causes of deforestation and forest degradation are usefully separated into direct drivers and underlying causes. Drivers of D&FD are mostly associated with anthropogenic activities.

Direct drivers and underlying causes of D&FD identified in Tawa South River System are presented in Table 5. The drivers are prioritized and presented in sequential order.

Table 5: Direct drivers and underlying causes of Deforestation and Forest Degradation

Drivers of D&FD	Underlying Causes	
Forest fire	Lack of awareness	
	Carelessness from herders and forest dwellers	Throwing of cigarette butts etc.
	Intentional fire	Intentions of illegal poaching
	Inadequate preparations for forest fire management	Inadequate skilled human resources and firefighting equipment; fire lines; removal of dry biomass
Unsustainable and illegal harvesting	Poverty and limited livelihood opportunities	Forest products being a source of income generation
	Higher dependency in firewood	Lack of alternative energy sources
	Demand-supply gap of forest products	Higher demand for timbers with settlement/market expansion; Delay in silviculture operations, harvesting and utilization in community forests (CFs); Increased forest users while the area of CF remains the same; Centralized timber distribution system from District Forest Products Supply Committee (DFPSC); Households with unregistered lands deprived of timbers and firewood distributed legally
	Insufficient private land forests	Small landholdings; Inadequate timber, firewood, fodder production in private lands
Open and uncontrolled grazing	Inadequate fodder production in private lands	Small landholdings
	Weak forest protection	Lack of fencing, poor enforcement of rules and regulations
Forest encroachment	Population growth	Settlement expansion; Agriculture land expansion

Drivers of D&FD	Underlying Causes	
	Poverty and limited livelihood opportunities	
	Ineffective law enforcement	
Ineffective forest management practices	Limited capacity and resources of CFUGs	Low income of CFUGs; Inadequate skill, equipment and technicians for forest management in CFUGs; Inadequate financial support
	Poor forest enhancement	Outdated forest operational plan; Problems associated with plantation like inadequate irrigation, open grazing, riverbank cutting and cutting of saplings by fodder, firewood collectors
	Weak governance	Declining accountability of CFUGs; Deficiency in forest sector transparency; Weak leadership in CFUGs' executive committees; Weak coordination and cooperation among stakeholders
Infrastructure development	Disproportionate population distribution	Construction of roads, transmission line, religious sites etc.; Scattered settlements
	National pride projects	Madan Bhandari highway

❖ **Problem Analysis**

The drivers of deforestation in Tawa South river system are encroachment of forest area and infrastructure development. Encroachment is mainly for settlement and farmland expansion. Population growth because of both natural growth and in-migration and poverty and limited livelihood opportunities of the people residing close to the forests are the main reasons behind this. It is also associated with ineffective law enforcement and presence of political influences. The constructions of Madan Bhandari highway, a national pride project, transmission line and local roads are other drivers of deforestation. One of the major causes is conflicting government policies that make forest tenure insecure. The major impacts associated with deforestation are increase in landslide, erosion, riverbank cutting and loss of biodiversity.

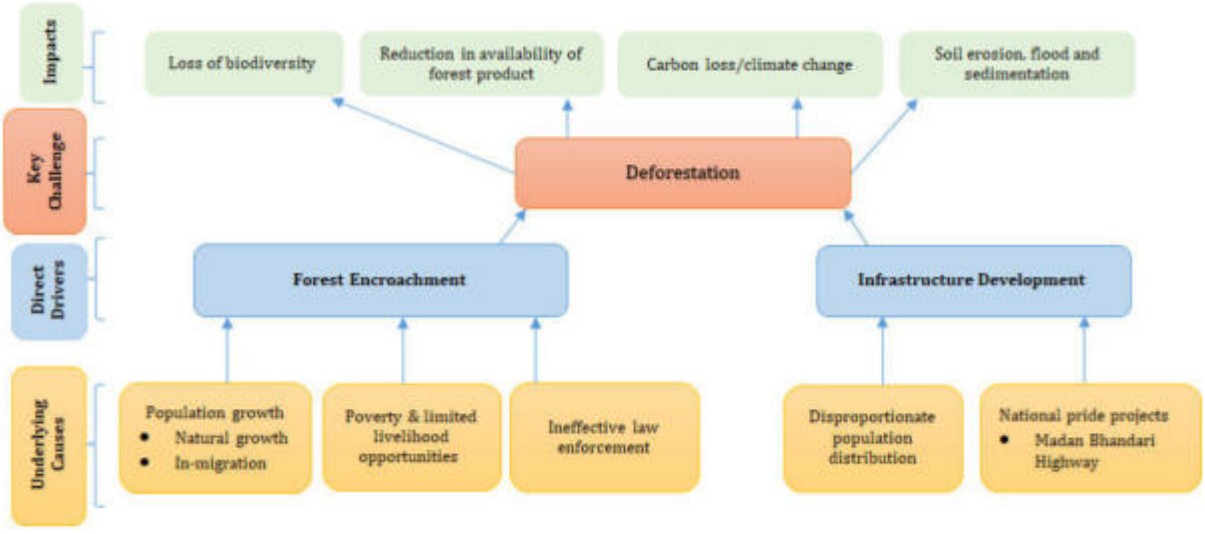


Figure 7: Problem tree for deforestation

Forest fire is one of the major drivers of forest degradation in Tawa South river system. The causes of forest fire are lack of awareness, carelessness among forest dwellers and herders. In some cases, poachers intentionally start forest fire to burn litters and twigs to make it easy site of the prey. The spread of forest fire has been difficult to handle due to inadequate trained human resources and firefighting equipment. Early preparations for forest fire like management of fire lines and, removal of dry biomass are inadequate. Reducing the occurrence of forest fire is challenging due to difficult geographical terrain especially in the upstream of Tawa South River System. Similarly, forests fire spreading from the adjoining community forests especially from Siraha district is also one of the hindering factors to control forests fire in the upstream forests. Unsustainable and illegal harvesting is one of the main drivers of forest degradation. People within the river system have higher dependency on forest products, especially firewood and fodder. The population growth has put further pressure on the forests. The demand for firewood and fodder is high due to lack of alternative sources. The supply as per the forest operational plan is insufficient to fulfill this demand. The other cause is poverty and limited livelihood opportunities for forest dependent people. In some cases, people collect firewood and are engaged in illegal logging for income generation. There exists an organized logging chain. Forest degradation is also triggered by open and uncontrolled grazing of livestock. The underlying cause behind this is inadequate fodder production in private lands. People either have small landholdings or are not involved in private forest development. The grazing areas outside the forests are almost unavailable with only few patches along the riverbanks. Ineffective forest management practices have also resulted in forest degradation. It is mainly associated with institutional weakness caused by weak coordination and collaboration among forest stakeholders, weak governance and low technical capacity and financial resources of CFUGs. Forest degradation has caused a decline in forest products, water source depletion, deterioration of wildlife habitat and increase in landslide, erosion and riverbank cutting. Majority of the workshop participants reported a decline in water sources within the river system.

Moreover, the river system lacks forest enhancement activities especially afforestation and reforestation. Very few efforts have been made by CFUGs for plantation because of their weak financial status and low support from the concerned agencies. People here are less interested in private forestry due to small landholdings, agriculture dependency and higher opportunity costs of land. The problem is further enhanced due to unregistered lands. Most of them are also unaware of the favorable and high value tree species and technical knowledge on forest development. Besides, less availability of demanded species and quality tree seedlings, forest fire, inadequate irrigation facilities (in dry areas) and open grazing, all create problems in plantation.

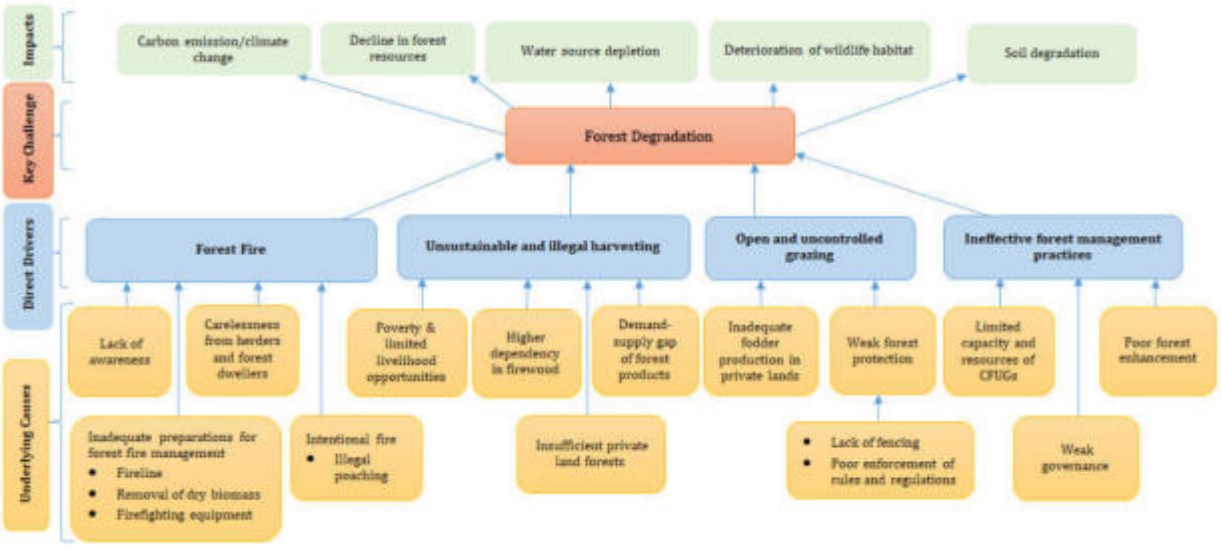


Figure 8: Problem tree for forest degradation

❖ **Key Observations**

- Approximately two-third out of 1426.76 ha (built-up and cultivation land) are unregistered lands/without ownership certificates based on local consultation and verification from expert planning workshop.
- Construction of Madan Bhandari highway has further enhanced forestland encroachment along the road.
- A couple of massive scale dry landslides have been observed in Tawa South RS.
- An elite influence in CFUGs is one of the major causes of weak governance. Persons holding major posts in executive committees of CFUGs resign once they find better opportunities. The other reason is competitive feelings where one who does not get hold on major posts files complaints against others in major posts to hinder his/her work.
- The major cause behind illegal logging is unemployment. The other cause is unregistered lands. The households without land ownership certificates are deprived of timbers distributed from District Forest Products Supply Committee. It also creates difficulties in private land forests, as sale of forest products from unregistered lands is illegal.
- At present, timber is distributed from DFPSC located at the district headquarter. Distant users are unwilling to buy from DFPSC due to additional cost of transportation.
- In some cases, an organized logging chain is also causing forest degradation especially, on the southern Chure hillslope. Loggers from opposite hillslopes (Siraha district) are engaged which has been difficult to control due to inter-district and inter-province administrative issues.
- Difficult to establish forest-based industry due to impractical provision of industrial development guidelines.

Theme 2: Climate Change Adaptation

4.1.2 Drivers and Underlying Causes of Vulnerable Ecosystem and Community

Climate induced disaster and climatic stress on agricultural productivity are the two key challenges representing the vulnerable ecosystem and community in Tawa South River System. These two key issues have impacts on the ecosystem and livelihood generations through damage to natural vegetation, loss and damage of agricultural lands, loss of life and properties, damage to infrastructures, low family income and food insecurity.

The direct drivers and underlying causes of vulnerable ecosystem and community identified in Tawa South River System are presented in Table 6. The drivers are prioritized and presented in sequential order.

Table 6: Direct drivers and underlying causes of vulnerable ecosystem and community

Drivers	Underlying Causes	
Climate Induced Disaster		
Erosion/landslide	Topography	Fragile geological condition and slope terrain
	Forest degradation	Forest fire, unsustainable harvesting, open grazing etc.
	Heavy/erratic rainfall	High intensity rainfall and continuous rainfall for several days
	Cultivation in marginal lands	Limited productive lands for the community
Flood	Upstream landslide and erosion	Fragile geological condition and slope terrain
	Heavy/erratic rainfall	
	Riverbank encroachment	Risk acceptance due to poverty, economic opportunity of land in future
Weak disaster risk management	Inadequate capacity and coordination	Insufficient investments; weak coordination and collaboration at national level
	Ineffective Disaster Risk Reduction (DRR) policy and planning	Low capacity of local governments in DRR planning and implementation
	Weak upstream-downstream linkage	Lack of early warning system and communication mechanism
Climatic Stress on Agriculture Productivity		
Inadequate capacity and resources	Limited farm skill and technology use	Inadequate agriculture technicians at local level
	Low investment capacity of farmers	
	Inadequate support	Inadequate promotional activities in agriculture
	Poor market access and infrastructures	Higher cost of production and low market price; Lack of processing and storage facilities
Pests and diseases	Decline in organic content of soil	Use of chemical fertilizers and pesticides; Low organic inputs
	Less immune hybrid seeds	
Soil quality deterioration	Low organic inputs	Less availability of compost manure due to declining livestock farming
	Use of chemical fertilizers and pesticides	Inadequate knowledge and technology for compost, bio-pesticides production
	Sedimentation in farmland	Erosion, flood
Insufficient irrigation	Limited surface water sources	Drying up of water sources
	Depletion of wetlands	Lack of conservation of water sources
	Lack of alternative irrigation technologies	Insufficient efforts to promote rainwater harvesting, drip irrigation and others
	Inadequate irrigation infrastructures	Inadequate investments

❖ **Problem Analysis**

The climate vulnerability to ecosystem and local community in Tawa South RS is due to natural disasters-erosion, landslides and floods. Landslide and flood have caused loss and damage of natural vegetation, agricultural land, properties and physical infrastructures mostly road and canals affecting local people's livelihood. These disasters are triggered by both natural and anthropogenic causes. The fragile geological condition and slope terrain of Chure hills, high intensity rainfall and continuous rainfall for several days are natural causes. Forest degradation, riverbank encroachment and cultivation in marginal land are major anthropogenic causes.

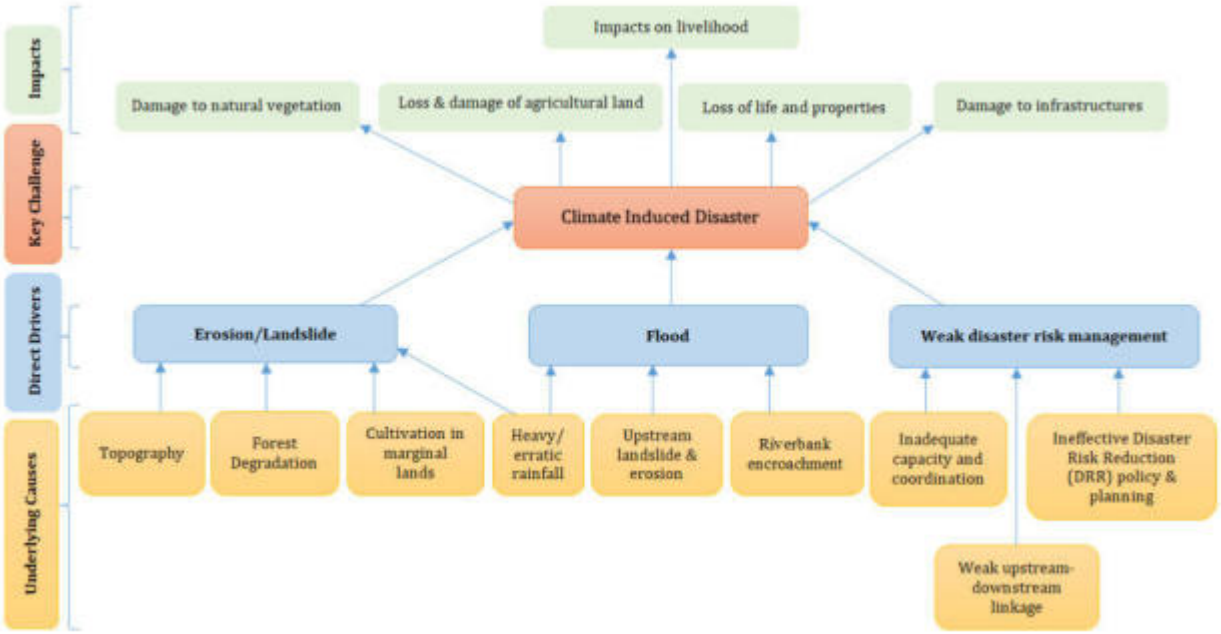


Figure 9: Problem tree for climate induced disaster

Weak disaster risk management has further exacerbated exposure to these disasters. The reasons behind this are weak coordination and collaboration among concerned sectors and low capacity of local governments in DRR planning and implementation. The investments in DRR are also inadequate and scattered without proper planning. Besides, there is a lack of early warning systems. As an example, in July 2019, the landslide of Dhappar in Udayapurgadhi Rural Municipality displaced about 10 households of Tintatne. Landslide dam was formed in Baidyanath Khola for 18 hours. However, the people downstream had no information until it gradually drained out.

Climatic stress on agricultural productivity is the other aspect of vulnerable local communities. It has direct impact on people's livelihood through low family income and food insecurity. It eventually makes forest ecosystem vulnerable through increased pressure on forest resources. Irrigation facilities are not sufficient. Farmers have limited skill for commercial and climate resilient farming practices. There is less use of technology and equipment for mechanization in agriculture. Poor market access and infrastructure have demotivated farmers to adopt commercial agriculture. There is lack of storage and processing industries. Besides, investment capacity of the small farmers is low due to poor financial status and small and scattered land holdings. Production cost is higher for them compared to the market price of sale of products. Lack of farm labor due to youth migration abroad, lack of agriculture technicians and inadequate support and promotional programs are other problems for enhancing commercial and smallholder agriculture. Soil quality deterioration is another driver of low agricultural productivity. It is

due to low organic inputs as people nowadays have less livestock holdings. Rather, the dependency on chemical fertilizers and pesticides is increasing. This further deteriorates soil quality. It also has increased the impacts of pests and diseases. Pests and diseases are also triggered by less immune hybrid seeds.

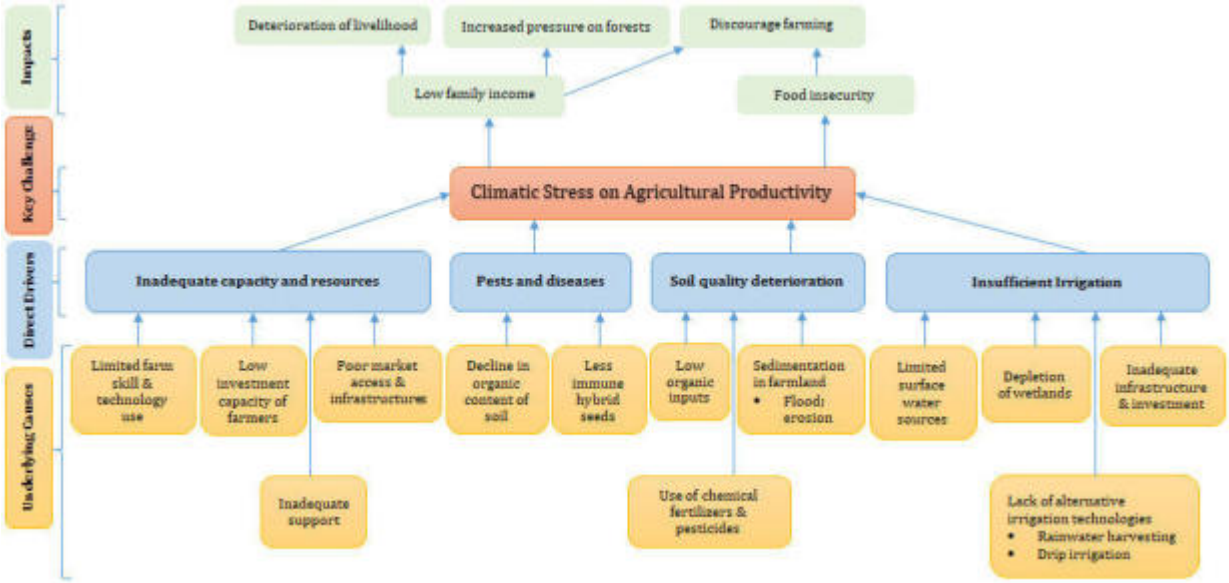


Figure 10: Problem tree for climate stress on agricultural productivity

❖ **Key Observations**

- Security agencies mostly Armed Police Force, is more involved in disaster management but they lack essential equipment.
- Unregistered lands make difficult for households to receive government incentives in farming.
- Though declared at policy level, provision of crop insurance is yet to be endorsed.
- Hybrid varieties are less pest-resilient both in cultivation and in storage.
- Farmers face unnecessary hurdles in registration of farmers group, acquisition of Permanent Account Number (PAN), approval for government incentives, auditing and renewals.

4.1.3 GESI Issues Observed in Problem Analysis

Women, IPs, Dalits, poor and marginalized groups have less access to finance, technology and skill to address the deforestation problems and policy gaps in addressing gender governance. Women are not able to ask for their equal rights to natural resources management. Women and marginalized groups are not having adequate knowledge and awareness in policies and law for sustainable forest management. Gendered governance, participation and integration was found to be low in all the issues and their voices are not heard or skills and technological access is weak. Settlements with unregistered lands do not allow women, IPs or marginalized communities to get benefits from the project interventions.

The GESI issues identified from problem analysis are presented in Table 7.

Table 7: Problems associated with GESI

Drivers	Underlying Causes	
Inadequate exercise of gender-inclusive governance in climate change, sustainable natural	• Male- supremacy and dominance in decisions • Limited access of women to information and communication (especially climate change and SNRM-related information, facility, fund, notice, and subsidies)	• Hesitation to speak in meeting • Less knowledge on CFUG management • Less knowledge on climate change adaption

Drivers	Underlying Causes	
resource management (SNRM) practice	• Less consultation with women regarding agenda and time of meetings • Unavailability of disaggregated data • Lack of recognition of traditional knowledge of women in climate resilient land use practices (CRLUP)/SNRM • Articulation of CRLUP/SNRM /DRR as scientifically complex subjects • Limited knowledge on gender mainstreaming approach and value among officers/key people • Gendered power relations within households, society and restricted mobility of women	• Insufficient women participation • Increased vulnerability of women towards environmental changes • Slower women leadership development in natural resource management (NRM), forest management and DRR • Low income of women • Less control of women over high value forest products

4.2 Solution Analysis

Theme 1: Climate Change Mitigation

4.2.1 Activities for Reducing Forest Loss and Enhancing Forest Density

The activities for reducing forest loss are associated with the mitigation of deforestation and forest degradation while the forest density can be enhanced through afforestation and reforestation. The major activities identified for reducing forest loss and enhancing forest density are presented in Table 8.

Table 8: Activities for reducing forest loss and enhancing forest density

Drivers of D&FD	Activities against Drivers	
Forest fire	Sensitization/awareness programs	Sensitize communities on the impacts of forest fire on ecosystem functions/services and their restoration
	Construction and improvement of fire lines	Capacity development and funding support for fire line construction
	Firefighting training and equipment support to CFUGs	Coordination and collaboration with DFOs/DRRMC and security forces
	Enhance water availability during forest fire	Construction of conservation ponds for water storage
	Removal of dry biomass	Promote compost production from dry leaf litters and unwanted bushes
Unsustainable and illegal harvesting	Enhance income generation opportunities for poor/ marginalized forest users	Skill development trainings on production of Sal leaf plates, bowls and bamboo products etc.) and equipment support
	Promote woodlots/commercial plantation in private lands	Seedling distribution of commercial trees, fruits (fast growing and high value), fodder trees; fencing support; Training on silviculture practices
	Promote agroforestry	Seedling distribution and technical support
	Promote alternative energy	

Drivers of D&FD	Activities against Drivers	
Open and uncontrolled grazing	Promote stall feeding	Training and support on commercial livestock farming and shed improvement
	Support fodder banks in private and public lands	Distribution of seeds/seedlings of fodder trees and nutrient grasses; technical trainings
Forest encroachment	Forest boundary demarcation	Technical and financial support to DFOs/sub-DFOs
	Enhance income generation opportunities	Employment generation for poor and marginalized groups through herbal farming and establishment of Sal leaf plate (*Tapari*) industry
	Resolution of land tenure issues	Policy commitments/ Policy interventions
Ineffective forest management practices	Implementation of sustainable forest management	Review/upgrade/renewal of forest operational plans (FOPs) of community forest user groups (CFUGs); Sensitization/awareness programs on sustainable forest management; Training on silviculture operations and equipment use
	Establish/upgrade nurseries	Demand based seedlings production (Amriso- *Thysanolaena maxima*; Bans- *Dendrocalamus hamiltonii*, *Dendrocalamus strictus*, *Bambusa sp*; Tanki- *Bauhinia purpurea*; Badahar- *Artocarpus lakucha*; Bakaino- *Melia azedarach*; Epil Epil- *Leucaena leucocephala*; Katahar- *Artocarpus heterophyllus*; Khamari- *Gmelina arborea* and others)
	Implement forest enhancement activities	Enrichment plantation, riverbank plantation, assisted natural regeneration (ANR) etc.
	Strengthen forest governance	Joint coordination meeting of government staffs and CFUGs
Infrastructure development	Regulate infrastructure development in forest area	Promote environment friendly infrastructures; IEE/EIA & detail engineering study and design for infrastructure development
		Coordination and collaboration between line agencies of Ministry of Forests and Environment (MoFE), provincial MoFESC, other development ministries and local government to discourage infrastructure development in forest area

❖ **Solution Analysis**

Solution trees are prepared to minimize deforestation and restore degraded forests. Deforestation is associated with encroachment of forestlands and infrastructure development. The foremost activity to control encroachment is to resolve land tenure issues. This requires intervention at policy level. Forest boundary demarcation can be helpful to avoid further encroachment and requires strong law enforcement. Poverty and livelihood issues can be addressed by enhancing income generation opportunities for poor/marginalized groups through skill development training and support for entrepreneurship development. Infrastructure development in forest areas can be regulated through policy interventions; enhancing inter-agency coordination and cooperation; and provision of

environment assessment (IEE/EIA), detail engineering study and designs. Infrastructures in forest areas should be environmentally friendly. There should be coordination and collaboration between line agencies of Ministry of Forest and Environment (MoFE) at federal level; Forest, Environment and Soil Conservation related ministries at province level; and other development ministries and local government to discourage infrastructure development in forest area.

Degraded forests can be restored through addressing direct and underlying drivers of forest degradation, improving natural regeneration and plantations. Forest fire, one of the major drivers of forest degradation, can be mitigated by enhancing firefighting capacity and early preparations. The CFUGs need to be well trained and equipped to control forest fire. In addition, collaboration with security agencies (Nepal Police, Armed Police Force) further enhances forest firefighting capacity. Periodic removal of dry biomass and construction of fire lines reduces forest fire spread. In turn, the bushes and dry leaf litters can be used for compost/manure production. Construction of water storage ponds in potential strategic locations enhances water availability during forest fire. Moreover, illegal poaching needs to be controlled by enhancing forest monitoring. Illegal harvesting of forest products can be minimized by enhancing income generation opportunities for poor/marginalized forest dependent people and improving legal supply of forest products. The socially and economically marginalized forest dependent people can be provided with skill development programs and support for entrepreneurship development. Promoting alternative energy, agroforestry and private forestry also reduces forest dependency. Promotion of agroforestry and private forestry require seedlings and technical support. Fodder trees and nutrient grasses can be promoted in private and public lands. This enhances fodder availability outside forests and reduces pressure of open grazing in forests. Providing training and support on commercial livestock farming and shed improvement can be helpful in promoting stall feeding.

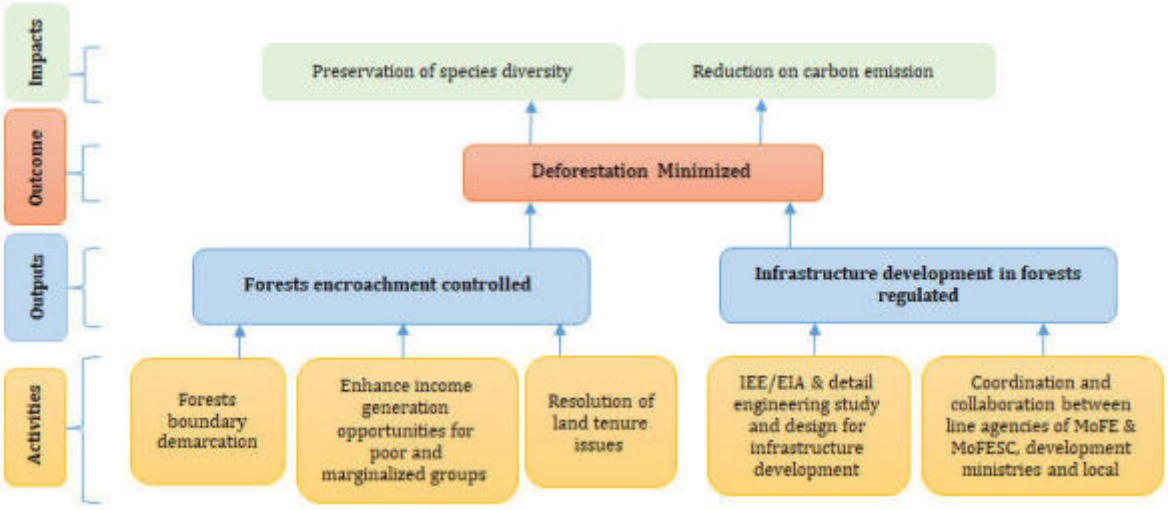


Figure 11: Solution tree for minimizing deforestation

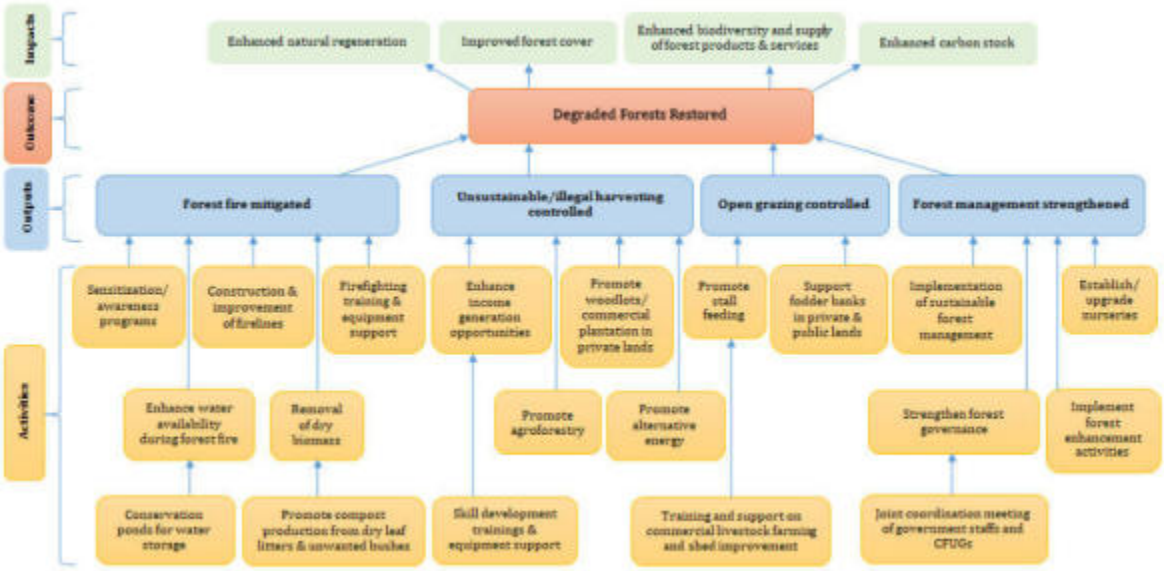


Figure 12: Solution tree for restoration of degraded forests

Forest management can be improved through FoP implementation and strengthening sustainable forest management practices, implementation of forest enhancement activities and strengthening forest sector governance. All the CFUGs should have valid forest operational plan. They should be well trained and equipped for its implementation. Forest enhancement can be done through afforestation and reforestation. Seedling/sapling availability can be ensured by construction/upgradation of nurseries. Priority should be given to local native species while other commercial species can also be introduced through proper study and in line with safeguard measures. Nurseries should produce saplings of demanded species that will encourage plantation. Moreover, government staffs and CFUGs' executive committee members should be sensitized and capacitated to strengthen forest sector governance.

❖ **Major Activities and Outputs**

The major activities and outputs proposed for reducing forest loss and enhancing forest density are presented in Table 9.

Table 9: Major activities and outputs for reducing forest loss and enhancing forest density

Major Activities	Outputs
Forest fire control	Restored degraded forests area halting forest fire, illegal harvesting and grazing
Agroforestry promotion	
Income source of poor/marginalized forest users enhanced halting illegal harvesting	
Improvement of forest cover within national forest through enrichment plantation/ANR	Improved natural forest management and increased forest area outside the forest
Restoration, enhancement and maintenance of forests and tree cover in the river system landscape through Public and private forestry	
Strengthening forest management	

❖ **Recommendations from Expert Planning Workshop**

- Better to implement conservation-oriented activities in Chure rather than focusing on plantation and its nurturing.
- Provide subsidies in electricity to promote use of electrical stoves.

- Enterprise development would be better for the employment generation. Skill development training should be focused on construction works that can guarantee employment opportunities and can be effective in replacing outside workers.
- Riverbank plantations can be effective to avoid riverbank encroachment. Considering Tawa Khola (main branch), plantation in adjoining land to the active flood plain can be cost effective and sustainable.
- It would be effective to enhance cooperation and collaboration with security agency for forest fire management. They should be provided with essential equipment like fire extinguisher, fireproof jackets, water jet spray etc. Security agencies can also provide firefighting training.
- Timber distribution should be decentralized with provision of distribution from sub-division forest offices. It can be effective in reducing demand-supply gaps.

Theme 2: Climate Change Adaptation

4.2.2 Activities for Enhancing Adaptation/Resilience of Ecosystem and Community

The activities for enhancing adaptation/resilience of ecosystem and local community are associated with minimizing impacts of climate induced disasters and adoption of climate resilient farming system. The major activities identified are presented in Table 10.

Table 10: Activities for enhancing adaptation/resilience building of ecosystem and community

Drivers	Activities Against Drivers	
Climate Induced Disaster		
Erosion/landslide	Landslide treatment	Crown (top part of landslide) protection, drain management, seed broadcasting, check dam etc.
	Construction of check dams and bioengineering for gully/debris torrent treatment	
	Promote agroforestry on marginalized land	Plantation of high value/multi-year species and grazing control in erosion prone areas
Flood	Riverbank stabilization	Embankments and bioengineering
	Plantation of bamboo and other species along river corridors	
Weak disaster risk management	Enhance coordination and collaboration among concerned agencies for integrated DRR planning	Participatory planning approach
	Strengthen disaster preparedness with equipment support	
	Strengthen upstream-downstream linkage	Establish early warning system
Climatic Stress on Agriculture Productivity		
Inadequate capacity and resources	Establish Farmer Field Schools to capacitate farmers	Training and incentives to promote commercial and climate resilient farming
	Promote cooperative farming among small landholders	Provide seed money, soft loans, subsidies in equipment, production based subsidies

Drivers	Activities Against Drivers	
	Establishment of collection, storage and processing facilities	
Pests and diseases	Train farmers on identification and treatments of pests and diseases	
	Promote conservation of resilient native crops and local livestock breeds	Trainings on seed production, selection, grading, storage
Soil quality deterioration	Promote organic farming and Integrated Pest Management (IPM)	Awareness programs and trainings on IPM and compost, bio-pesticides production; Promote livestock farming by supporting shed improvement and fodder banks establishment; Distribution of seeds/seedlings of fodder trees and nutrient grasses; Support soil quality test
Insufficient irrigation	Promote alternative irrigation practices	Training and support drip irrigation, rainwater harvesting, plastic line ponds, solar technology for lifting irrigation etc.
	Conservation of water sources	Plantation around water sources; Construction of check dams wherever possible for water storage and source conservation

❖ **Solution Analysis**

The strategic actions proposed for disaster risk reduction are landslide treatment, erosion control, riverbank stabilization and strengthening disaster risk management. Landslide treatment can be done through crown protection, drain management, seed broadcasting etc. gullies/debris torrent can be treated by constructing check dams. Promoting agroforestry, livestock management and conservation agriculture in slope lands also help in reducing soil erosion. Plantation of high value species, multi-year fruits and plant species, not only reduces erosion but also provides a source of income. Riverbank stabilization requires construction of embankments. Bioengineering can be integrated for effectiveness along with structural measures. It also enhances vegetation cover. The other important activity to minimize disaster risk is to enhance coordination and collaboration between different agencies working for disaster risk management. The disaster risk reduction plans of various agencies should be integrated that provides solution to inadequate and scattered investments thereby enhancing effectiveness of DRR activities. Disaster preparedness can also be strengthened through equipment support. Moreover, early warning system should be established to strengthen upstream-downstream linkage.

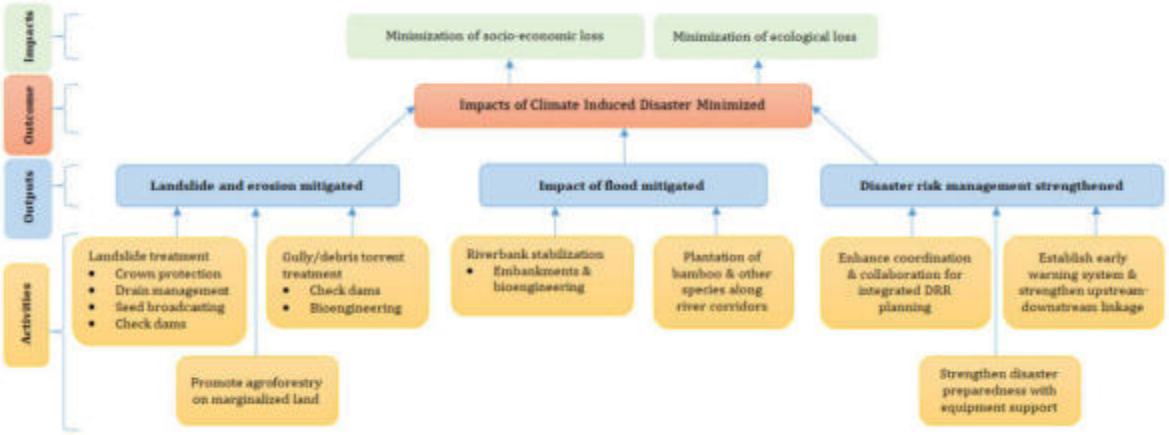


Figure 13: Solution tree for minimizing impact of climate-induced disasters

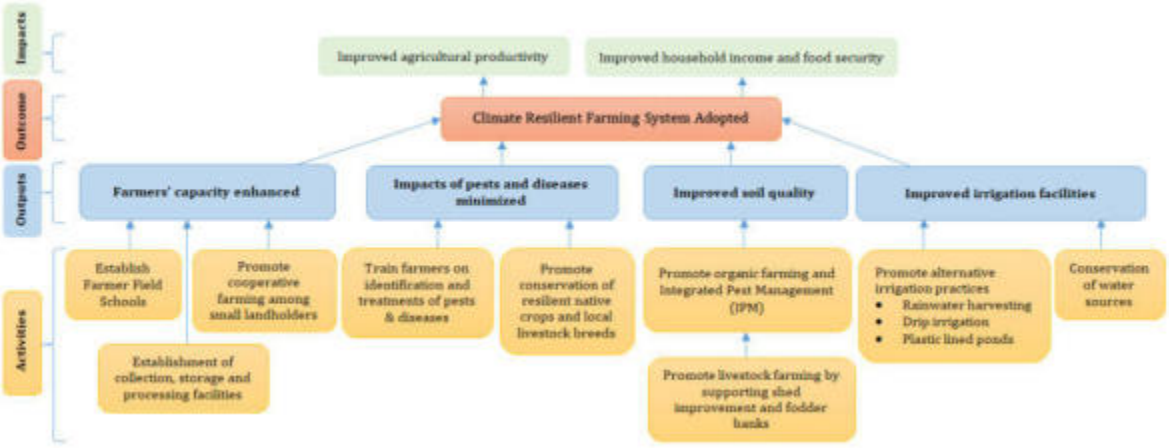


Figure 14: Solution tree for climate resilient farming practices

One of the important aspects of enhancing adaptation/resilience building of ecosystem and local community would be climate resilient farming practices and enhancing agricultural productivity. Increase in agriculture productivity will improve livelihood of small farmers and at the same time, it will decrease forest dependency. To achieve this, foremost priority should be to enhance capacity of farmers. Farmer Field Schools can be the best solution where farmers will be trained on climate resilient farming practices and enhancing agriculture productivity. Training farmers alone would not be sufficient to encourage farmers. Providing seed money, soft loans, subsidies in equipment, production-based subsidies and improving irrigation facilities can encourage farmers to commercial farming. Cooperative farming can be promoted among small landholders to enhance income generation opportunities of farmers. Alternative irrigation practices like rainwater harvesting, drip irrigation can be promoted along with conservation of water sources, installation of solar pump technology, deep boring to improve irrigation facilities. Organic farming and Integrated Pest Management (IPM) can be promoted to improve soil quality by reducing use of chemical fertilizers and pesticides. It can be promoted by providing trainings and equipment support. Promoting commercial livestock farming can further enhance organic farming. Farmers should be provided with technical support and incentives for commercial livestock farming and shed improvement. They can be encouraged to establish fodder banks in private land by providing seedlings of fodder trees and nutrient grasses. It will be helpful in promoting stall feeding and decreases impact on forest due to open grazing. Promoting organic farming and IPM can also be beneficial in reducing crop pests and

diseases. Farmers can also be trained on identification and treatment of pests and diseases. Conservation of resilient native crops and local livestock breeds should be promoted. Improvement of native crop varieties/livestock breeds can enhance resiliency and productivity. The above-mentioned activities are intended to capacitate farmers in climate resilient farming, minimizing agriculture yield loss and increasing productivity. Nevertheless, collection, storage and processing facilities should be established to support commercial farming.

❖ **Major Activities and Outputs**

The major activities and outputs proposed for enhancing adaptation/resilience building of ecosystem and local community are presented in Table 11.

Table 11: Major activities and outputs for enhancing adaptation/resilience building of ecosystem and community

Major Activities	Outputs
Controlling erosion/landslide and management of sedimentation	Minimized impacts of climate induced disasters (erosion, landslides/sedimentation and flooding)
Agroforestry promotion in marginal/sloping lands	
Minimization of negative impact of flood	
Strengthening disaster risk management and awareness creation on climate resilient NRM	
Establish and operationalize Farmers Field Schools (FFS)	Farmers adopted climate resilient farming practices
Implementation of climate-resilient land use practices (pest and disease minimized, soil quality improved, irrigation facility enhanced)	

❖ **Recommendations from Expert Planning Workshop**

- More than 440 gullies were observed in Tawa South. Among them about 40 gullies, need treatment based on their severity. However, only four gullies are prioritized for treatment considering direct impacts on settlement and agriculture.
- Gulley treatment should be focused right from the upstream. Only downstream treatments will not be effective.
- Provide equipment support to security agencies for disaster management.
- Increase governance related activity to promote women's engagement and participation.
- Construct sediment trappers in river/torrents with higher sedimentation.
- More focus should be on groundwater recharge through construction of water storage dams, and conservation/recharge ponds.
- Concretization should be avoided in water source conservation.
- Promote climate resilient agriculture practices and coordinate with agriculture offices.
- Households with unregistered lands (lands without ownership certificates) can receive government support for agriculture on recommendation from respective ward offices.

4.2.3 Gender Inclusive Process and Action Plan

Gender inequality and social norms limit women's access to resources and sufficient opportunity to participate in the decision-making process, particularly in sustainable natural resource management. Women are playing a significant role in the conservation of forests and increasing the adaptability of climate change impact. The entire CERP process has adopted gender-inclusive actions such as ensuring equal participation during the consultation. The process adopted a gender-specific approach to collect problems, especially among women's user groups, through the Himalayan Grassroots Women's Natural Resource Management Association (HIMAWANTI). The gender-specific approach adopted particular research tools such as seasonal calendars, problem and solution community workshops, and focus group discussions among women, Dalits, Ip's women, and other marginalized communities. Also, the consultation process includes a consultation with women and women lead organizations. The male leaders were also involved in advocating gender equality and women's engagement in the climate change

planning process. The gender mainstreaming approach is included in problem and solution analysis and the recommendation has been incorporated in the plan. Key issues and solutions on gender equality in SNRM:

Table 12: GESI issues and gender inclusive actions

Key issues	Solution
1. Unequal representation and influence of women in NRM, CCA, and DRR governance	1. Equal representation of women and consideration of specific adaptation needs is a must to realize inclusive SNRM and CCA
2. Women's issues and capacity are not considered in the planning process	2. Involvement and integrating women and women's concerns need to include in the programming process (planning, budgeting, monitoring, evaluation, and redesigning of the plans and project)
3. Women are just counted as vulnerable groups and passive beneficiaries of development interventions	3. Plan/conduct gender mainstreaming training, learning events, and advocacy campaigning for gender integration for the government officers, CBOs executive, local resource persons, and other stakeholders
4. Women are more involved in labour contributions both in conservation and management of natural resources	4. Learning and sharing platforms for grassroots-level women at their settlements can help to identify their issues and problems in the group
5. Women have less control over high-value products such as timber and the commercialization of non-timber forest products as compared to men	5. Provide business opportunities, build the leadership skills to communicate or negotiate with men/leadership/decision makers to access information and resources and initiate entrepreneurship, promote men into governance-related activities, and present men as change makers "Champions."
6. Underrepresentation of women in the process is the major reason and the challenges to women's representation are the gender role, restricted mobility	6. Conduct a rapid assessment to generate the case study and build the capacity of municipality people to keep the record-gender disaggregated data
7. Lack of gender-disaggregated data in government offices	7. Building the technical capacity of women-led organizations helps to raise the collective voice of women contributing to advocating for gender-inclusive planning and budgeting at local levels
8. Lack of equal representation of women in decision-making process	8. Sensitization on the gender differential impact of climate change has been strongly suggested in a community workshop, focused group discussion, and discussion with women-led organizations
9. Loss of women's control over valuable resource	9. Institutionalization of gender analysis as part of program design helps to increase gender-related actions-such as promoting women's participation, providing information, and integrating gender in a planning process
10. Less achievement/progress on gender specific reports, activities, and progress	10. Application of gender budgeting for the effective implementation of gender-inclusive planning

Key issues	Solution
11. Women are not aware about the plan, policy, subsidies, and other facilities	11. Capacity development of local government based on capacity need assessment for gender-inclusive planning and budgeting
12. less agriculture productivity	12. Increased access of women to climate resilient agriculture practices, availability of drought tolerant plants, seeds through farmer's field school
13. Food scarcity and hunger especially among poor, Dalits, and indigenous women.	13. Promote cash crops such as seasonal and off-season vegetable farming through FFS. Promote the concept of community farming or group farming
14. Limited understanding about the socioeconomic impact of gender inequality	14. Advocacy campaign to promote gender equality (community radio, community theatre, communication materials; booklets, best practices, posters, flex with key messages, day celebration (International women's day celebration, 16 days of activism against gender-based violence, etc)

4.2.4 Solution to Gender Issues

Gender and women empowerment issues and concerns are integrated into all activities. However, considering the importance of gender-inclusive governance as a key element to mainstream gender into the implementation, the plan is focused on one gender-specific IPack on gender-inclusive governance. Therefore, the solutions to gender issues are associated with enhancing gender-inclusive governance.

The solutions to GESI issues are associated with enhancing gender-inclusive governance.

Table 13: Activities to enhance gender-inclusive governance

Drivers	Activities Against Drivers	
Inadequate exercise of gender-inclusive governance in climate change, SNRM practice	• Create informal learning and sharing platforms for grassroots-level women • Conduct local level policy discourses to ensure gender responsiveness and women's participation, access, control and leadership • Produce and publish best practices and learning in gendered governance • Conduct rapid assessment on women's contribution and involvement in SNRM/ CRLUP and management • Provide gender mainstreaming trainings/ workshops to local government and CBOs and concerned stakeholders • Conduct GESI focused social audits and public hearing • Conduct advocacy campaign to promote awareness on gender responsive information, available provisions and resources among CBOs/ women groups. This will include day celebration, integration of gender in local radio program, learning events, etc. • Engage male involvement to advocate gender and women's issues and concern in advocacy and media campaign.	• Increase women's participation • Share information about the latest news, update, notice, fund, plans and budget • Time information about training and meetings • Promote and engage leadership • Include and integrate males in advocacy campaigns and radio programs (the radio program will be integrated with other SNRM themes and activities)

❖ **Major Activities and Outputs**

The activities and outputs proposed for enhancing gender-inclusive governance are presented in Table 14.

Table 14: Major activities and outputs for enhancing gender-inclusive governance

Major Activities	Outputs
Increase access of women to SNRM and knowledge and information	Gender inclusive governance practiced and adopted climate resilient practices
Integrate gender and women's participation in local planning processes in SNRM	

4.2.5 Integration of GESI and IP's Issues into Solution Activities

The following special attention is required to mainstreaming women, Dalits, indigenous people, and marginalized communities in the implementation of ecosystem restoration plans for the river system:

a. Provide opportunities to build capacity in natural resource management for users, particularly women, indigenous peoples, Dalits, and forest-dependent marginalized communities.

b. Improve and synchronize CFUGs' operational plans in order to improve users' capabilities (women, Dalit, IPs, and marginalized users) and build a strong mechanism for GESI in the river system's forestry sector.

c. Provide an opportunity for women with specific, major actions in the restoration of the hotspots, for example:

- Provide women's capacity-building training in nursery establishment and seedling production
- Provide capacity-building training to CFUGs and farmers' groups on river bank and gully stabilization
- Provide skill-building training to women for the promotion of afforestation in river reclaimed lands and the promotion of agroforestry and other opportunities (for example, the development of fruit orchards)
- Invest in women's decision-making capacity building, especially in forestry activities for Churia regions' women and agriculture activities for lowland regions' women
- Minimize women's workloads in the collection of fuelwood: a) by providing cost-effective equipment and techniques, especially in alternative energy uses for cooking); b) by providing fodder seeds and access to woodlots in public and private lands
- Reduce social barriers (social and economic insecurity and lowered education and understanding level) for Dalit, indigenous, and other vulnerable ethnicity women to participate in ecosystem restoration activities such as sustainable forest management and agriculture land restoration (on both public and private lands)
- Engage women in agroforestry, FFS, IPM and trainings to ensure their incomes and knowledge enhancement

❖ **Inclusive Process and Plans for Indigenous People**

Special attention is given on FAO, FPIC Manual for Project Practitioners 2016, focused on an Indigenous Peoples' right and a good practice for local communities. Free, Prior and Informed Consent (FPIC) process is required for the implementation of any activities highlighted in the CERP. For this, implementing agency (CBOs) and project manager must follow 6 steps in different actions during CERP implementation in the river system:

Step 1: Identification of Indigenous Peoples' concerns and their representatives

Step 2: Document geographic and demographic information through participatory mapping

Step 3: Design a participatory communication plan and carry out iterative discussions through which project information will be discussed in a transparent way

Step 4: Reach consent, document Indigenous Peoples' needs that are to be included into the project and agree on feedback and complains mechanism

Step 5: Conduct participatory monitoring and evaluation of the agreement

Step 6: Document lessons learned and disclose information about project achievements.

CHAPTER 5 : INTERVENTION PACKAGE

5.1 Formulation of Intervention Packages

From problem and solution tree analysis the main problems along with their causes and effects are recorded, to come up with clear and manageable goals and the strategies to combat them. There are two main stages to this process: (1) the identification of negative aspects of existing situations (or key challenges) in the form of problem trees, and (2) the change of the problems into objectives leading to solution trees showing potential solutions or strategies that respond to the drivers and underlying causes.

It is important to understand and recognize stakeholder engagement and listen to the voices and concerns of forest dependent and poor/marginalized social groups in the process of prioritizing the CERP activities. All these intervention packages (IPacks) were developed based on the activities and key results identified from local stakeholder workshops and verified from expert planning workshops involving most of the key stakeholders. The IPacks developed mainly focused on reducing deforestation and forest degradation; enhancing adaptation/resilience building of vulnerable ecosystem and local community; and integrating gender and equity issues in governance practices in natural resource management and climate resilient land use practices. It provides activities for forest and carbon enhancement; climate resilient agriculture practices and land use practices; and reducing ecosystem and community vulnerability from climate-induced disasters.

Problem, Solution analysis and map demarcations done by participants are considered as a foundational step for formulating IPacks to group the activities. First the similar activities that are identified in solution analysis and their map demarcations are carefully reviewed against the underlying causes obtained in problem analysis. In next step, the activities are grouped based on adaptation and mitigation themes making sure it addresses the underlying causes and major problems (key drivers) identified during problem analysis. In addition, the findings of gender – a specific field study conducted by HIMAWANTI are integrated into the ipack. The gender study identified three key interventions focused on gender and women empowerment. However, the intervention package integrated most of the gender-related concerns in the ipack and added one gender-responsive government ipack as an advocacy campaign in the plan.

Ipacks are formulated based on this grouping such that each Ipacks address the major problems (drivers) and activities relate with solution analysis process. However, all activities identified in solution analysis are not reflected in IPack activities – as in reference to guidance from CERP manual Box 14 and section C1.2 based on which policy level interventions that are already reflected in REDD+ national strategy are not included in IPacks. Ipacks geographic focus and coverage areas were also closely reviewed to make sure that the upstream-downstream linkage issues are addressed, although geographic focus are not considered as a primary criterion for activity grouping.

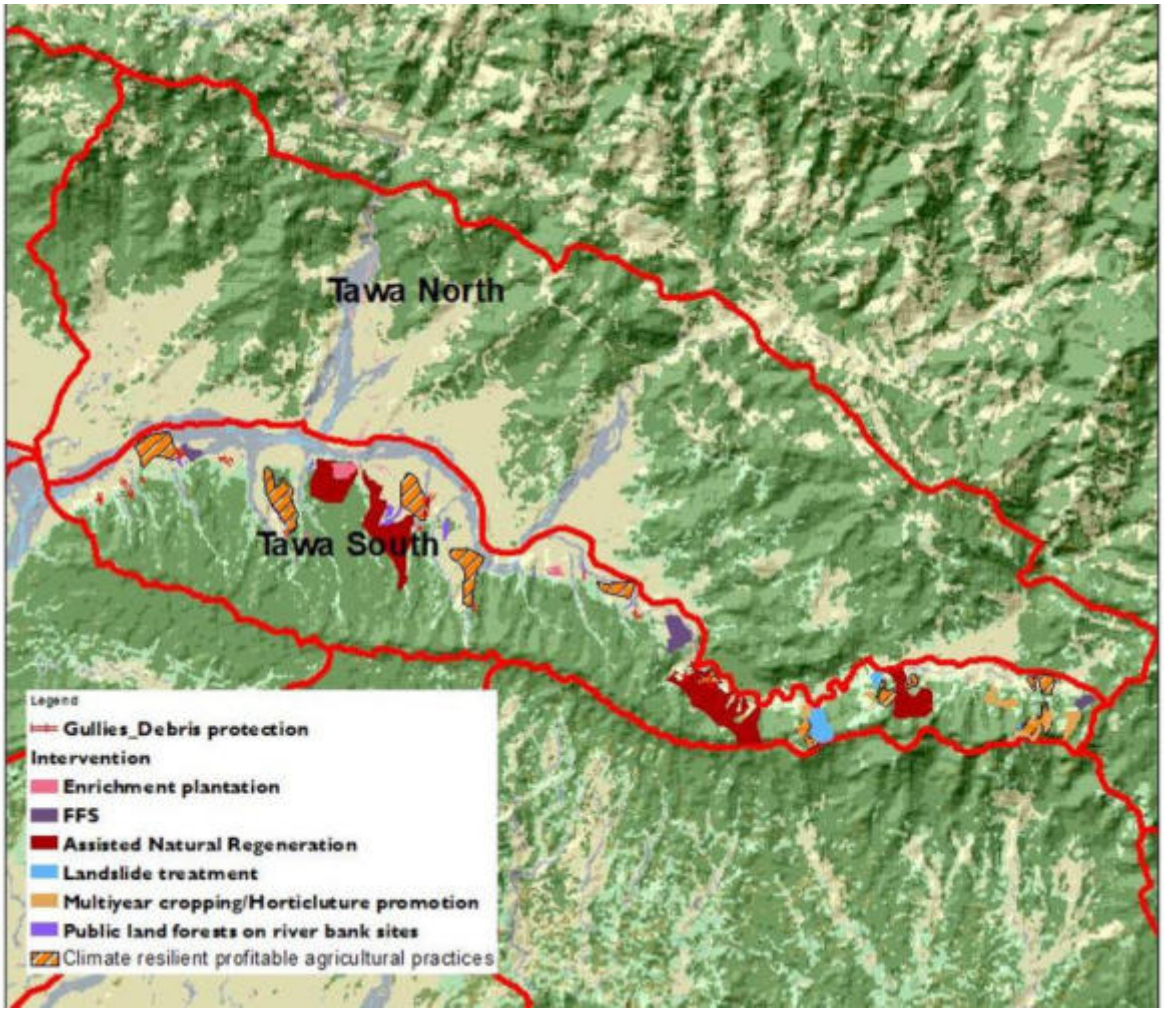
A number of activities that do not directly relate with ecosystem restoration were also noted during the problem-solution analysis process. These activities primarily include large scale infrastructure development along river corridors, revising national/provincial level policies, construction of local infrastructure, irrigation infrastructure, food security, water supply etc. Based on the guidance from project documents and CERP manual most strategic interventions that are feasible through activity prioritization are included in IPack formulation.

Table 15: Intervention packages for CERP

Intervention Packages (IPacks)	Outputs	Drivers or barriers addressed
IPack 1: Climate resilient agriculture and land use practices	Farmers capacitated in climate resilient agriculture	Inadequate capacity and resource; Pests and diseases; Soil quality deterioration; Insufficient irrigation
	Improved climate-resilient land use practices	
IPack 2: Improving/maintaining river system landscape through soil and water conservation	Agroforestry promoted	Erosion/ landslide; Flood; Unsustainable and illegal harvesting
	Erosion/landslide controlled and sedimentation managed	
	Flood mitigation	
	Disaster risk management strengthened	
IPack 3: Capacity enhancement for sustainable forest management	Forest management strengthened	Ineffective forest management practices; Unsustainable and illegal harvesting; Forest encroachment
IPack 4: Restoration and rehabilitation of degraded forests (Inside existing national forest)	Forest Restored through enrichment plantation and ANR	Forest fire; Unsustainable and illegal harvesting; Forest encroachment
	Forest fire mitigated	
	Income source of poor/marginalized forest users enhanced	
IPack 5: Restoration of river system landscape (outside national forest)	Forests and tree cover are restored, enhanced and maintained in the river system landscape	Unsustainable and illegal harvesting; Open and uncontrolled grazing; Erosion/landslide; Flood
IPack 6: Advocacy campaign: Gender-inclusive governance campaign	Increased access of women to SNRM and knowledge and information	Lack of gender integration in SNRM, CCA, and DRR planning and implementation process
	Integrated gender and women's participation in local planning processes in SNRM	

This CERP only covers those key results and IPacks that correspond to local level interventions. However, it also reveals a number of vital areas of interventions that can take place at national level such as- resolution of land tenure issues and interventions to regulate infrastructure development in forest area. These higher-level measures or interventions should also be incorporated into national strategies for successful implementation of CERP.

IPack activities also reflect up-mid-downstream linkages to foster integrated management approach. An activity mapped below at river system scale demonstrates that those activities under IPack 2 (such as landslide/erosion control, water sources conservation, flood mitigation) and IPack 3, 4 (such as ANR, Fire control, capacity building SFM) focus on upstream churia hill regions that are expected to reduce sedimentation and have profound impact on the morphology of the river and related disasters in the inner river valley. IPack 1 on CRA and IPack 5 on restoration of riverine landscape with plantation focus on these inner river valleys. Ipack 6 being an advocacy-Gender governance package, focuses on the entire river system. For a smaller river system such as Tawa South, consideration of these dynamics of Churia hills – Inner valley during IPack formulation are expected to play a crucial role in fostering the linkages to plan an integrated approach for better impact at river system level.



❖ **Strategies and Activities**

For each of the IPacks there are strategies (Table 16) and activities (Table 17). Strategies are followed by activities and provision of incentives that could encourage stakeholder's participation, as well as change their current practices that would enhance resilience and mitigation benefits (Table 16). All the activities developed are considered realistic and practical as regards their implementation. Ambiguous activities that are difficult to obtain clear and measurable outcomes have been excluded.

❖ **Summary of Feasibility Analysis**

Feasibility analysis was used to assess the strengths and weaknesses of the IPacks (Table 18), which can lead to desired results of the CERP. In the feasibility analysis, the risks and obstacles to implementation of each IPacks were assessed, and this provided the basis for assessing the overall feasibility of each IPack. Cost-effectiveness is also a vital criterion in feasibility analysis. The scores obtained through overall feasibility analysis at output levels indicate that all the IPs are reasonably feasible (Table 19). Erosion/landslide control and flood mitigation seem moderately feasible taking account of the risk that its implementation cost will be high with moderate cost effectiveness, as well as influential decisions on prioritization of sites for interventions. The feasibility analysis was duly verified from expert planning workshop.

❖ **Summary of Safeguard Analysis**

Safeguard analysis was done to identify social and environmental risks or threats (Table 20), as well as to identify where CERP interventions can contribute to significant social or environmental benefits (Table 21). Social risks are negative social side effects on poor and marginalized social groups while implementing the proposed IPacks. Women, IPs and marginalized minority groups, including Dalits among others, can experience discrimination and may face additional barriers to their participation and engagement that could limit their engagement within the project. Similarly, environmental risks are potential side effects from proposed interventions such as natural forest conversion, negative effects on biodiversity or other ecosystem services among others. In safeguard analysis, the measures to mitigate risks and enhance benefits were also assessed. The safeguard analysis matrix was duly verified during expert planning workshop.

❖ **Budget Plan**

The budget plan for CERP activities has been prepared based on approved district rate, and in close coordination with government officials at expert planning workshop, The quantitative implementation targets defined in the planning stage are the starting point for the budgeting process, followed by detail analysis of the activities, tasks and resources needed. The summary of budget plan for each IPacks is presented in Table 22. The detail budget plan with locations for interventions is presented in Annex 4.

❖ **Monitoring**

It is clearly essential to monitor the CERP implementation both for adaptive management of CERP and to be able to compensate or incentivize local stakeholders for their contribution to positive outcomes. For this, a monitoring protocol has been prepared (Table 23).

5.2 General Description of Intervention Packages

Table 16: General descriptions of IPacks

Intervention Packages	IPacks description	Objectives	Strategies	Activities/Incentives for Participation and Changing Stakeholder Practices
IPack 1: Climate resilient agriculture and land use practices	Farmers vulnerability have been increasing due to limited farm skill and technology, low investment capacity, inadequate irrigation facilities, increasing pest and diseases and poor market access which relates with inability to cope with climate change impacts. Eventually the result is increased pressure in forest resource. This intervention package thus provides solution to combat climate change impacts and enhance farm sustainability. Farmers are also facing problems of higher cost of agriculture input and low market price on sale.	• To capacitate vulnerable farmers, women, Dalits to adopt climate resilient agriculture practices • To enhance agriculture yield	• Improving resilience of farmers to climate change, disasters, price volatility and other shocks • Increase agricultural productivity of Forest dependent and other smallholders (equal participation of men and women)	• Train farmers (prioritizing women) on climate resilient agriculture • Incentivize poor/marginalized farmers (skill development and equipment support) • Promotion of alternative irrigation practice, local breed improvement and cooperative farming to enhance yield • Promote organic farming with provision of compensating yield loss to reduce chemical inputs • Disease/pest control • Support agriculture commercialization
IPack 2: Improving/ maintaining river system landscape through soil and water conservation	Landscape degradation within the river system is combined effect of natural and anthropogenic causes. It is mainly associated with fragile topography, climate instability and unsustainable use of natural resources. Natural hazards like erosion, landslide, flood, forest fire and declining ecosystem services like declining water resource, forest resource and agriculture yield all are associated with landscape degradation. This IPack thus focuses on restoration and maintaining the degraded landscape	• To mitigate disaster risks to reduce community and ecosystem vulnerability • To enhance restoration of ecosystem services • To enhance local knowledge, awareness and capacity on CRLUP and SNRM	• Increase non-carbon benefits of forest ecosystems • Minimizing erosion, landslide and floods through infrastructure development and also adopting indigenous knowledge, skills and customary practices • Promote changing annual crop into multiyear crop in Chure hill slopes	• Incentivize multiyear cropping/ horticulture • Promotion of agroforestry in marginal lands • Promote water conservation ponds in Chure hills as well as lowlands • Promote fodder grass in slopy public lands • Project implementation in-line with priority of local government • Formation of school based eco-clubs

Intervention Packages	IPacks description	Objectives	Strategies	Activities/Incentives for Participation and Changing Stakeholder Practices
	and livelihood improvement of local communities.		• Implementation of projects in the collaboration with local government • Awareness raising through schools, media and other relevant measures • Trainings for capacity enhancement in CRLUP and SNRM	• Training/capacity building on soil and watershed conservation using bio-engineering
IPack 3: Capacity enhancement for sustainable forest management	Forest management regimes within the river system reflect Community Forest and Government Forest. These forest areas in Chure are subject to immense pressure with increasing population. The problem of unsustainable harvesting and illegal logging prevails due to demand and supply gap. There is robust legal and policy framework in forest sector but lacks compliance in many ways. Limited access of CFUG members in decision-making, lack of clarity and uncertainty over forestland use, tenure, and resolution of households with unregistered land, widespread reports of corruption among different actors and law breaking in forest sector have weakened forest management efforts, accountability and transparency. This IPack focuses on improving forest management to resolve disparity among	• To improve forest quality through effective implementation of sustainable forest management • To improve forest governance	• Improve capacity, institutional performance and service delivery of the forestry sector institutions (including intra district/province level coordination) • Improving capacity of CFUGs as well as other stakeholders for sustainable forest management • Improve collaboration, cooperation and synergy among sectoral policies, sectors and actors • Enhance the role of private sector in forestry to promote forest-base enterprises for livelihood and economic development • Promote women and GESI and increase access of Indigenous People in sustainable forest management	• Financial and equipment support to encourage CFUGs for climate resilient sustainable forest management • Enhance forest sector transparency thereby, enhancing accountability of forest users and also reducing illegal activities • Promote women and GESI in participation and benefit sharing • Policy intervention for resolution of land tenure issues • Promote forest-based entrepreneurship • Decentralization of district based timber supply system • Development of compensatory mechanism for accidents during legal forest management activities • Incentive to security forces for capturing loggers and loggings.

Intervention Packages	IPacks description	Objectives	Strategies	Activities/Incentives for Participation and Changing Stakeholder Practices
	CFUGs and government agencies and enrich forest resources.			
IPack 4: Restoration and rehabilitation of degraded forests	Forest encroachment, unsustainable harvesting and illegal logging, open grazing and forest fire are the major D&FD drivers in the river system. It is further worsened by weaknesses in forest enhancement. Limited livelihood opportunities of forest users and management weaknesses of CBFUGs have hindered restoration and rehabilitation of degraded forests. This IPack seeks measures to tackle these weaknesses and restore degraded forests. It also supports enrichment of existing forests thorough assisted natural regeneration.	• To enhance forest cover through enrichment plantation • To capacitate CFUGs in handling forest fire • To provide forest dependent people with alternative resource and income generation opportunities	• Reduce carbon emissions, enhance forest carbon stocks, and improve supply of forest products • Promote livelihood improvement programs for poor and marginalized forest dependent people	• Support for nursery establishment and enrichment plantation • Enhancing technical capacity of CFUGs in plantation and nurturing of seedlings • Strengthen forest firefighting • Provide skill development trainings to increase income source of poor/marginalized forest users
IPack 5: Restoration of river system landscape (outside national forests)	Landscape degradation have been the concern and focused area of this project for restoration. Together with aforementioned IPacks, this IPack is focused on ecosystem restoration of this river system through enhancement of vegetation cover mostly in private and public lands	• To enhance vegetation cover through public and private land plantation • To decrease pressure in natural forests	• Reduce carbon emissions, enhance forest carbon stocks, and improve supply of forest products • Promote private and public land forestry	• Support for nursery establishment with production of on-demand seedlings • Incentives for shed improvement and fodder banks to support commercial livestock • Community ownership for plantation in public lands • Campaign for encouraging plantation in private lands with provision of tree insurance and production based subsidies

Intervention Packages	IPacks description	Objectives	Strategies	Activities/Incentives for Participation and Changing Stakeholder Practices
				• Promotion through demonstration plantation • Promote 50% share of woodlots development in lands with women and indigenous ownership
IPack 6: Advocacy campaign: Gender-inclusive governance campaign	The under-representation of women in the decision-making process has resulted in the exclusion of women's specific needs and capacities in SNRM, CCA, and DRR. Increased influence of women in governance is important to identify and include gender-responsive program interventions to increase the adaptive capacity of vulnerable women. The advocacy campaigns will include local-level stakeholders and the community and leverage local-level funds and resources.	• Increase women's leadership in NRM, CCA, and DRR • Building women's knowledge and skills in resource conservation and management Increase women's participation in decision-making forums • Increase common understanding towards gender equality and women empowerment in SNRM	• Build network among women and women-led organizations for an enabling environment • Engage male and government representatives in the campaign	• Consider women's convenience while setting meeting agenda and venue • Provide transportation costs for attending the trainings • Ensure that women are aware of meetings or activities in an appropriate way • Provide opportunity to participate in learning events /platforms for women leaders and women champions

5.3 Major Activities and Sub-activities

Table 17: IPacks, major activities and sub-activities

Intervention Packages (IPacks)	Major Activities	Sub-activities
IPack 1: Climate resilient agriculture and land use practices	**Establish and operationalize Farmers Field Schools (FFS)**	Identification and operationalization of FFS
		Capacity-building in the use of weather information and its application in agricultural practices
	Implementation of climate-resilient land use practices	Implement climate resilient agriculture practices
		Train and support farmers to adopt and apply climate-resilient land use practices
IPack 2: Improving/maintaining river system landscape through soil and water conservation	**Agroforestry promotion**	Promote agroforestry with multiyear cropping/horticulture promotion/on-farm conservation
	Controlling erosion/landslide and management of sedimentation	Landslide treatment
		Construction of check dams and bioengineering for gully/debris torrent protection
	Minimization of negative impact of Flood	Construction of embankments with bioengineering
	Strengthening disaster risk management and awareness creation on climate resilient NRM	Strengthening climate and disaster risk reduction mechanism in collaboration with local government
		Training/capacity building on soil and watershed conservation using bio-engineering
		Climate resilient awareness campaign through Eco-clubs
IPack 3: Capacity enhancement for sustainable forest management	**Strengthening forest management**	Review/upgrade/renew of forest operational plans (FOPs) of community forest user groups (CFUGs)
		Training and capacity development for implementation of FOPs
		Equipment support for implementation of FOPs
		Capacitate government staffs and CBOs on climate resilient forest management (Training of Facilitators-ToF)
		Governance training to government staffs and CFUGs to enhance accountability and transparency
IPack 4: Restoration and rehabilitation of degraded forests	**Improvement of forest cover within national forest through enrichment plantation/ANR**	Enrichment plantation
		Implement Assisted Natural Regeneration

Intervention Packages (IPacks)	Major Activities	Sub-activities
	Forest fire control	Firefighter training and support firefighting equipment to CFUGs
		Support firefighting equipment to security institution
		Training and equipment support to compost production
		Construction and improvement of fire lines
		Customize fire alert system in Community Based Forest Management (CBFM)
	Income source of poor/marginalized forest users enhanced halting illegal harvesting	Skill development trainings and equipment support
IPack 5: Restoration of river system landscape (outside national forest)	**Restoration, enhancement and maintenance of forests and tree cover in the river system landscape through Public and private forestry**	Establish and support multi-purpose tree nurseries
		Production of saplings
		Establish On-farm tree nursery
		Riparian/River bank plantation
		Technical guidance and support to establish woodlots
IPack 6: **Advocacy campaign: Gender-inclusive governance campaign**	**Increase access of women to SNRM and knowledge and information**	Create informal learning and sharing platforms for grassroots-level women
		Conduct local level policy discourses to ensure gender responsiveness and women's participation, access, control and leadership
		Produce and publish best practices and learning in gendered governance
	Integrate gender and women's participation in local planning processes in SNRM	Conduct rapid assessment on women's contribution and involvement in SNRM
		Provide gender mainstreaming trainings/ workshops to local government and CBOs
		Conduct GESI focused social audits and public hearing
		Conduct advocacy campaign and promote awareness on gender responsive information, available provisions and resources among CBOs/ women groups
		Engage male involvement to advocate gender and women's issues and concern in campaign

5.4 Feasibility Analysis

Table 18: Feasibility analysis

Outputs	Activities	Implementation Risk or Obstacle	Risk Reduction Measures	Risk Reduction Targets	Indicators
IPack 1: Climate resilient agriculture and land use practices					
Farmers capacitated in climate resilient agriculture	Identification and operationalization of FFS	• Exclusion of poor and marginalized farmers • Lower investment capacity of small farmers • Drop out of participants of FFS	• Build transparent selection criteria • Incentives for small farmers • Encourage and incentivize the participants	• Selection criteria to include poor and marginalized are in place • 100 % farmers attending FFS are incentivized to adopt climate resilient agriculture • At least 80% of FFS participants complete FFS package	• Selection criteria • Proportion of farmers incentivized • % of participants who complete FFS package
Improved climate-resilient land use practices	Train and support farmers to adopt and apply climate-resilient land use practices				
IPack 2: Improving/maintaining river system landscape through soil and water conservation					
Agroforestry promoted	Promote agroforestry with multiyear cropping/horticulture promotion/on-farm conservation	• Unwillingness due to higher opportunity cost of land	• Promotion of high value agroforestry • Incentivize socially and economically marginalized households	• Agroforestry in 92 ha land • Proportionate sharing of benefits among women, Dalit Janajati and marginalized groups	• Land area with agroforestry • % of women, Dalit Janajati and marginalized groups incentivized
Erosion/landslide controlled and sedimentation managed	Landslide treatment	• Local knowledge and practices missing in the stabilization measures • Influential decision in implementation	• Integrate local knowledge and practices • Risk prioritization prior to implementation in coordination with local government	• At least 3 landslides treated with integration of structural & bioengineering measures and risk prioritization • Local knowledge and practices integrated for the landslide treatment	• Number of landslides treated • Number of landslide treatment with local knowledge and practices
	Construction of check dams and bioengineering for gully/Debris torrent protection	• Local knowledge and practices missing in the bioengineering for the protection • Influential decision in implementation	• Integrate local knowledge and practices with structural and non-structural (bioengineering) measures	• At least 4 gullies/debris torrent stabilized with integration of structural & non-structural measures and risk prioritization	• Number of gullies stabilized with local knowledge and practices

Outputs	Activities	Implementation Risk or Obstacle	Risk Reduction Measures	Risk Reduction Targets	Indicators
			• Risk prioritization during mitigation		
Negative impact of flood minimized	Construction of embankment with bioengineering	• Higher cost of mitigation (higher opportunity cost of investment)	• Integrate indigenous knowledge, skills and customary practices and resources for low- cost solutions	• 2135 m riverbank stabilization integrating structural & non-structural measures	• Length of riverbank stabilized with indigenous knowledge, skills and customary practices
Disaster risk management strengthened	Training/capacity building on soil and watershed conservation using bio-engineering	• Disparity in selection of participants	• Build transparent selection criteria	• At least 50 % women, 13 % Dalit and 31 % indigenous peoples representatives trained on soil and watershed conservation using bio-engineering	• Number of women, Dalits and indigenous representatives trained
IPack 3: Capacity enhancement for sustainable forest management					
Forest management strengthened	Review/upgrade/renew of forest operational plans (FOPs) of community forest user groups (CFUGs)	• Unwillingness of CFUGs due to lack of budget and technical knowledge	• Provide financial and technical support	• At least 34 CFUGs receive financial and technical support	• Number of CFUGs receiving financial and technical support
	Training and capacity development for implementation of FOPs	• Disparity in selection of participants (recommendation of participants from CFUGs)	• Build transparent selection criteria for CFUGs	• At least 50 % women, 13 % Dalit and 31 % indigenous peoples representatives trained in implementation of climate resilient FOPs	• Number of women, Dalits and indigenous representatives trained
	Equipment support for implementation of FOPs	• Inadequate technical knowledge in handling of equipment	• Sensitize about BRCRN project scope and deliverables • Technical trainings on equipment handling	• At least 34 CFUGs receive equipment support with trained individuals	• Number of CFUGs receiving equipment and its handling support
	Capacitate government staffs and CBOs on	• Level of understanding on climate resilient forest management practices	• Adoption of peer learning method	• At least 4 events of joint training (government staff and CBO representatives)	• Number of joint trainings

Outputs	Activities	Implementation Risk or Obstacle	Risk Reduction Measures	Risk Reduction Targets	Indicators
	climate resilient forest management (ToF)	among the trainee and trainers			
	Governance training to government staffs and CFUGs to enhance accountability and transparency	• Gaps in understanding of governance in forest management procedures between government authority & CFUG	• Joint trainings/ roundtable discussion	• Bi-annual joint trainings for 5 years	• Number of joint training events organized
IPack 4: Restoration and rehabilitation of degraded forests					
Improved forest cover through enrichment plantation and ANR	Enrichment plantation/ANR	• Conflict on site and seedling species selection	• Prior consultation with CFUGs	• At least 1 consultation meeting with each CFUGs	• Number of prior consultations
Forest fire mitigated	Firefighter training and support firefighting equipment to CFUGs	• Lack of technical knowledge in handling of equipment	• Technical trainings on equipment handling	• At least 10 CFUGs are well equipped with trained firefighting groups	• Number of well-equipped CFUGs with trained firefighting groups
	Training and equipment support to promote compost production	• Elite capture • Cheaper alternatives to compost in the market	• Transparent selection to include most fire prone CFs • Awareness raising programs on the significance of composting conducted for CFUGs with opportunities to the market linkages	• At least 10 most fire prone CFs are included • At least 10 awareness raising events conducted covering 10 CFUGs	• Number of most fire prone CFs included • Number of awareness raising events
	Construction and improvement of fire lines	• Selected sites might demand cutting of trees in significant number	• Selection of site with minimal tree removals • Improvement of fire lines will be prioritized	• At least 4 km of fire lines constructed/ improved	• Length of fire lines
Income source of poor/marginalized forest users enhanced	Skill development trainings and equipment support	• Low investment capacity of trainees on small and	• Incentivize to develop small and medium	• More than 50% trainees involved in income generation	• % of trainees involved in income generation

Outputs	Activities	Implementation Risk or Obstacle	Risk Reduction Measures	Risk Reduction Targets	Indicators
		medium enterprise establishment	enterprise (nursery, agroforestry)		
IPack 5: Restoration of river system landscape (outside national forest)					
Forests and tree cover are restored, enhanced and maintained in the river system landscape	Establish and support multi-purpose tree nurseries	• Disparity in site and species selection	• Prior consensus with communities for site and species selection	• At least 2 consultation workshops organized	• Number of consultation workshops conducted to select site and species
	Riparian/Riverbank plantation	• Conflict of land use change (eg. Current grazing sites)	• Community consultation before plantation site selection	• All the plantation sites are free from conflict	• Number of sites free of conflicts for riparian plantation
	Technical guidance and support to establish woodlots	• Unwillingness due to higher opportunity cost of land	• Distribution of high value and fast growing tree species • Provide financial support for field preparation, protection and management of woodlots	• 100% landowner who establish woodlots receives financial support	• % of landowner who establish woodlots receiving financial support
IPack 6: Advocacy campaign: Gender-inclusive governance campaign					
Increased access of women to SNRM and knowledge and information	Create informal learning and sharing platforms for grassroots-level women	• Social norms and values restricting women to participate and give time for informal learning and sharing platforms	• Identification of social and structural barriers faced by women through sensitization measures	• At least one gender sensitization learning event per year	• Number of gender sensitization events conducted
	Conduct local level policy discourses to ensure gender responsiveness and women's participation,	• Women lack access and resources about local level policies making them vulnerable	• Awareness and sharing of policies	• At least one event held on policy dissemination among women groups • At least 70% of target population participated	• Event/ activity report • Proportion of target population reached

Outputs	Activities	Implementation Risk or Obstacle	Risk Reduction Measures	Risk Reduction Targets	Indicators
	access, control and leadership				
	Produce and publish best practices and learning in gendered governance	• Lack of resources	• Ensure availability of resources	• Allocate budget for production and publication	• At least one report containing five best practices published and disseminated
Integrated gender and women's participation in local planning processes in SNRM	Conduct rapid assessment on women's contribution and involvement in SNRM	• Inadequate budget	• Explore budget availability	• Integrate subcomponents on ongoing studies	• Assessment reports
	Provide gender mainstreaming trainings/ workshops to local government and CBOs	• Gender is not a priority	• Raise awareness about long-term benefits after participating in gender workshops/ workshops	• Conduct in-person meetings with potential participants to understand their needs	• Number of trainings conducted
	Conduct GESI focused social audits and public hearing	• Lack of transparency • Inadequate budget • Exclusion of women and marginalized groups	• Increase practices for transparency through networking meetings, regular meetings • Policy guidance for ensuring inter-sectionality in social audits and public hearing • Adopt participatory tools for public hearing such as role-plays	• Regular meetings/ events conducted to increase transparency	• Number of social audit/ public hearings conducted • Percentage of women including Dalits and IPs participation • Number of issues raised on intersectional issues
	Conduct advocacy campaign and promote awareness on gender responsive information, available provisions and	• Inadequate interest and motivation of concerned institutions	• Raise awareness about long-term benefits of information dissemination	• Continuous follow-up meetings between institutions and women groups/ CBOs	• Number of events between institutions and women groups/ CBOs

Outputs	Activities	Implementation Risk or Obstacle	Risk Reduction Measures	Risk Reduction Targets	Indicators
	resources among CBOs/ women groups				
	Engage male involvement to advocate gender and women's issues and concern in campaign	• Less priority	• Raise awareness about long-term benefits, social prestige	• Continuous follow-up meetings	• Frequency of male involvement in gender and women's issues and concerns

Table 19: Overall feasibility analysis of IPacks

Intervention Packages	Outputs	Implementation risks/obstacles L=3/M=2/H=1	Cost effectiveness of risk reduction measures H=3/M=2/L1	Cost to implement L=3/M=2/H=1	Opportunity cost L=3/M=2/H=1	Incentive Measures H=3/M=2/L=1	Total score
IPack 1: Climate resilient agriculture and land use practices	Farmers capacitated in climate resilient agriculture	3	3	3	3	2	14
	Improved climate-resilient land use practices	3	3	2	3	2	13
IPack 2: Improving/maintaining river system landscape through soil and water conservation	Agroforestry promoted	2	3	2	3	3	13
	Erosion/landslide controlled and sedimentation managed	2	2	1	2	3	10
	Negative impact of flood minimized	2	2	1	1	2	8
	Disaster risk management strengthened	2	3	3	3	2	13
IPack 3: Capacity enhancement for sustainable forest management	Forest management strengthened	2	3	2	2	3	12
IPack 4: Restoration and rehabilitation of degraded forests	Improved forest cover through enrichment plantation and ANR	2	3	1	3	2	11
	Forest fire mitigated	3	2	2	2	2	11
	Income source of poor/marginalized forest users enhanced	2	3	2	1	3	13
IPack 5: Restoration of river system landscape	Forests and tree cover are restored, enhanced and	3	3	2	2	3	13

Intervention Packages	Outputs	Implementation risks/obstacles L=3/M=2/H=1	Cost effectiveness of risk reduction measures H=3/M=2/L1	Cost to implement L=3/M=2/H=1	Opportunity cost L=3/M=2/H=1	Incentive Measures H=3/M=2/L=1	Total score
(outside national forest)	maintained in the river system landscape						
IPack 6: Advocacy campaign: Gender-inclusive governance campaign	Increased access of women to SNRM and knowledge and information	2	3	3	3	3	14
	Integrated gender and women's participation in local planning processes in SNRM	2	3	3	3	3	14

5.5 Safeguard Analysis

Table 20: Safeguard analysis (risk)

Outputs	Activities	Social & Environmental risk	Risk reduction measures	Risk reduction targets	Indicators
IPack 1: Climate resilient agriculture and land use practices					
Farmers capacitated in climate resilient agriculture	Identification and operationalization of FFS	• Participation from elite groups might be high	• Ensure participation of farmers including socially and economically marginalized group (IPs, women, Dalit etc.)	• At least 50% women, 13% Dalit and 31% Indigenous people are included in group at FFS	• % of women, Dalit and Indigenous people included in group at FFS
Improved climate-resilient land use practices	Train and support farmers to adopt and apply climate-resilient land use practices	• Lack of commitment by marginalized farmers	• Ensure participation of farmers including socially and economically marginalized group (IPs, women, Dalit etc.) • Incentives for small farmers	• 50% women, 13% Dalit and 31% Indigenous people are included • 100 % farmers involved are incentivized to adopt climate resilient agriculture	• % of women, Dalit and Indigenous people included • Proportion of marginalized farmers incentivized
IPack 2: Improving/maintaining river system landscape through soil and water conservation					
Agroforestry promoted	Promote agroforestry with multiyear cropping/horticulture promotion/on-farm conservation	• Human-wildlife conflicts due to improved habitat and connectivity	• Sensitization events for human-wildlife conflict	• At least 6 sensitization events (1 at each hotspot) on reducing human wildlife conflict; improving habitat and connectivity)	• Number of sensitization events conducted
Erosion/landslide controlled and sedimentation managed	Landslide treatment	• Durability of the structure due to fragile geology and climatic extremes	• Ensure technically sound structure following the design guideline	• Number of planned structures follow design guideline	• Number of structure following the guidelines
	Construction of check dams and bioengineering for gully/Debris torrent protection	• Durability of the structure due to fragile geology and climatic extremes • Occupational hazard for the construction workers	• Ensure technically sound structure following the design guideline • Provide awareness on the occupational hazards and the protective gear for the	• Design guideline followed • 100 % construction workers aware about the occupational hazards with the protective gear	• Number of structures following the guidelines • Proportion of the construction workers aware on the occupational

Outputs	Activities	Social & Environmental risk	Risk reduction measures	Risk reduction targets	Indicators
			construction related works		hazards with the protective gear
Negative impact of flood minimized	Construction of embankment with bioengineering	• Improper design & implementation can lead to further degradation • Occupational health risks	• Ensure such infrastructure is planned in an integrated manner with involvement of DRR/ land use management/ engineers and/or watershed planning experts • Occupational Health and Safety training and equipment support	• 100% of planned structures follow design guideline • At least one OHS trainings for a site	• Proportion of structures following design guideline • Number of OHS trainings
IPack 3: Capacity enhancement for sustainable forest management					
Forest management strengthened	Review/upgrade/renew of forest operational plans (FOPs) of community forest user groups (CFUGs)	• Similar FOPs in varying topographical settings	• Incorporate sensitivity analysis including topography, geology & geomorphic process	• 100% updated FOPs are based on sensitivity analysis	• FOPs with sensitivity analysis
	Training and capacity development for implementation of FOPs	• Selection bias of participants can lead to lower level of outcome	• Establish transparent selection criteria	• 100% eligible and efficient personnel	• More than 90% achievement level in sustainable forest management
	Equipment support for implementation of FOPs	• Occupational health risks (injuries) due to inappropriate safety measures	• Training on OHS good practices, protocols and equipment to Trainers/ extension staff	• 7 trainings to CFUGs	• Number of person trained
IPack 4: Restoration and rehabilitation of degraded forests					
Improved forest cover through enrichment	Enrichment plantation/ANR	• Introduction of nonnative species can pose a risk to the local biodiversity • Loss of species having current social use can	• Promote tree species which are locally adapted/native	• 100 % of the species will be locally adapted/native species	• Proportion of local species in enrichment planation

Outputs	Activities	Social & Environmental risk	Risk reduction measures	Risk reduction targets	Indicators
plantation and ANR		worsen livelihood of marginal households	• Provision of alternatives to affected marginal households		
Forest fire mitigated	Firefighter training and support firefighting equipment to CFUGs	• Firefighting without sufficient protective equipment or with inappropriate practices could lead to personal injuries • Possibility of exclusion of women	• Ensure trained groups are well aware of protective measures and procedures of fire controlling in the field through demonstration & examination • Promote inclusion/participation of women	• All members are trained • At least 20% participants are women	• Number of trained members on the use of firefighting equipment • Proportion of women participants
	Construction and improvement of fire lines	• Excessive construction of fire line can lead to habitat fragmentation and impact on habitat connectivity	• Use existing road/trail/river/stream as fire line	• 4 Km of fire line constructed/ improved	• Length of fire line constructed/ improve
IPack 5: Restoration of river system landscape (outside national forest)					
Forests and tree cover are restored, enhanced and maintained in the river system landscape	Establish and support multi-purpose tree nurseries	• Land tenure issues on nursery site • Limited availability of quality seed of demanded species	• Consultation meetings • Demand analysis for choice of seedlings species	• At least 1 consultation meeting to screen and address the land tenure issues • At least 50% seedlings produced are of native species	• Number of nursery sites screened and land tenure issue addressed • Proportion of native species' seedlings produced
	Riparian/River bank plantation	• Land tenure issue • Introduction of nonnative species can pose a risk to the local biodiversity • Loss of current social use can worsen livelihood of marginal households	• Consultation meetings with local community and municipality • Promote tree species which are already locally adapted	• At least 1 consultation meeting to screen and address the land tenure issues • At least 50% of plantation will use native species	• Number of nursery sites with screened and addressed land tenure issue • Proportion of native species in planation

Outputs	Activities	Social & Environmental risk	Risk reduction measures	Risk reduction targets	Indicators
		• Loss and damage from flood	• Provision of alternatives to affected marginal households • Protective plantation with integration of structural measures and bioengineering techniques		
	Technical guidance and support to establish woodlots	• Conflicts with neighboring landowner • High value alternative crop can change woodlot practice	• Provide support to group of landowners rather than individual	• 90% landowners who received support will develop woodlots	• Area of woodlots established
IPack 6: Advocacy campaign: Gender-inclusive governance campaign					
Increased access of women to SNRM and knowledge and information	Create informal learning and sharing platforms for grassroots-level women	• Possibility of elite women capture • Possibility of the exclusion of Dalits and IPs women • Social norms and values restricting women to participate and give time for informal learning and sharing platforms	• Promote inclusion/participation of Dalits and IPs (Women) • Organize sensitization learning events to remove restrictions	• At least 20% participants are Dalits and IPs women • At least one gender sensitization learning event per year	• % of Dalits and IPs women • Number of gender sensitization learning events
	Conduct local level policy discourses to ensure gender responsiveness and women's participation, access, control and leadership	• Change in gender roles not easily accepted posing threats to social norms and values	• Conduct GESI trainings and awareness campaigns and policy reviews to strengthen the GESI initiatives	• 50% men and women know about the GESI policy and integration strategies	• Province and local level policy reviewed
	Produce and publish best practices and	• Gendered governance restricting women to participate	• Document of good and best practices in gendered governance that has	• Gendered governance best practices documented and	• Best practices in gendered governance

Outputs	Activities	Social & Environmental risk	Risk reduction measures	Risk reduction targets	Indicators
	learning in gendered governance	• Women participation in NRM sectors can pose threat to social change	minimized social discrimination and women empowered reducing GBV as well	learning shared for social change	documented and published
Integrated gender and women's participation in local planning processes in SNRM	Conduct rapid assessment on women's contribution and involvement in SNRM	• Women not being empowered could hinder their participation • Leadership discrimination among women and elite captures	• Rapid assessment on women's contribution and involvement in NRM/CRLUP and management to be conducted and shared for minimizing social barriers	• % of women's contribution and involvement analyzed and further plans developed	• Rapid assessment conducted
	Provide gender mainstreaming trainings/ workshops to local government and CBOs	• GESI not prioritized	• Trainings to be provided to mainstream gender increasing the trend of preparing action plans as GESI priority	• % of understanding level and mainstreaming of GESI well adopted	• GESI mainstreaming training and workshops raised awareness
	Conduct GESI focused social audits and public hearing	• Inclusive transparency and practices limited and not prioritized	• Regularly conduct GESI focused audits and public hearing to increase transparency and good governance	• % of local institutions practice GESI focused social audits and public hearing for social and strong governance practice	• GESI focused social audit and public hearing conducted regularly
	Conduct advocacy campaign and promote awareness on gender responsive information, available provisions and resources among CBOs/ women groups	• Gender responsive awareness not shared or available as they are not prioritized	• Awareness promotion on gender responsive information and ensure to make available to all	• % of CBOs and women groups made aware on gender responsive information and access to resources increased	• Gender responsive information and availability access made easy
	Engage male involvement to advocate gender and	• Men not interested for social change and not supportive too	• Advocating GESI and women's issues among male and inform on	• % of male engagement in GESI and women's	• Male involvement increased in advocacy of GESI

Outputs	Activities	Social & Environmental risk	Risk reduction measures	Risk reduction targets	Indicators
	women's issues and concern in campaign	• Women participation not ensured in NRM/CRLUP and management	transformative change and recognizing women's voice for change, reduce GBV	issues help change the social norms and values	and women's issues and minimized social disparities

Table 21: Safeguard analysis (benefits)

Outputs	Activities	Benefits	Benefit enhancement measures	Benefit enhancement targets	Indicators
IPack 1: Climate resilient agriculture and land use practices					
Farmers capacitated in climate resilient agriculture	Identification and operationalization of FFS	• Increased farm productivity	• Continuity of FFS for longer period (one crop cycle may not be sufficient) • Integration of FFS in municipal agriculture section2	• FFS operated for whole project period • All three FFS will be integrated in respective municipal agriculture section	• Number of FFS operated for whole project period • Number of FFS owned and run by local government
Improved climate-resilient land use practices	Train farmers on climate-resilient land use practices	• Enhance soil organic carbon • Sustain farm productivity	• Provide financial, equipment and technological support to farmers adopting climate resilient land use practices3 • Promote climate resilient commercial farming in collaboration with local government4 • Promote organic farming and Integrated Pest Management system	• At least 50% farmers adopting climate resilient land use practices will be supported • Project will support at least one municipality for institutional procedures and marketing • At least 50% share of fertilizer and pesticides is organic	• Proportion of farmers supported • Number of municipality assisting institutional procedures and marketing • Decrease in use of chemical fertilizer and pesticides
IPack 2: Improving/maintaining river system landscape through soil and water conservation					
Agroforestry promoted	Promote agroforestry with multiyear cropping/horticulture promotion/on-farm conservation	• Erosion control • Enhance income generation opportunities • Decrease in forest dependency	• Prioritize cash crops, fast growing fodder trees and grasses	• At least 50% cash crops and fodder trees	• Proportion of cash crops and fodder trees in plantation

[2] Development of FFS as on-farm learning center in the long run (even after project completion)
[3] Seed money, soft loans, crop/livestock insurance, production based incentives, seed bank, subsidies in farm equipments, support for alternative irrigation facilities (earthbag ponds, drip irrigation, rainwater harvesting, deep boring, solar pumps and others), storage (cold store, chilling center) and processing facilities
[4] Assist in institutional procedures including registration, PAN acquisition, accounting, renewal and others; marketing support (branding, packaging, negotiations)

Outputs	Activities	Benefits	Benefit enhancement measures	Benefit enhancement targets	Indicators
Erosion/landslide controlled and sedimentation managed	Landslide treatment	• Reduce loss and damage • Reduce sedimentation	• Prioritize high value multipurpose plant species for bioengineering	• At least 50% use of high value multipurpose plant species for bioengineering	• Proportion use of high value multipurpose plant species for bioengineering
	Construction of check dams and bioengineering for gully/Debris torrent protection	• Reduce sedimentation in downstream • Reduce risks of flash floods and minimize settlement vulnerability	• Prioritize high value multipurpose plant species for bioengineering	• At least 50% use of high value multipurpose plant species for bioengineering	• Proportion use of high value multipurpose plant species for bioengineering
Negative impact of flood minimized	Construction of embankment with bioengineering	• Reduce riverbank erosion and loss and damage from flood	• Construction of siltation dam in midstream • Extraction and utilization of siltation through detail environmental assessment • Use of bamboo/other income generating plants for bioengineering	• At least 10 siltation dams • 100% embankments with plantation	• Number of siltation dams • Proportion of embankments with plantation
IPack 3: Capacity enhancement for sustainable forest management					
Forest management strengthened	Review/upgrade/renew of forest operational plans (FOPs) of community forest user groups (CFUGs)	• Support annual silvicultural operations for sustainable forest management	• Update FOPs with sensitivity analysis based on local scenario • Integrate forest based entrepreneurship development and income generation • Multi-stakeholder sharing for quality assurance of FOPs	• 100% CFUGs update FOPs with sensitivity analysis and integrating forest based entrepreneurship development	• Proportions of CFUGs with updated FOPs
	Training and capacity development for	• Enhance capacity of CFUGs on	• Involve all CFUGs within River System in trainings	• 100% CFUGs participate in trainings	• Proportion of CFUGs participating in trainings

Outputs	Activities	Benefits	Benefit enhancement measures	Benefit enhancement targets	Indicators
	implementation of FOPs	sustainable forest management			
	Equipment support for implementation of FOPs	• Enhance capacity of CFUGs on sustainable forest management	• Support all CFUGs within River System	• 100% CFUGs receive equipment support	• Proportion of CFUGs receiving equipment support
	Capacitate government staffs and CBOs on climate resilient forest management (ToF)	• Increase skilled manpower on climate resilient forest management	• Sensitize users of community forest on climate resilient forest management	• At least 90% users will be aware of climate resilient forest management	• Proportion of users participating in sensitization program
	Governance training to government staffs and CFUGs to enhance accountability and transparency	• Good forest governance	• Public hearing • Make information available in DFO websites	• Bi-annual public hearing and update of website information	• Number of public hearings annually • Availability of information in websites
IPack 4: Restoration and rehabilitation of degraded forests					
Improved forest cover through enrichment plantation and ANR	Enrichment plantation/ANR	• Enhance forest quality and carbon stock	• Plantation of fast growing and locally adapted plant species • Promoting natural regeneration • Bio-fencing for protection	• At least 70% of fast growing and locally adapted/native plant species	• Proportion of fast growing and locally adapted/native plant species
Forest fire mitigated	Firefighter training and support firefighting equipment to CFUGs	• Enhance capacity on forest fire control	• Collaborate with security agencies and also provide equipment support	• At least 6 sets of firefighting equipment to security agency	• Sets of firefighting equipment supported
	Training and equipment support to promote compost production	• Increase in soil organic content in farmlands	• Compensate litter collectors and provide subsidy to compost manure • Production based subsidy in organic farming	• At least 50% share of fertilizer is compost manure	• Number of households practicing composting

Outputs	Activities	Benefits	Benefit enhancement measures	Benefit enhancement targets	Indicators
	Construction and improvement of fire lines	• Provides barrier to slow or stop the progress of wildfire	• Regular maintenance • Construct fire line as forest product collecting route	• Annual maintenance before fire season	• Number of fire line free of litters in dry season
IPack 5: Restoration of river system landscape (outside national forest)					
Forests and tree cover are restored, enhanced and maintained in the river system landscape	Establish and support multi-purpose tree nurseries	• Enhance seedling availability for plantation	• Demand based seedling production (fruit, fodder etc.)	• Seedling production will meet 100% demand	• Proportion of seedlings used for plantation
	Riparian/River bank plantation	• Increase biodiversity • Enhance carbon stock • Reduce riverbank erosion	• Plantation of fodder species, fruits, bamboo, khayar, sissoo and other high value species including grass • Ownership of plantation area to local community	• At least 50% fodder species	• Proportion of fodder species
	Technical guidance and support to establish woodlots	• Reduces forest dependency and hence forest degradation • Enhance carbon stock	• Facilitate woodlot development in unregistered lands on collaboration with local government • Additional incentives to promote woodlots in adjacent private land along river banks	• At least 50% additional incentives for woodlot development in adjacent private land along river banks	• Number/area of woodlots in adjacent private land along river banks
IPack 6: Advocacy campaign: Gender-inclusive governance campaign					
Increased access of women to SNRM and knowledge and information	Create informal learning and sharing platforms for grassroots-level women	• Women empowered and their voices being respected	• Create and manage learning platform	• Five learning events	• Number of learning events
	Conduct local level policy discourses to ensure gender responsiveness and women's participation,	• Women's participation, access, control and leadership	• Interaction held between policy makers and targeted women	• One event	• Number of events

Outputs	Activities	Benefits	Benefit enhancement measures	Benefit enhancement targets	Indicators
	access, control and leadership	developed and supported			
	Produce and publish best practices and learning in gendered governance	• Documentation and publication of gendered governance strengthened and institutionalized	• Sharing and publicity	• One best practice documented	• Number of best practices documented
Integrated gender and women's participation in local planning processes in SNRM	Conduct rapid assessment on women's contribution and involvement in SNRM	• Women's contribution and participation increased	• Gender data disseminated	• One Sharing event	• Number of sharing events
	Provide gender mainstreaming trainings/ workshops to local government and CBOs	• Women's capacity enhanced in GESI integration and local government and CBOs take the issues seriously	• Knowledge enhancement, accountability	• One training event for 20 government staffs	• Number of training events
	Conduct GESI focused social audits and public hearing	• Social transparency increased and regularly practiced	• Coverage of wider audience target group	• Two events	• Number of events
	Conduct advocacy campaign and promote awareness on gender responsive information, available provisions and resources among CBOs/ women groups	• Gender responsive information making women and marginalized groups empowered	• Awareness raising sessions	• Three events	• Number of events

Outputs	Activities	Benefits	Benefit enhancement measures	Benefit enhancement targets	Indicators
	Engage male involvement to advocate gender and women's issues and concern in campaign	• Male roles changing and supportive for women empowerment	• Continues encouragement of male change agent to promote gender	• Two events	• Number of events

5.6 Budget

Note: Budget estimations are tentative and done based on consultation workshops with key stakeholders at river system level during 2022. However, during time of implementation, the rate and amount mentioned in the CERP plans are subjected to change based on the changes in market situation as well as the field condition. Respective Provincial Project Management Offices (PPMUs) can make necessary changes based on field situation following the norms and rates as per the Nepal government rules and regulations.

Table 22: Budget plan

Sub-activities	Unit	Quantity	Unit Cost	Budget (NPR)
IPack 1: Climate resilient agriculture and land use practices				
Identification and operationalization of FFS	No	3	700,000	2,100,000
Capacity-building in the use of weather information and its application in agricultural practices	No	2	100,000	200,000
Implement climate resilient agriculture practices	ha	1,865	4,000	7,461,738.22
Train and support farmers to adopt and apply climate-resilient land use practices	Events	10	450,000	4,500,000
Total Budget for IPack 1 (NRs)				**14,261,738.22**
IPack 2: Improving/maintaining river system landscape through soil and water conservation				
Promote agroforestry with multiyear cropping/horticulture promotion/on-farm conservation	ha	92	6,000	552,000
Landslide treatment	No	3		7,000,000
Construction of check dams and bioengineering for gully/Debris torrent protection	Gully/Debris torrent	4		8,000,000
Construction of embankment with bioengineering	m	2,135		32,700,000
Strengthening climate and disaster risk reduction mechanism in collaboration with local government	Municipality/Rural municipality	2	300,000	600,000
Training/capacity building on soil and watershed conservation using bio-engineering	Event	1	500,000	500,000
Climate resilient awareness campaign through Eco-clubs	School	4	50,000	200,000
Total Budget for IPack 2 (NRs)				**49,552,000**
IPack 3: Capacity enhancement for sustainable forest management				
Review/upgrade/renew of forest operational plans (FOPs) of community forest user groups (CFUGs)	No	34	150,000	5,100,000
Training and capacity development for implementation of FOPs	No	34	250,000	8,500,000
Equipment support for implementation of FOPs	No	34	200,000	6,800,000

Sub-activities	Unit	Quantity	Unit Cost	Budget (NPR)
Capacitate government staffs and CBOs on climate resilient forest management (ToF)	Event	4	300,000	1,200,000
Governance training to government staffs and CFUGs to enhance accountability and transparency	Event	10	240,000	2,400,000
Total Budget for IPack 3 (NRs)				**24,000,000**
IPack 4: Restoration and rehabilitation of degraded forests				
Enrichment plantation	ha	34	80,000	2,720,000
Implement Assisted Natural Regeneration	ha	123	20,000	2,460,000
Firefighter training and support firefighting equipment to CFUGs	CFUG	10	300,000	3,000,000
Support firefighting equipment to security institution	Set	6	150,000	900,000
Training and equipment support to promote compost production from bushes and leaf litters	CFUG	10	150,000	1,500,000
Construction and improvement of fire lines	Km	4	300,000	1,200,000
Customize fire alert system in Community Based Forest Management (CBFM)	No	1	LS	300,000
Skill development trainings and equipment support	Household	100	25,000	2,500,000
Total Budget for IPack 4 (NRs)				**14,580,000**
IPack 5: Restoration of river system landscape (outside national forest)				
Establish and support multi-purpose tree nurseries	No	3		2,000,000
Production of saplings	No	2,50,000	40	10,000,000
Establish On-farm tree nursery	No	1	600,000	600,000
Riparian/River bank plantation	ha	37	600,000	22,200,000
Technical guidance and support to establish woodlots	ha	25	250,000	6,250,000
Total Budget for IPack 5 (NRs)				**41,050,000**
IPack 6: Advocacy campaign: Gender-inclusive governance campaign				
Create informal learning and sharing platforms for grassroots-level women	Event	5	50,000	250,000
Conduct local level policy discourses to ensure gender responsiveness and women's participation, access, control and leadership	Event	1	50,000	50,000
Produce and publish best practices and learning in gendered governance	Event	1	50,000	50,000

Sub-activities	Unit	Quantity	Unit Cost	Budget (NPR)
Conduct rapid assessment on women's contribution and involvement in SNRM	Event	1	100,000	100,000
Provide gender mainstreaming trainings/ workshops to local government and CBOs	Event	1	100,000	100,000
Conduct GESI focused social audits and public hearing	Event	2	150,000	300,000
Conduct advocacy campaign and promote awareness on gender responsive information, available provisions and resources among CBOs/ women groups	Meeting	3	50,000	150,000
Engage male involvement to advocate gender and women's issues and concern in campaign	Event	2	50,000	100,000
Total Budget for IPack 6 (NRs)				**1,100,000**
Grand Total Budget (NRs)				**144,543,738.22**

Note: Budget estimations are tentative and are subjected to change based on the changes in market situation as well as the field condition.

5.7 Monitoring and Reporting Protocol

River system level monitoring and reporting will be carried out by Ministry of Forest and Environment through PMU and PPMU of BRCRN.

Following monitoring protocol will be adopted to monitor the outputs of the CERP;

Table 23: Monitoring Protocol

Results	Indicator	Baseline	Target	Means of verification	Assumption
Output 1: Restored degraded forests area halting forest fire, illegal harvesting and grazing	Area (in ha.) of natural forest restored through ANR and enrichment plantation	0	157 ha of natural forest restored through ANR including 34 ha enrichment plantation	PMU and PPMUs reports Project report	This river system has 5267.1 ha of forest and 40.5 ha of other wooded land (baseline survey report 2022)
Output 2: Improved natural Forest management and increased forest area outside the forest	xx ha of forest area of xx groups under implementation through updated forest management plan	0	7785 ha area managed by 34 community forestry user groups	PMU and PPMUs reports Project report	34 community forestry user groups manage 7785 ha of forest having 7098 ha (91.18%) of natural forest, 0 ha (0%) plantation forest and 687 ha (8.82%) degraded forest (CBO profile 2022)
	xx ha of new plantation outside forest area; and their survival rate (public land forestry and private forestry)	0	Area: 62 ha. Survival rate: 80% (Demonstration plantation: 0 ha; riverbank plantation: 37 ha and wood lots: 25 ha)	PMU and PPMUs reports Project report	Local government supported and owned public land and private forestry initiatives under their own jurisdiction
Output 3: Minimized Impacts of climate induced disasters (erosion, landslides/ sedimentation and flooding)	Volume of sedimentation (Cubic meter of soil volume per unit area)	0	25% in comparison to before constructing structures	PMU and PPMUs reports Project report	Other climate-resilient SNRM practices (including Activities on climate-resilient land use, sustainable management of forests and reforestation) are successfully implemented,

Results	Indicator	Baseline	Target	Means of verification	Assumption
					further reducing potential for erosion and sedimentation
Output 4: Farmers adopted Climate resilient farming practices	Ha. of agricultural land under climate resilient farming/agriculture system	0 ha	1865 ha	FFS record PPPMUs Reports Project report	
	Proportion of farmers trained by the project who begin to apply climate- resilient land use practices on their fields in the relevant season following their respective trainings	0	At least 80% of the farmers involved in project trainings begun to apply project-promoted climate-resilient land use practices in the season following their training	PMU and PPMUs reports Project report	The final selection of practices to be promoted at each specific training site are highly relevant to targeted farmers' cropping systems and conditions, as well as the climate change challenges with which they must contend. Trainings are delivered in a form and manner that is accessible to and relevant for, targeted farmers.
Output 5: Integrated gender and equity issues in governance practices in NRM/ CRLUP and management	% of women in leadership positions of CBO's executive committee	Out of 335 leadership position in CFUGs, 136 (40.6%) are women	At least 50% women in leadership position	DFO/PPMU/Group records	Proportional representation of all social groups ensured
	Access of women in Natural resources management, CRLUP, knowledge and information	0	At least 50% women participation in all events	Group record/PPMU records	Proportional representation of all social groups ensured

Results	Indicator	Baseline	Target	Means of verification	Assumption
	Integrate gender in local planning processes in NRM/ CRLUP and management	0	34 Gender sensitive forest management operational plan of forestry user groups	PPMU/DFO/Group records	Gender dimensions ensured in climate resilient plan including forest management operational plan of groups

Outcome and impact level result assessment will be carried out based on result framework of CERP (annex-1) using BRCRN monitoring and evaluation framework. Output level results of this CERP fully aligned with the BRCRN outcome and impact indicators.

Activity level monitoring will be carried out based on work plan and budget. Joint monitoring mechanism will be established to monitor the activity and results.

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Annex-1: Result Framework of Tawa South Critical Ecosystem Restoration Plan

Vision: Climate resilient and sustainably managed Natural Resources and local communities in Tawa South River system

Result Framework

Expected Results	Objectively verifiable Indicator	Baseline	Target	Means of verification	Assumptions
Impacts					
GCF core indicator (Mitigation) *A4.0 Improved resilience of ecosystems and ecosystem services (proxy indicator 2 to 5)*	Tonnes of carbon dioxide equivalent (tCO_2eq) reduced or avoided. **Proxy indicator**: Area of (1) Deforestation rate: (2) Sustainable forest management area: (3) ANR area (4) Plantation area (5) Area of Climate Resilient Agriculture (CRA)	**Proxy indicators:** Deforestation rate: -0.03% Sustainable forest management area: 0 ha ANR: 0 ha Plantation area: 0 ha Climate Resilient Agriculture: 0 ha	**Proxy indicator**: Deforestation rate: 0 Sustainable forest management area: 7785ha Plantation area: 62 ha ANR: 157 ha (including 34 ha. enrichment plantation) Climate Resilient Agriculture: 1865 ha	PPMUs/PMU report GCF/BRCRN GHG mitigation calculation tool-based calculation sheet	This river system has 5267.1 ha of forest and 40.5 ha of other wooded land (baseline survey report 2022) CERP land use data shows changes in forest area between 2000 and 2019 is +35.04 ha. Hence, 0% deforestation rate. In this river system, 34 forestry user groups are managing 7785 ha of forest (CBO profile 2022)
GCF core indicator (Adaptation)	Total number of direct and indirect beneficiaries (gender disaggregated)	0	Direct Male: 11731 Female: 12070 Total : 23801	PMU and PPMUs reports Project report	This river system has 34 forestry users groups with 4452 HHs and 23801 population including 11731 male and 12070 female.
Outcomes					
M9.0 Improved management of land or	M9.1 Hectares of land or forests under improved	0	Sustainable forest management area: 7785ha	PMU and PPMUs report	Beneficiaries adopt climate-resilient land use practices

Expected Results	Objectively verifiable Indicator	Baseline	Target	Means of verification	Assumptions
forest areas contributing to emissions reductions	and effective management that contributes to CO_2 emission reductions		Plantation area: 62 ha ANR: 157 ha (including 34 ha. enrichment plantation) Climate Resilient Agriculture: 1865 ha	Project report	
A8.0 Strengthened awareness of climate change threats and risk reduction processes	A8.1 Number of males and females made aware of climate threats and related appropriate responses	0 men 0 women 0 total	Male: 11731 Female: 12070 Total : 23801	Project report Workshop/training Attendance sheets and materials	Beneficiaries are interested in adopting climate resilient land use practices
Outputs					
Output 1: Restored degraded forests area halting forest fire, illegal harvesting and grazing	Area (in ha.) of natural forest restored through ANR and enrichment plantation	0	157 ha of natural forest restored through ANR including 34 ha enrichment plantation	PMU and PPMUs reports Project report	This river system has 5267.1 ha of forest and 40.5 ha of other wooded land (baseline survey report 2022)
Output 2: Improved natural Forest management and increased forest area outside the forest	xx ha of forest area of xx groups under implementation through updated forest management plan	0	7785 ha area managed by 34 community forestry user groups	PMU and PPMUs reports Project report	34 community forestry user groups manage 7785 ha of forest having 7098 ha (91.18%) of natural forest, 0 ha (0%) plantation forest and 687 ha (8.82%) degraded forest (CBO profile 2022)
	xx ha of new plantation outside forest area; and their survival rate (public land forestry and private forestry)	0	Area: 62 ha. Survival rate: 80% (Demonstration plantation: 0 ha; riverbank plantation: 37 ha and wood lots: 25 ha)	PMU and PPMUs reports Project report	Local government supported and owned public land and private forestry initiatives under their own jurisdiction

Expected Results	Objectively verifiable Indicator	Baseline	Target	Means of verification	Assumptions
Output 3: Minimized Impacts of climate induced disasters (erosion, landslides/ sedimentation and flooding)	Volume of sedimentation (Cubic meter of soil volume per unit area)	0	25% in comparison to before constructing structures	PMU and PPMUs reports Project report	Other climate-resilient SNRM practices (including Activities on climate-resilient land use, sustainable management of forests and reforestation) are successfully implemented, further reducing potential for erosion and sedimentation
Output 4: Farmers adopted Climate resilient farming practices	Ha. of agricultural land under climate resilient farming/agriculture system	0 ha	1865 ha	FFS record PPPMUs Reports Project report	
	Proportion of farmers trained by the project who begin to apply climate-resilient land use practices on their fields in the relevant season following their respective trainings	0	At least 80% of the farmers involved in project trainings begun to apply project- promoted climate-resilient land use practices in the season following their training	PMU and PPMUs reports Project report	The final selection of practices to be promoted at each specific training site are highly relevant to targeted farmers' cropping systems and conditions, as well as the climate change challenges with which they must contend. Trainings are delivered in a form and manner that is accessible to and relevant for, targeted farmers.
Output 5: Integrated gender and equity issues in governance practices in NRM/ CRLUP and management	% of women in leadership positions of CBO's executive committee	Out of 335 leadership position in CFUGs, 136 (40.6%) are women	At least 50% women in leadership position	DFO/PPMU/Group records	Proportional representation of all social groups ensured

Expected Results	Objectively verifiable Indicator	Baseline	Target	Means of verification	Assumptions
	Access of women in Natural resources management, CRLUP, knowledge and information	0	At least 50% women participation in all events	Group record/PPMU records	Proportional representation of all social groups ensured
	Integrate gender in local planning processes in NRM/ CRLUP and management	0	34 Gender sensitive forest management operational plan of forestry user groups	PPMU/DFO/Group records	Gender dimensions ensured in climate resilient plan including forest management operational plan of groups

Activities

Activities	Description	Sub-activities	Remarks/Deliverables
Output 1: Restored degraded forests area halting forest fire, illegal harvesting and grazing			
1.1 Forest fire control	Support and strengthen forestry-related CBOs to combat forest fire.	1.1.1 Firefighter training and support firefighting equipment to CFUGs 1.1.2 Training and equipment support to promote compost production 1.1.3 Support firefighting equipment to security institution/DFO/Groups (from budget plan) 1.1.4 Construction and improvement of fire lines 1.1.5 Customize fire alert system in Community Based Forest Management (CBFM)	At least 10 CFUGs of most fire prone community forests supported with firefighting equipment About 4 km of fire lines established/improved
1.2 Income source of poor/marginalized forest users enhanced halting illegal harvesting	Enhance income generation opportunities for forest dependent women, IPs, Dalits and poor/marginalized people to reduce pressure on forest resources.	1.2.1 Skill development trainings and equipment support	Approximately 100 household beneficiaries
Output 2: Improved natural Forest management and increased forest area outside the forest			
2.1 Strengthening forest management	Improving the application of sustainable forest management practices in all forest land managed by forestry-related CBOs within project area, ensuring silvicultural practices are implemented and maximizing ecosystem service provision and resilience, as well as generating significant climate change benefits.	2.1.1Review/upgrade/renew of forest operational plans (FOPs) of community forest user groups (CFUGs) and provide implementation support 2.1.2 Training and capacity development for implementation of FOPs 2.1.3 Equipment support for implementation of FOPs 2.1.4 Capacitate government staffs and CBOs on climate resilient forest management (Training of Facilitators) 2.1.5 Governance training to government staffs and CFUGs to enhance accountability and transparency	Approximately 34 forest operational plans developed and/or strengthened. Approximately 4 ToF events organized to capacitate government staffs and CBOs on climate resilient forest management.

Activities	Description	Sub-activities	Remarks/Deliverables
2.2 Improvement of forest cover through enrichment plantation and ANR	Support different types of forest plantation to build resilience and deliver important mitigation benefits.	2.2.1 Enrichment plantation/Assisted natural regeneration in forest area	Enrichment plantation/ANR implemented on 157 ha of community managed forest land.
2.3 Restoration, enhancement and maintenance of forests and tree cover in the river system landscape through Public and private forestry	Establish tree nurseries in the project area to support tree planting and forest restoration under this project, as well as planting and restoration by communities throughout the project area during and after the project implementation. Support expansion of forest cover and restoration of forest landscapes in critical locations of river system, thereby restoring crucial ecosystem functions and ecosystem resilience while also generating significant mitigation benefits.	2.3.1 Establish and support multi-purpose tree nurseries 2.3.2 Riparian/River bank plantation 2.3.3 Technical guidance and support to establish woodlots and incentivize tree plantation	Three multi-purpose nurseries established 37 ha of riparian/river bank plantation established 25 ha of woodlots established in private land
Output 3: Minimized Impacts of climate induced disasters (erosion, landslides/sedimentation and flooding)			
3.1 Controlling erosion/landslide and management of sedimentation	Construct local structures, as well as bioengineering that will reduce community vulnerability to erosion and landslides.	3.1.1 Landslide treatment 3.1.2 Construction of check dams and bioengineering for gully/Debris torrent protection 3.1.3 Training/capacity building on soil and watershed conservation using bio-engineering	Establish relevant structures and practices to stabilize 3 landslides and 4 gully/debris torrents mostly in Churia hills.
3.2 Minimization of negative impact of Flood	Construct local structures, as well as bioengineering that will reduce community vulnerability to flooding.	3.2.1 Construction of embankments with bioengineering	Establish relevant structures and practices for riverbank stabilization
3.3 Strengthening disaster risk management and awareness creation on climate resilient NRM	Improving disaster risk management in collaboration with local government and capacity strengthening for disaster risk reduction, as well as awareness creation for climate resilient natural resource management	3.3.1 Strengthening climate and disaster risk reduction mechanism in collaboration with local government 3.3.2 Training/capacity building on soil and watershed conservation using bio-engineering 3.3.3 Climate resilient awareness campaign through Eco-clubs	5days training for Government staffs/CBFMG/Farmer groups on soil and watershed conservation using bio-engineering

Activities	Description	Sub-activities	Remarks/Deliverables
			Student-run eco-clubs established
Output 4: Farmers adopted Climate resilient farming practices			
4.1 Establish and operationalize Farmers field schools (FFS)	Establish training sites on which farmers can be trained on climate resilient farming practices during and after the project.	4.1.1 Operationalize Farmer's Field Schools on adopting climate resilient land use practices 4.1.2 Capacity-building in the use of weather information and its application in agricultural practices	Three FFS established and operational
4.2 Implementation of climate-resilient land use practices (pest and disease minimized, soil quality improved, irrigation facility enhanced)	Support and strengthen farmers' capacities to adopt/apply climate-resilient farming practices in their own fields.	4.2.1 Implement climate resilient agriculture practices (including pest and disease control, soil quality improvement, irrigation facility enhancement) 4.2.2 Train and support farmers to adopt and apply climate-resilient land use practices	Climate-resilient land use practices adopted/applied in 1865 ha of farmlands
4.3 Promotion of Agroforestry	Support and strengthen farmers' capacity to adopt/apply suitable agroforestry and livestock management practices on their own land.	4.3.1 Promote agroforestry with multiyear cropping/horticulture promotion/on-farm conservation 4.3.2 Establish on-farm tree nursery and support livestock rearing 4.3.3 Production/Purchase of saplings	One on-farm nursery established Agroforestry established in 92 ha marginal land
Output 5: Integrated gender and equity issues in governance practices in NRM/ CRLUP and management			
5.1 Increase access of women to SNRM and knowledge and information	Establish platforms for women's involvement and access to knowledge and information, as well as build capacity in natural resource management and climate resilient land use practices	5.1.1 Create informal learning and sharing platforms for grassroots-level women 5.1.2 Conduct local level policy discourses to ensure gender responsiveness and women's participation, access, control and leadership 5.1.3 Produce and publish best practices and learning in gendered governance	With enhanced access to knowledge and information, more women involved in in natural resource management and climate resilient land use practices
5.2 Integrate gender in local planning processes in SNRM	Sensitize CBOs, women groups, local government and other concerned stakeholders on gender responsive information, available provisions and resources to ensure GESI integration in local planning processes for natural	5.2.1 Conduct rapid assessment on women's contribution and involvement in SNRM 5.2.2 Provide gender mainstreaming trainings/ workshops to local government and CBOs and concerned stakeholders	GESI integration ensured in in local planning processes for natural resource management and climate resilient land use practices

Activities	Description	Sub-activities	Remarks/Deliverables
	resource management and climate resilient land use practices	5.2.3 Conduct GESI focused social audits and public hearing 5.2.4 Conduct advocacy campaign and promote awareness on gender responsive information, available provisions and resources among CBOs/ women groups 5.2.5 Engage male involvement to advocate gender and women's issues and concern in campaign	

Annex 2: List of Participants

A. Problem and Solution Analysis Workshop

S. N.	Name of Participants	Address	Institution	Designation	Contact No.
1	Phanindra Prasad Pokharel	Katari	Division Forest Office, Triveni	Divisional Forest Officer	9852836561
2	Deependra Mehata	Katari	Division Forest Office, Triveni	Forest Ranger	9849629295
3	Yagya Bahadur Karki	Katari	Sub Division Forest Office, Risku		9867191598
4	Baijanath Adhikari	Katari-3	Suryamukhi Farmer Group		
5	Ram Prasad Gautam	Katari-2	Sitapokhari CFUG	Chairman	9818707210
6	Tikam Raj Rai	Katari-5	Jana Jagriti CFUG	Chairman	
7	Bhuwan Raj Giri	Katari-5	FECOFUN	Local Chairman	9819732185
8	Omraj Rai	Katari-3	Sadabahar CFUG		9842883664
9	Peshal Pokharel	Katari-3	Hamro Samudayik Seed Bank		9849960883
10	Thakur Kumar Poudel	Katari-2	Naulo Bihani Farmer Group		
11	Badri Bikram Karki	Katari-2	Kamala Namuna CFUG		9825735885
12	Ramdev Danuwar	Katari-5	Manauji CFUG		9840493520
13	Singha Bahadur Magar	Udayapurgadhi-7	Chiyabari CFUG		9862862080
14	Chandra Kumar Magar	Udayapurgadhi-7	Himshikhar Farmer Group		9844868124
15	Goma Kumari Khatri	Udayapurgadhi-7	Bijanbari CFUG		9819924907
16	Muna Magar	Udayapurgadhi-7	Himshikhar Farmer Group	Secretary	9807790788
17	Durga Basnet (Karki)	Katari-6	Pashupati CFUG		9842989715
18	Mahesh Kumar Rai	Katari-6	Sangam CFUG	Secretary	9863000915
19	Durga Bahadur Katuwal	Katari-6	Pashupati CFUG		
20	Meghnath Adhikari	Udayapurgadhi-6	Saraswoti CFUG		
21	Sambhu Kumar Dhakal	Udayapurgadhi-6	Krishi Sanjal	Chairman	9842537908
22	Yagya Prasad Adhikari	Udayapurgadhi-6	Farmer Group		9840442292
23	Rajan Mote	Katari-6	Aranne CFUG	Chairman	9861206996
24	Urmila Magar	Katari-6	Sangam CFUG		
25	Manju Ale	Katari-6	Aranne CFUG		
26	Bireslal Adhikari	Katari-3	Paluwatar CFUG	Chairman	9852855505
27	Santosh Rai	Udayapurgadhi-6	Danphe CFUG	Secretary	9840314617
28	Buddi Maya Tamang	Udayapurgadhi-6	Danphe CFUG		
29	Sangita Tamang	Udayapurgadhi-6	Danphe CFUG		9866396969
30	Dev Kumari Magar	Katari-6	Lamiduwali Farmer Group		9862013453
31	Gauri Ale Magar	Katari-6	Lamiduwali Farmer Group		
32	Huma Devi Dahal	Katari-2	Pragati Vegetable Group		9842888237
33	Ruplal Kumar	Katari-2	Triveni CFUG		
34	Madan Bahadur Basnet	Katari-5	Srijana CFUG		9808241150
35	Krishna Bahadur Khatri	Udayapurgadhi-6		Ward Chairman	
36	Sitaram Giri	Udayapurgadhi-6		Ward Member	9842284716
37	Tejnarayan Tharu	Katari-3	Paluwatar CFUG		

B. Disaggregated Participants Data

S. N.	Name of Participants	Gender		Ethnicity						
		Male	Female	Janajati	Dalit	Brahmin	Chhettri	Dasnami	Madhesi	Muslim
1	Phanindra Prasad Pokharel	1				1				
2	Deependra Mehata	1							1	
3	Yagya Bahadur Karki	1					1			
4	Baijanath Adhikari	1				1				
5	Ram Prasad Gautam	1				1				
6	Tikam Raj Rai	1		1						
7	Bhuwan Raj Giri	1						1		
8	Omraj Rai	1		1						
9	Peshal Pokharel	1				1				
10	Thakur Kumar Poudel	1				1				
11	Badri Bikram Karki	1					1			
12	Ramdev Danuwar	1		1						
13	Singha Bahadur Magar	1		1						
14	Chandra Kumar Magar	1		1						
15	Goma Kumari Khatri		1				1			
16	Muna Magar		1	1						
17	Durga Basnet (Karki)		1				1			
18	Mahesh Kumar Rai	1		1						
19	Durga Bahadur Katuwal	1					1			
20	Meghnath Adhikari	1				1				
21	Sambhu Kumar Dhakal	1				1				
22	Yagya Prasad Adhikari	1				1				
23	Rajan Mote	1		1						
24	Urmila Magar		1	1						
25	Manju Ale		1	1						
26	Bireslal Adhikari	1				1				
27	Santosh Rai	1		1						
28	Buddi Maya Tamang		1	1						
29	Sangita Tamang		1	1						
30	Dev Kumari Magar		1	1						
31	Gauri Ale Magar		1	1						
32	Huma Devi Dahal		1			1				
33	Ruplal Kumar	1					1			
34	Madan Bahadur Basnet	1					1			
35	Krishna Bahadur Khatri	1					1			
36	Sitaram Giri	1						1		
37	Tejnarayan Tharu	1		1						
Total		**27**	**10**	**16**	**0**	**10**	**8**	**2**	**1**	**0**

C. Expert Planning Workshop

River Systems	Tawa South, Adheri-Baruwa-Dwar, Gidari and Sunkoshi
Date of Workshop	August 21 - 22, 2022
Venue	Hotel Kohbar
Location	Gaighat, Udayapur

S. N.	Name of Participants	Institution	Designation	Contact No.	Email
1	Ambika Pd. Poudel	DFO Gaighat, Udayapur	DFO	9852835134	ambikapoudel12@gmail.com
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4	Dilip Prasad Gupta	Province Forest Directorate	Assistant Forest Officer	9842552666	pradeshforest@gmail.com
5	Kashi Narayan Chaudhari	DFO, Triveni	AFO	9864226567	kashichaudhari@gmail.com
6	Ram Singh Chaudhari	SDFO, Sunpur	Forest Guard	9842450556	
7	Binod Kumar Shah	SDFO, Tapeswari	AFO	9842050118	binodshah566@gmail.com
8	Bindeswar Shah	SDFO, Katari	Forest officer	9848117063	sahbindeswar21@gmail.com
9	Raj Kishor Mandal	MoFESC, Biratnagar	ASCO	9842635267	rkm2022@gmail.com
10	Ram Bhagat Yadav	SDFO, Swanku	AFO	9842825218	ramvagaty7@gmail.com
11	Dev Chandra Girte	SDFO, Nepaltar	AFO	9846055012	dev3760@gmail.com
12	Dharm Dev Thakur	SDFO, Rampur	AFO	9844671151	dharmadev35@gmail.com
13	Sanni Kumar Jha	SDFO, Mainamaini	AFO	9841249173	jha.sunnykumar1@gmail.com
14	Arvind Pandey	DFO, Udaypur, Triveni	AFO	9842096201	arvindpanday56568@gmail.com
15	Kamala Lpo	BMC, Koshi	ASCO	9846717055	kamala401@gmail.com
16	Kamala Shrestha	DFO, Gaighat	Forest Ranger	9842837606	
17	Ajay Chandra Subedi	SWMO, Okhaladhunga	ASCO	9855063076	ajay.subedi02@gmail.com
18	Ram Krishna Rajthala	BMC, Koshi	Senior Watershed Management Officer	9852835204	rkrajthala3a@gmail.com
19	Sushil Bhandari	PPMU, BRCRN-Itahari	Project Coordinator	9852074085	sbhandari7@gmail.com
20	Anu BC	AKC, Gaighat, Udaypur	Agriculture Officer	9842065006	sanub2004@gmail.com
21	Bijay Kumar Yadav	SDFO, Beltar	AFO	9849391436	bijay00yadav00@gmail.com
22	Raj Kumar Shrestha	DFO, Udaypur	AFO	9849148020	rajshrestha10@gmail.com
23	Narayan Shrestha	FAO-TA KTM	NIPS	9851040880	narayan.shrestha@fao.org
24	Dron Kumari Rai	Triyuga-4 Udaypur	Hemwanti Nepal	9842869064	rai.drona123@gmail.com
25	Punya Prasad Paudel	DFO, Udaypur	Ranger	9852837222	punyapaudel28@gmail.com

Annex 3: Field Verification of Hotspots

1. Sombare, Geruwa Khola

- **Community Forests:** Pashupati CF and Shanti CF
- Flood risk at Dalit Basti (Bishwokarma)- 6 households
- Stone piling for embankment
- About 200m stone piling required upstream from the Sub-division Forest Office, Risku

Photo: Flood risk houses at Dalit Basti

- **Plantation site:** Barren land, few Sal trees exist, Simali and Sajiwon planted at the river banks, Teak plantation in private land

Photo: Potential plantation site adjacent to Risku Sub-division Forest office

- **Nursery Establishment:** Proposed in area beside Sub-division Forest Area, Risku, about 50,000 saplings/seedlings (Estimated cost: NRs. 10,00,000 for 2 years)

- **Local Safeguard Issues**
  - Water Unavailability
  - Might require soil filling
  - Land ownership, some private lands exist
  - Land used for grazing by nearby Dalit community and others

Photo: Proposed site for nursery establishment at Risku Sub-division Forest office

2. Dasbighe, Ratu Khola

- Flood risk: about 30-40 households
- Magar, Rai, Tamang communities
- **Existing:**
  - Traces of old earthen and stone piling embankment
  - Spurs and new embankment with sediment piling at about 20m parallel to the old embankment
  - About 300 m embankment of sediment pile constructed 3 years before but not so effective
  - Maintenance work done this year but about 80m remaining due to insufficient budget

Photo: Existing earthen embankment to mitigate flood risk

- Gabion walls (stone filled gabion) required for effective embankment
- Potential plantation areas in river corridor

Photo: Potential plantation site along the riverbank

- **Local Safeguard Issues:**
  - Potential river bank encroachment as some houses are built outside the old embankment
  - Soil filling might require for plantation due to sediments
- **IPs Suggestions:**
  - Embankment in collaboration with local communities and local government
  - Plantation in potential reclaimed river flood plain. Species selection should benefit to the farmers of the local community

3. Sanguri Khola

- Potential Plantation area

- **Local Safeguard Issues:**
  - Land ownership issues, needs further verification

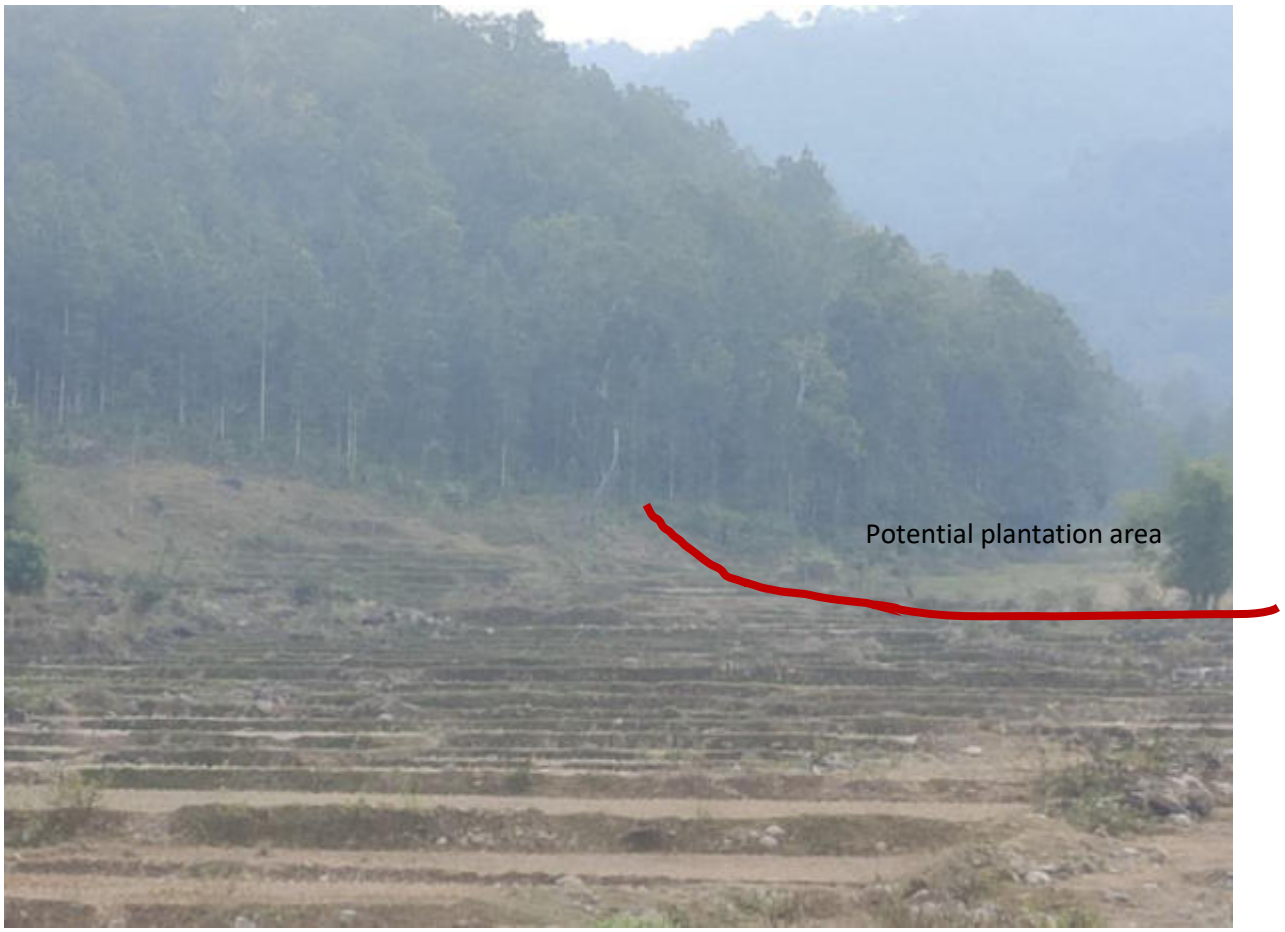


Photo: Potential plantation area on abandoned cultivation land along right bank of Sanguri Khola

4. Giddhabar, Baliya Khola (Katari-2)

- **Community Forest:** Paluwatar CF
- Flood Risk to Musahar Basti

Photo: Flood risk houses at Musahar Basti

- **Potential plantation areas:** River banks and either side of the football ground
    - **Local Safeguard Issues:**
        - Grazing area allotted within the potential plantation area


Photos: Potential plantation site in between the playground and earthen embankment

- **IPs Suggestions:**
    - Strengthening of earthen embankment and spurs constructed 5 years before with proper planning and plantation (Mal Bans, Simal, Khayar) along the embankment

5. Simanpur, Simanpur Khola (Katari-2)

- Plantation area

Photo: Potential plantation site at abandoned flood plain of Simanpur Khola

- **IPs Suggestions:**
    - Species selection should benefit to the farmers of the local community

6. Kalyanpur Basti, Amaha Khahare

- Earthen embankment constructed 3-4 years is continuously breached every monsoon
- Danuwar, Chhetri, Brahman, Musahar, Rai, Magar community

Photo: Settlement at flood risk at Kalyanpur Basti

- **IPs Suggestions:**
    - Strengthening of earthen embankment

7. Chyanga Gaun (Katari-3)

- **Community Forest:** Sadabahar CF
- Plantation along Chyanga Khola (especially bamboo) for river training
- A playground developed along the river bank
- **Local Safeguard Issues:**
    - CFUGs' Forest Operational Plan not renewed

9. Lamiduwali

- About 125 households at Tallo Lamiduwali and Mathillo Lamiduwali
- Farmer Group formed; majority Magar and Dalit involved in vegetable farming and piggery
- Issues of water scarcity, market

IPs Suggestion:

- Agriculture support program

10. Hattidhunga (Udayapurgadhi)

- Landslide treatment

Photo: Landslide and gulley erosion site at Hattidhunga

IPs Suggestion:

- Protection works for newly constructed playground

11. Dhappar (Udayapurgadhi)

- Landslide treatment
- 29th Asar, 2076; Blockade of Baidyanath Khola for 18 hours; About 10 households of Tintatne displaced

Photo: Landslide at Dhappar

Photos: Fruit tree plantation on landslide susceptible area at Dhappar (Farmers' initiation)

Annex 4: Activities, Location and Budget Plan

Note: Budget estimations are tentative and done based on consultation workshops with key stakeholders at river system level during 2022. However, during time of implementation, the rate and amount mentioned in the CERP plans are subjected to change based on the changes in market situation as well as the field condition. Respective Provincial Project Management Offices (PPMUs) can make necessary changes based on field situation following the norms and rates as per the Nepal government rules and regulations.

Sub-activities	Unit	Quantity	Unit Cost	Budget (NRs.)	Location	Lat.	Long.	Activity Code	Local Government
Identification and operationalization of FFS								A1.1	
FFS at Jagaran Krishi Tatha Pashupanchi Samuha	No	1	700,000	700,000	Lamiduwali	86.453171	26.914516	A1.1.1	Katari M-6
FFS at Suryamukhi Farmer group	No	1	700,000	700,000	Baliya	86.323068	26.957023	A1.1.2	Katari M-3
FFS at Himshikhar Krishak Samuha	No	1	700,000	700,000	Simle-Bhagkhor	86.56204	26.898538	A1.1.3	Udayapurgadhi RM-7
Capacity-building in the use of weather information and its application in agricultural practices	No	2	100,000	200,000				A1.1.4	
Implement climate resilient agriculture practices	ha	192	4,000	769,364.96	Katari M-2	86.303161	26.951666	A1.2.1	Katari M-2
	ha	328	4,000	1,311,944.00	Katari M-3	86.344172	26.952306	A1.2.2	Katari M-3
	ha	517	4,000	2,068,468.29	Katari M-5	86.388984	26.942459	A1.2.3	Katari M-5
	ha	375	4,000	1,501,807.39	Katari M-6	86.442572	26.918636	A1.2.4	Katari M-6
	ha	134	4,000	537,206.46	Udyapurgadi RM-7	86.552431	26.896864	A1.2.5	Udyapurgadi RM-7
	ha	318	4,000	1,272,947.14	Udyapurgadi RM-6	86.513937	26.900076	A1.2.6	Udyapurgadi RM-6
Train and support farmers to adopt and apply climate-resilient land use practices	Event	1	450,000	450,000	Giddhabar (Danuwari tol)	86.317237	26.956406	A1.3.1	Katari M-2
	Event	1	450,000	450,000	Chyanga	86.34814	26.946288	A1.3.2	Katari M-3
	Event	1	450,000	450,000	Bhorle (Sahalesh cf)	86.397223	26.92475	A1.3.3	Katari M-5
	Event	1	450,000	450,000	Bhulke (Sagajor cf)	86.379739	26.944999	A1.3.4	Katari M-5

Sub-activities	Unit	Quantity	Unit Cost	Budget (NRs.)	Location	Lat.	Long.	Activity Code	Local Government
	Event	1	450,000	450,000	Bagpati (Arne cf)	86.463806	26.903168	A1.3.5	Katari M-6
	Event	1	450,000	450,000	Galtar (Pashupati cf)	86.43825	26.924086	A1.3.6	Katari M-6
	Event	1	450,000	450,000	Hattidhunga	86.488989	26.888638	A1.3.7	Udayapurgadhi RM-6
	Event	1	450,000	450,000	Sano Dhapper-Budhathokitar	86.516194	26.90346	A1.3.8	Udayapurgadhi RM-6
	Event	1	450,000	450,000	Kuibhir	86.546941	26.891881	A1.3.9	Udayapurgadhi RM-7
	Event	1	450,000	450,000	Bijanbari	86.550927	26.903807	A1.3.10	Udayapurgadhi RM-7
Promote agroforestry with multiyear cropping/horticulture promotion/on-farm conservation								A2.1	
	ha	20	6,000	120,000	Simle	86.558439	26.893132	A2.1.1	Udayapurgadhi RM-7
	ha	25	6,000	150,000	Kuibhir	86.549883	26.892489	A2.1.2	Udayapurgadhi RM-7
	ha	22	6,000	132,000	Malika cf (Sande-Bhutiya)	86.539428	26.898728	A2.1.3	Udayapurgadhi RM-6& 7
	ha	5	6,000	30,000	Thulo Dhapper	86.504898	26.899315	A2.1.4	Udayapurgadhi RM-6
	ha	15	6,000	90,000	Hattidunga	86.487564	26.893253	A2.1.5	Udayapurgadhi RM-6
	ha	5	6,000	30,000	Madenpakha	86.471229	26.89573	A2.1.6	Katari M-6
Landslide treatment								A2.2	
	No	1	LS	3,000,000	Dhappar	86.506714	26.903826	A2.2.1	Udayapurgadhi RM-6
	No	1	LS	2,000,000	Kuibhir	86.544908	26.892354	A2.2.2	Udayapurgadhi RM-7
	No	1	LS	2,000,000	Hattidunga	86.491581	26.89232	A2.2.3	Udayapurgadhi RM-6
Construction of check dams and bio-engineering for gully/Debris torrent protection	No	1	LS	2,000,000	Bhasuwa	86.455313	26.903616	A2.3.1	Katari M-6
	No	1	LS	2,000,000	Ratukhahare	86.442222	26.918521	A2.3.2	Katari M-6

Sub-activities	Unit	Quantity	Unit Cost	Budget (NRs.)	Location	Lat.	Long.	Activity Code	Local Government
	No	1	LS	2,000,000	Paluwatar cf	86.33328	26.954832	A2.3.3	Katari M-3
	No	1	LS	2,000,000	Paluwatar cf	86.331285	26.955561	A2.3.4	Katari M-3
Construction of embankment with bio-engineering	m	200	15,000	3,000,000	Giddhabar	86.319567	26.957113	A2.4.1	Katari M-2
	m	140	10,000	1,400,000	Baliya	86.320366	26.957218	A2.4.2	Katari M-3
	m	175	10,000	1,750,000	Dadriya Khahare (Kalyanpur)	86.298543	26.946547	A2.4.3	Katari M-2
	m	490	15,000	7,350,000	Amaha khajare	86.305535	26.949194	A2.4.4	Katari M-2
	m	460	15,000	6,900,000	Ratu Khola	86.385946	26.944586	A2.4.5	Katari M-5
	m	130	15,000	1,950,000	Ratukhola (Right)	86.387689	26.94729	A2.4.6	Katari M-5
	m	390	15,000	5,850,000	Rauwa Khola	86.539758	26.907531	A2.4.7	Udayapurgadhi RM-6
	m	150	30,000	4,500,000	Duble -Tawa confluence	86.396373	26.949168	A2.4.8	Katari M-5
Strengthening climate and disaster risk reduction mechanism in collaboration with local government	Municipality/ Rural municipality	2	300,000	600,000				A2.5.1	Katari M & Udayapurgadhi RM
Training/capacity building on soil and watershed conservation using bio-engineering	Event	1	500,000	500,000				A2.5.2	
Climate resilient awareness campaign through Eco-clubs	School	4	50,000	200,000				A2.5.3	
Review/upgrade/renew of forest operational plans (FOPs) of community forest user groups (CFUGs)	No	34	150,000	5,100,000	Starting from CBFMGs with higher willingness to participate and not having any technical and financial dispute			M3.1	
Training and capacity development for implementation of FOPs	No	34	250,000	8,500,000				M3.2	
Equipment support for implementation of FOPs	No	34	200,000	6,800,000				M3.3	

Sub-activities	Unit	Quantity	Unit Cost	Budget (NRs.)	Location	Lat.	Long.	Activity Code	Local Government
Capacitate government staffs and CBOs on climate resilient forest management (Training of Facilitators-TOF)	Event	4	300,000	1,200,000				M3.4	
Governance training to government staffs and CFUGs to enhance accountability and transparency	Event	10	240,000	2,400,000				M3.5	
Enrichment plantation	ha	5	80,000	400,000	Sadabahar cf	86.35435	26.936039	M4.1.1	Katari M-3
	ha	20	80,000	1,600,000	Sringar cf	86.363912	26.953102	M4.1.2	Katari M-3 &5
	ha	9	80,000	720,000	Santi cf	86.420613	26.929063	M4.1.3	Katari M-6
Implement Assisted Natural Regeneration	ha	32	20,000	640,000	Sugajor cf	86.375816	26.938847	M4.2.1	Katari M-5
	ha	26	20,000	520,000	Sringar cf	86.360313	26.950246	M4.2.2	Katari M-3 & 5
	ha	14	20,000	280,000	Arne cf	86.464681	26.89711	M4.2.3	Katari M-6
	ha	39	20,000	780,000	Sarsoti Nepaltar cf	86.515498	26.898986	M4.2.4	Udayapurgadhi RM-6
	ha	12	20,000	240,000	Sitapokhari cf	86.316029	26.954225	M5.3.5	
Firefighter training and support firefighting equipment to CFUGs	CFUG	10	300,000	3,000,000				M4.3.1	
Support firefighting equipment to security institution	Set	6	150,000	900,000				M4.3.2	
Training and equipment support to compost production	CFUG	10	150,000	1,500,000				M4.3.3	
Construction and improvement of firelines	Km	4	300,000	1,200,000				M4.3.4	
Customize fire alert system in Community Based Forest Management (CBFM)	No	1	LS	300,000				M4.3.5	
Skill development trainings and equipment support	Household	100	25,000	2,500,000				M4.4	
Establish and support multi-purpose tree nurseries	No	1	1,000,000	1,000,000	Risku Sub-divison			M5.1.1	

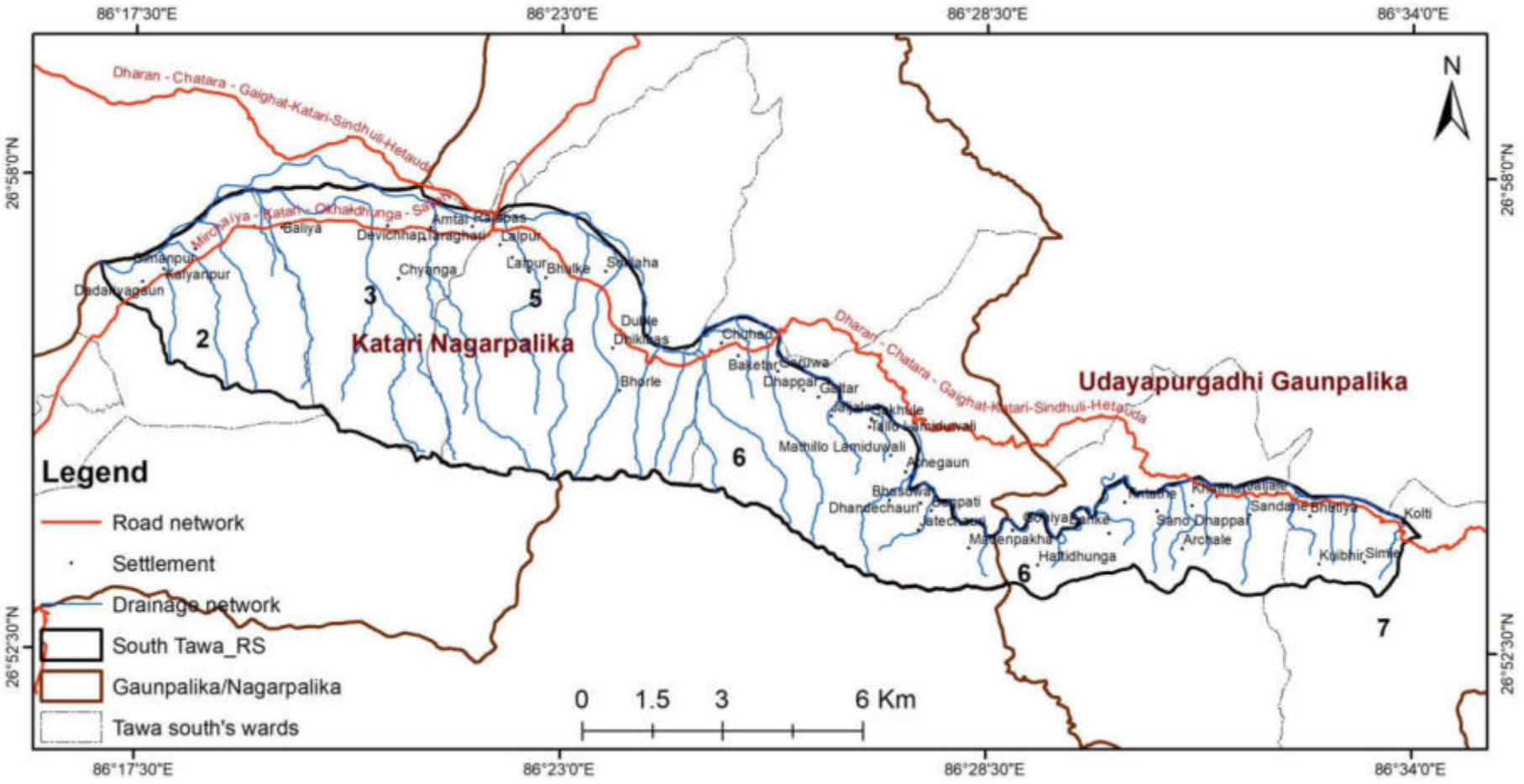
Sub-activities	Unit	Quantity	Unit Cost	Budget (NRs.)	Location	Lat.	Long.	Activity Code	Local Government
	No	1	500,000	500,000	Nepaltar Sub-divison			M5.1.2	
	No	1	500,000	500,000	Katari Sub-divison			M5.1.3	
Production of saplings	No	150000	40	6,000,000	Risku			M5.2.1	
	No	50000	40	2,000,000	Nepaltar			M5.2.2	
	No	50000	40	2,000,000	Katahari			M5.2.3	
Establish On-farm tree nursery	No	1	600,000	600,000	Simile (Chyabari cf)	86.558439	26.893132	M5.3.1	Udayapurgadhi RM-7
Riparian/River bank plantation	ha	3	600,000	1,800,000	Sltapokhari cf	86.320061	26.954879	M5.4.1	Katari M-2
	ha	2	600,000	1,200,000	Paluwatar cf	86.321685	26.954738	M5.4.2	Katari M-3
	ha	4	600,000	2,400,000	Sadabahar cf	86.34689	26.941628	M5.4.3	Katari M-3
	ha	3	600,000	1,800,000	Sukhajor Khahare	86.355057	26.954321	M5.4.4	Katari M-3
	ha	6	600,000	3,600,000	Chhauri Khola	86.375923	26.943375	M5.4.5	Katari M-5
	ha	7	600,000	4,200,000	Chhauri Khola	86.376692	26.941642	M5.4.6	Katari M-5
	ha	6	600,000	3,600,000	Dube Khola	86.391225	26.939157	M5.4.7	Katari M-5
	ha	1	600,000	600,000	Thulo Saguri Khola	86.4149	26.92852	M5.4.8	Katari M-6
	ha	2	600,000	1,200,000	Geruwa Khola	86.428099	26.930627	M5.4.9	Katari M-6
	ha	2	600,000	1,200,000	Ratu Khola	86.441401	26.922259	M5.4.10	Katari M-6
	ha	1	600,000	600,000	Diyalo Khola	86.46116	26.899371	M5.4.11	Katari M-6
Technical guidance and support to establish woodlots	ha	25	250,000	6,250,000	Others			M5.5.1	

Sub-activities	Unit	Quantity	Unit Cost	Budget (NRs.)	Location	Lat.	Long.	Activity Code	Local Government
Create informal learning and sharing platforms for grassroots-level women	Event	5	50,000	250,000					
Conduct local level policy discourses to ensure gender responsiveness and women's participation, access, control and leadership	Event	1	50,000	50,000					
Produce and publish best practices and learning in gendered governance	Event	1	50,000	50,000					
Conduct rapid assessment on women's contribution and involvement in SNRM	Event	1	100,000	100,000					
Provide gender mainstreaming trainings/ workshops to local government and CBOs	Event	1	100,000	100,000					
Conduct GESI focused social audits and public hearing	Event	2	150,000	300,000					
Conduct advocacy campaign and promote awareness on gender responsive information, available provisions and resources among CBOs/ women groups	Meeting	3	50,000	150,000					
Engage male involvement to advocate gender and women's issues and concern in campaign	Event	2	50,000	100,000					
Total Budget (NRs.)				**144,543,738.22**					

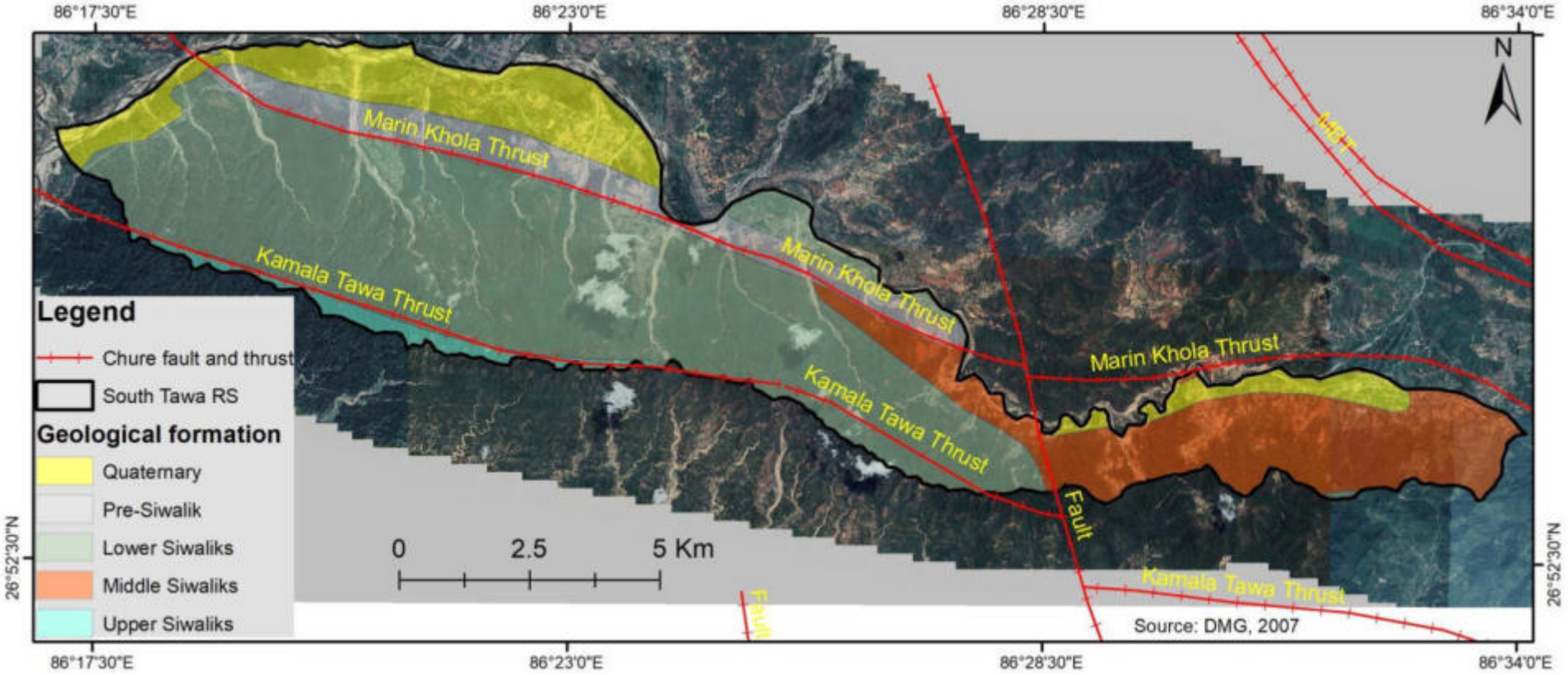
Note: Budget estimations are tentative and are subjected to change based on the changes in market situation as well as the field condition

Annex 5: Maps

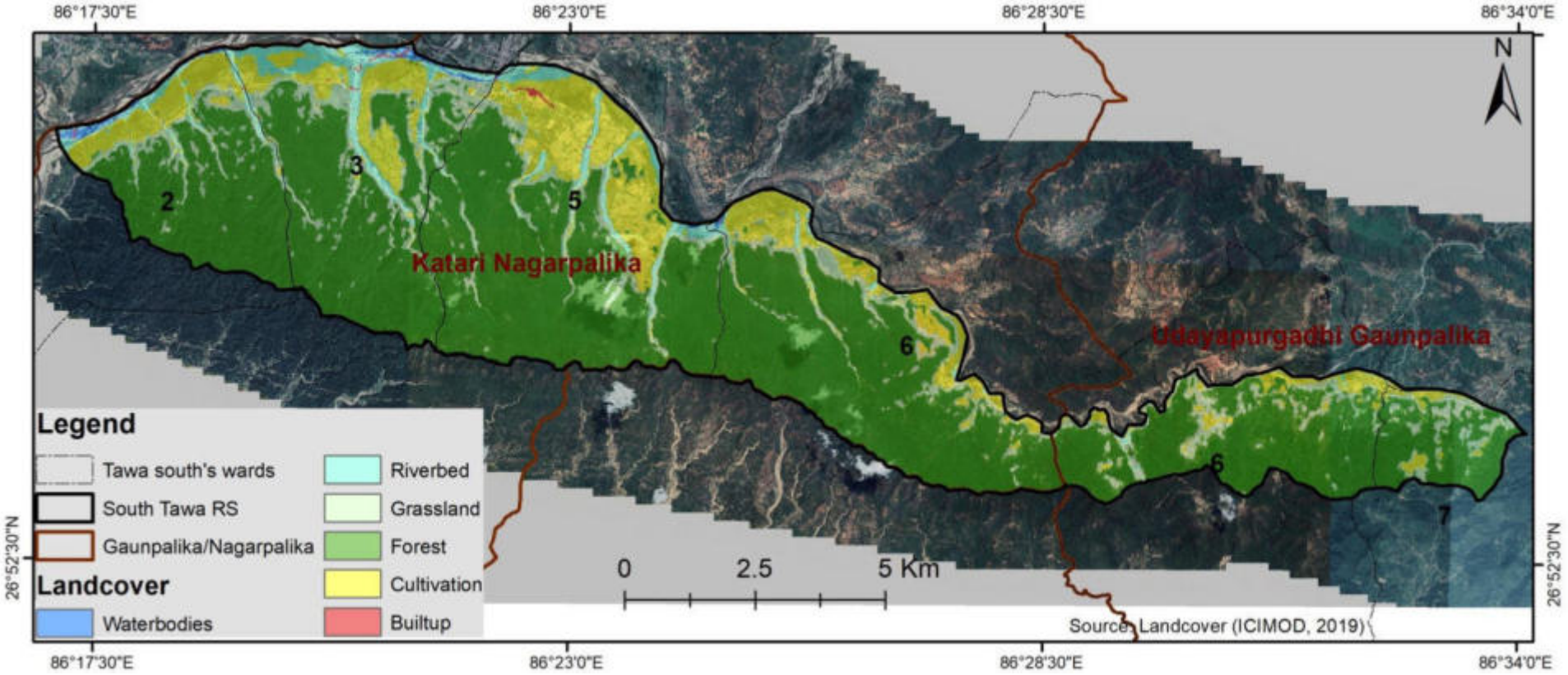
Location Map



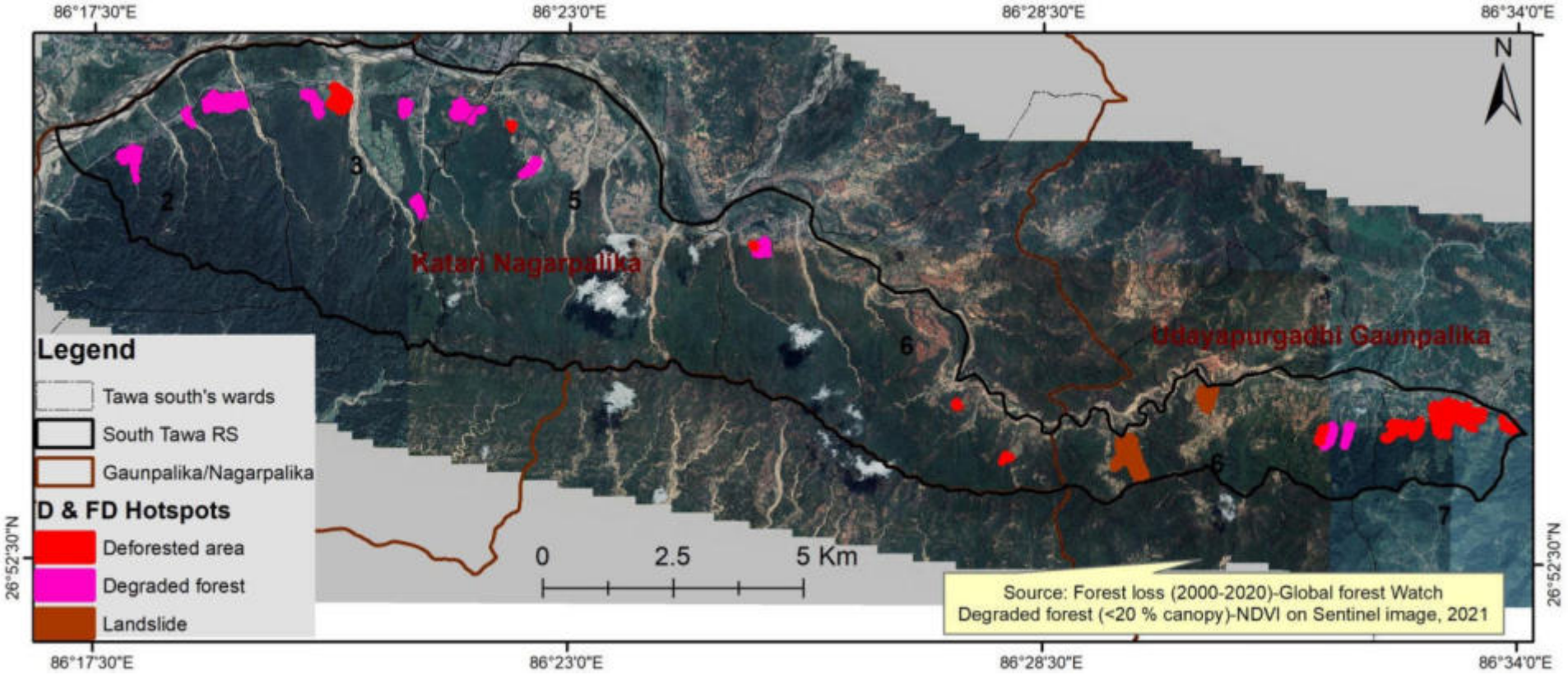
Geological Map



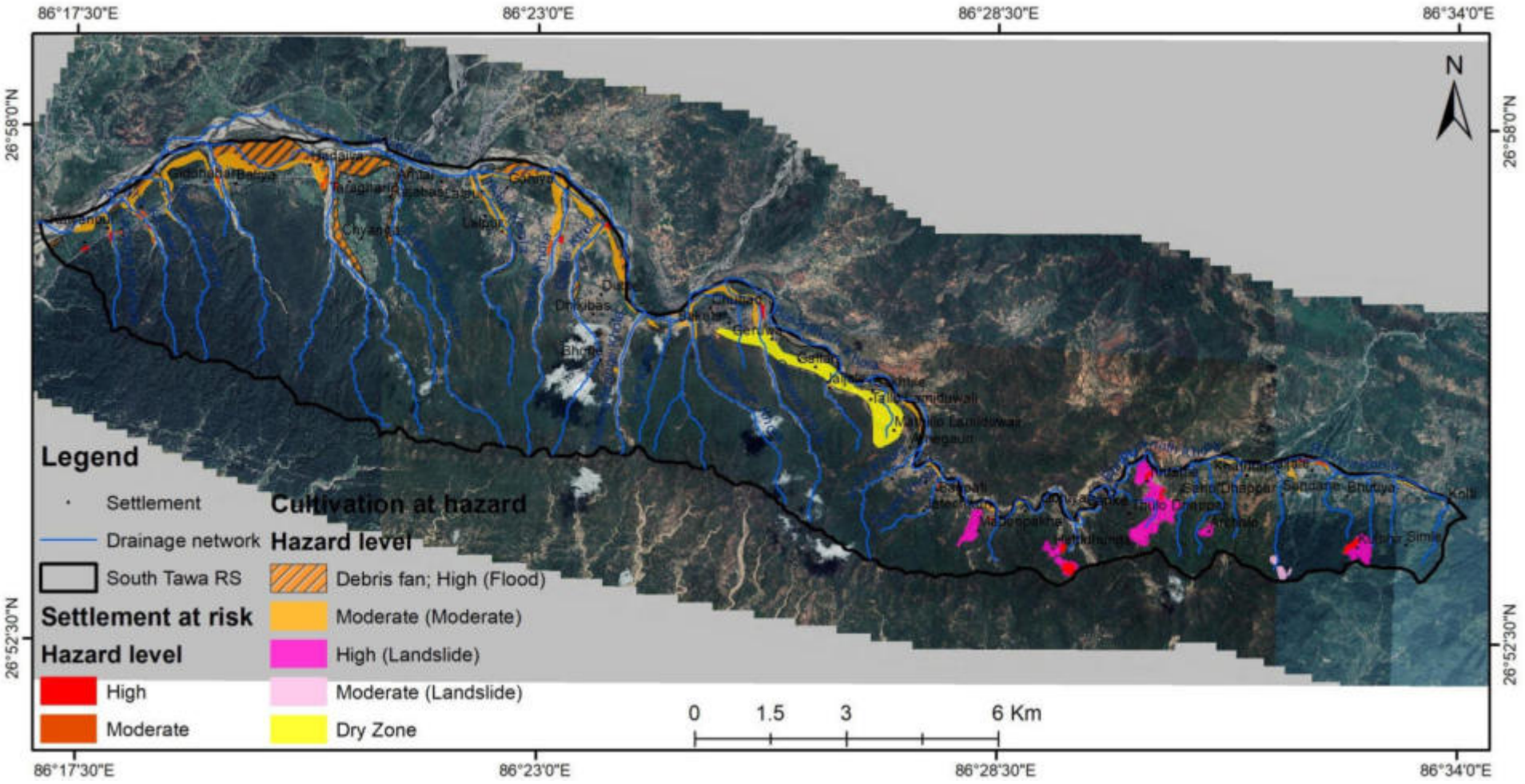
Land Cover Map



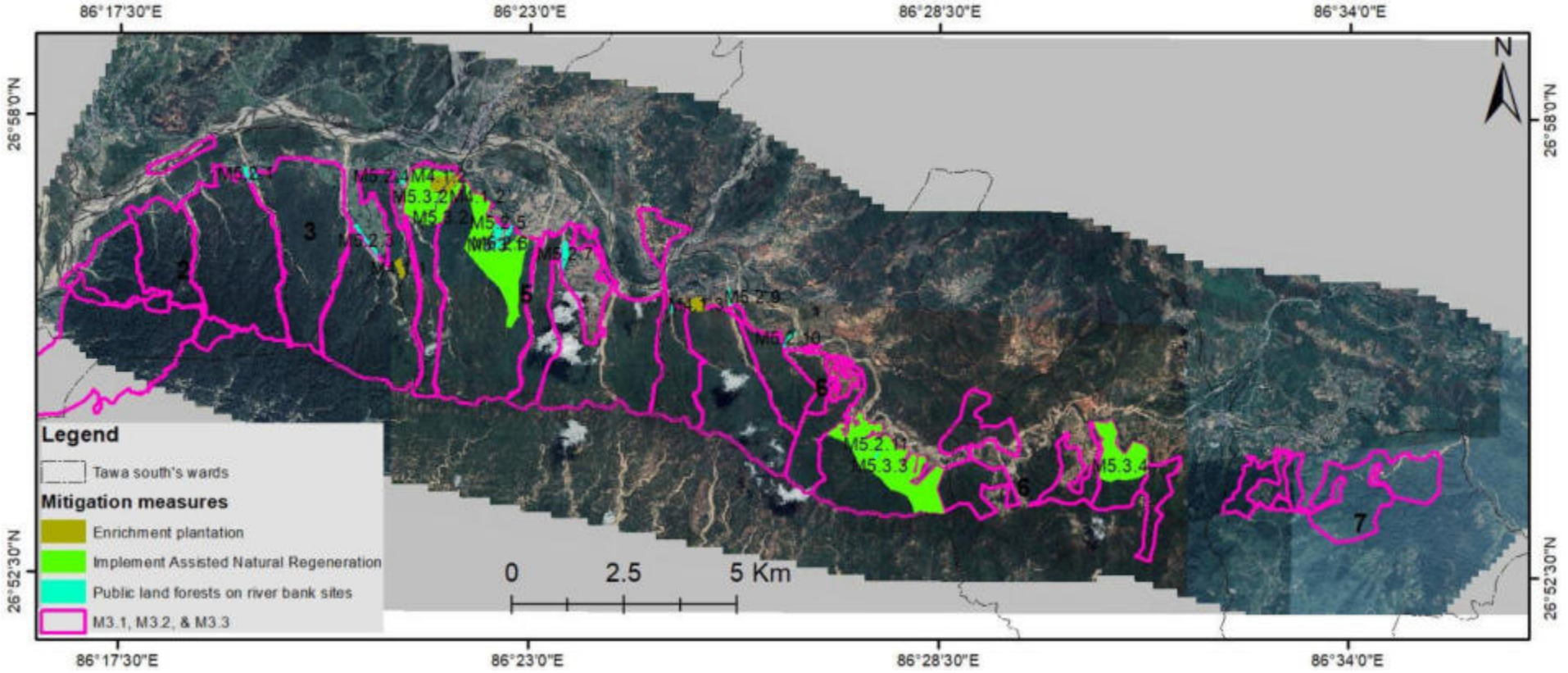
Hotspots for Forest Loss (D&FD)



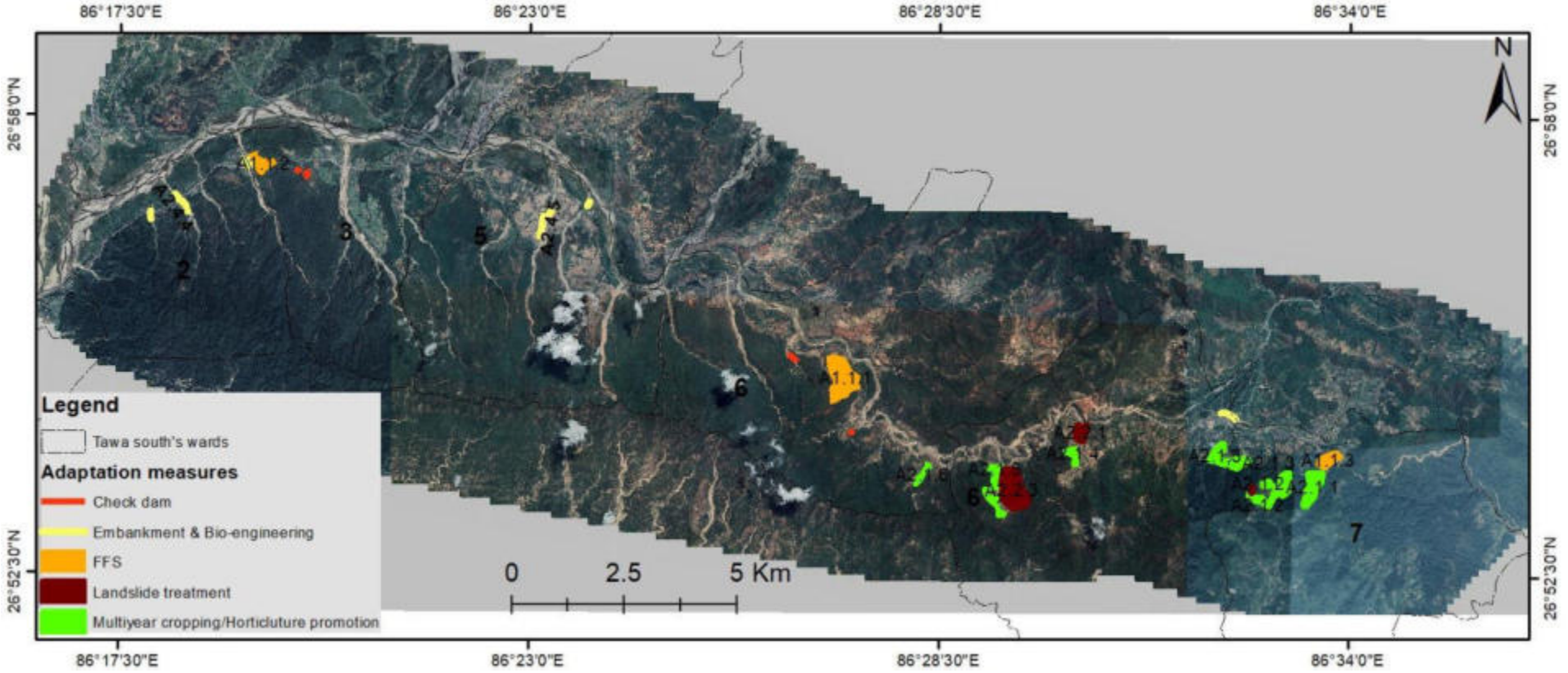
Hotspots for Climate Adaptation



Final Activity Map for Mitigation



Final Activity Map for Adaptation



Annex 6: Photographs

A. Problem and Solution Analysis Workshop

B. Expert Planning Workshop

C. Hotspot Verification

D. Focus Group Discussion

FGD at Musahar Basti Giddhabar, Katari Municipality -2

FGD at Lamiduwali Women Farmers' Group, Katari Municipality-6, Lamiduwali