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Ministry of Forests and Environment

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Food and Agriculture Organization of the United Nations

Critical Ecosystem Restoration Plan (CERP)

of

Bataha 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.

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Date: 26 March, 2021

DECLARATION OF AUTHENTICITY

To the best of our knowledge and in accordance with the MOFE approved CERP manual, we, the service provider Nature's Conservation (P) Ltd. , Kathmandu, hereby confirm that this CERP report is our original outcomes and the data and information provided in the reports of the Madhesh and Bagmati provinces are based on advice from FAO-TA, the expertise of the service provider , community user groups, district expert consultation sessions, provincial and federal validation consultation meetings, and other secondary sources. Without citing the GoN-BRCRN project's copyright, we won't give permission for our team or any other sources to use it as copied material.

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Contents

Acronyms and Abbreviation

A	Adaptation
AF	Agro-Forestry
AFG	Agroforestry Group
AKC	Agriculture Knowledge Center
ANR	Assisted Natural Regeneration
BRCRN	Building a Resilient Churia Region in Nepal
CB-FFFG	Community Based Forest Fire Fighting Group
CBO	Community Based Organization
CERP	Critical Ecosystem Restoration Plan
CF	Community Forest
CFUGs	Community Forest Users Groups
CRLU	Climate Resilient Land Use
D & FD	Deforestation and Forest Degradation
DFO	District Forest Office
DRR	Disaster Risk Reduction
DoS	Department of Survey
FFS	Farmer Field Schools
FoP	Forest Operational Plan
FPIC	Free, Prior, and Informed Consent
GESI	Gender Equality and Social Inclusion
GIS	Geographic Information System
HHs	Households
ICIMOD	International Centre for Integrated Mountain Development
ICS	Improved Cooking Stove
IPs	Indigenous Peoples
IPPF	Indigenous Peoples Planning Framework of BRCRN Project
IPacks	Intervention Packages
IPM	Integrated Pest Management
LFUGs	Local Forest Users Groups

LMC	Livestock Management Center
LPG	Liquefied petroleum gas
LRP	Local Resource Person
M	Mitigation
MCA	Multi-Criteria Analysis
MoU	Memorandum of Understanding
NARC	Nepal Agriculture Research Center
NDC	Nationally Determined Contributions (NDC)
NDRRMA	National Disaster Risk Reduction and Management Authority
PPMU	Provincial Project Management Unit
RM	Rural Municipality
SCWs	Seepage Cutoff Walls
SDFOs	Sub-Division Forest Offices
SNRM	Sustainable Natural Resource Management
ToF	Training of Facilitators
WFG	Women Farmer Group

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Executive summary

The Critical Ecosystem Restoration Plan (CERP) is based on participatory and results-based planning methodology with a robust monitoring protocol, to help leverage support and facilitate budget planning from the federal to the provincial and local level for investments in ecosystem restoration. The CERP methodology covers all steps in the planning process, from the identification of stakeholders, collection of data and information, processing, analysis, discussion, and evaluation including participatory stakeholder consultations and negotiations. Multiple stakeholder workshops are instrumental in the CERP preparation process in the targeted ecosystems within river systems. In addition, the project adopted a gender-integrated approach to mainstream gender into the plan. The project has conducted additional gender study mainly focused on women, Dalits women, and indigenous women to identify the gender-specific problem and local-level solution for the intervention. The gender-specific study adopted research tools such as a seasonal calendar for gender analysis, problem, and solution community workshops, and focus group discussions among the community. Also, the process includes a consultation with women and women lead organizations.

The Bataha River rises on Churia Hill in Mirchaiya Municipality-9 in the north at an elevation of 624.9 meter above mean sea level (masl), flows to the south, and merges with the Kamal River at an elevation of 82 masl. 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 in one location in the river system: Mirchaiya Municipality-6, Mirchaiya Bazar. Participants from Community Based Organizations (CBOs) user groups-with a focus on women, indigenous people, poor and Dalit (community 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. Additionally, the workshop also discussed and drafted the CERP with solution-activities to overcome the problems observed (drivers) and restore the ecosystem of the river system. The participants in the expert planning workshop represented the government authorities and other networks working in forests and natural resource management sector, agriculture sector and disaster risk reduction sector in the river system.

Based on the problem analysis workshops, following key problems were identified in river system:

a. Over the past 19 years (2000-2019), forest area has decreased at rate of 1.76 percent per year and cultivation land also decreased at the rate of 0.10 percent per year, whereas the built up area has increased at the rate of 10.33 percent per year over the period. (Source: ICIMOD, 2000 and ICIMOD, 2019). During field observations and mapping total forest loss has been detected is 421 ha, which is more than the as shown by national data. This is mainly because the national data does not cover field details and degradation happenining in the river systems. Forest fires, open grazing, illegal logging and careless fuelwood collection, encroachment, climate led hazards- (flash flood, landslide),

and the development of physical infrastructure, especially rural networks in of roads both municipalities, are the main causes of forest loss within this river watershed.

b. About 21 Community/Local Forest User Groups (CFUGs/LFUGs) are functional in the river system, which is a significant in terms of number of forest user groups. However, there is inadequate technical human resources, tools and techniques, knowledge and skills, and financial resources, and hence there is an ineffective forest management in this river system .
c. About 19 landslides (covering about 10 ha) and a number of gullies in 13 torrents in various locations in the Karjanha Municipality-10,11 and Mirchaiya Municipality-1,5,7,9 have contributed to degraded forest in upstream areas causing loss of soil and vegetation in this river system.
d. On sloppy lands upstream (about 32 ha), poor agricultural interventions are being practiced, which has led to soil erosion and the deterioration of the land's fertility and quality.
e. A total of 257 ha of river side land, including a flood plain and agricultural land downstream, have been deposited by the riverbed materials (like sands, boulders and pebbles), which contributes to degraded agriculture lands and reduces the fertility in the river system.
f. Lack of access to climate-informed decision-making in agriculture practices, ineffective practices with no access to commercialization of agricultural production, intense and frequent short-duration rainfall with a risk of flash flood, inefficient irrigation facilities, infestation of pest and disease pests, and diseases, and inadequate support for improved livestock management practices are all examples of inadequate climate adaptation practices in the river system.
g. Women and marginalized communities need access to and control over forest and community resources and information to participate in climate change and forestry-related actions at the river systems.
h. The involvement of women in the overall planning, leadership, and decision-making process is affected by poor gender-inclusive governance. This affects the performance of CBO's women members/leader to participate in the SNRM intervention actively.

The identified solutions with intervention activities (solutions-activities) are grouped into five Intervention Packages (IPacks) based on guidance from CERP manual to address the drivers of: a) climate change mitigation—hotspot of forest loss in upstream; b) climate change adaptation—. Each IPack contains a general description of the drivers, a list of the most significant initiatives for resolving problems with outputs and outcomes to address the drivers and the underlying causes and effects of the hotspots, implementing strategies, 5-year budget plan for carrying out the initiatives, monitoring plans, analyses the feasibility of the implementation and a brief safety precaution. Additionally, there are two categories of solution activities: capacity buildings and solution-activities in spatial mappings with activities area code (GIS data layers: polygons, lines, and points). The suggested solution-activities in the plan also include beyond the BRCRN priority.

Following are a brief glimpse of the Intervention Packages and key activities:

IPack 1: Restoration of degraded forest and afforestation in river reclaimed land

a. Enrichment plantation in the degraded forest: the potential native tree species,
b. Natural regeneration management- Assisted Natural Regeneration (ANR) through:
    - Reduction of forest fire hazards through weeding, cleanings and improvements (extraction of bushes, leaf litters and forest residues) (about 11 km);
    - Mesh-wire fencing for protection of existing forest as priority ANR activity (20 km) in the riverside lands (257 ha) plantation, including community land plantation (**55 ha**), Demosntration Plantation (**32 ha**), Riparian plantation (65 **ha),** and Woodlots establishment (**105 ha**).
c. Support for alternative energy sources, priority for Women and marginalized communities

d. Capacity building for local government on monitoring for sustainable extraction of river bed materials.

IPack 2: Soil and water conservation

a. Landslide treatments in 19 sites with bio-engineering and vegetative measures
b. Stabilization of gully in the torrent (13 torrents)
c. Construction of water conservation new ponds (8 ponds)
d. Improvement of existing ponds (6 pond)
e. Improvement of hill-terracing(32 ha in several locations)
f. Construction of water harvesting structure
g. Riverbank stabilization
h. Wetland improvement
i. Capacity buildings in water and soil conservation practices (Skill based trainings, orientation and demonstration visits, success stories collection and sharing)

IPack 3: Agroforestry system

a. Adoption of Agroforestry system in the potential areas of the riverside (about 76 ha) and link with livestock promotion with establsihment of agroforestry nursery-focus on the local fodder species
b. Providing supports for irrigation facilities
c. Formulation of groups called Agroforestry Groups (AFGs), if no any agroforestry group existed currently
d. Capacity builing trainings on Agroforestry and Institutional support

IPack 4: Climate resilient agriculture technologies and practices.

a. Establishment of Farm Field Schools on the basis of crop problems and failures for several reasons.
b. Support for the conservation and utilization of water source for irrigation facility using climate resilient technology
c. Capacity building trainings on CRA (composting, manuring, mulching, water retention techniques), livestock management, protection of cultivation lands from wildlife threats and use of weather information:

a. **IPack 5:** Advocacy campaign for gender**-inclusive governance for SNRM and resilience** Developing and implementing awareness-raising sessions targeting government, civil society, grassroots organizations, and rural communities.
b. Create informal learning and sharing platforms for grassroots-level women by utilizing local schools, eco clubs, and youth associations.
c. Collect local-level best practices for learning and policy influence to ensure gender responsiveness and women's participation, access, control, and leadership.
d. Provide gender mainstreaming training/ workshops to local government and CBOs
e. Conduct GESI-focused social audits and public hearings

The intervention packages are targeted to improve the overall ecosystem functions of the river system and are designed as guided by CERP manual. The CERP manual guides: *"IPacks are to be composed of activities that can be operationalized at river system or site level, they should not include national level policies and measures (PAM) even though the solution trees will naturally contain these, since they respond to the policy*

and governance failures that are the main underlying causes of D&FD". Based on the CERP manual guidance, policy related interventions identified in solution analysis are reviewed against already existing REDD+ national strategy and found that most of them align with the national strategy. Hence, policy level interventions are not emphasized in CERP, rather a local level intervention focusing on restoring degraded ecosystems is prioritized.

CERP being a river system level plan, its interventions (IPacks) are designed to foster upstream-downstream linkages and address issues covering entire river system area. Although the core focus of the IPacks are the upstream and mid-stream regions as guided by BRCRN project documents, the interventions done in upstream area are expected to bring positive change in downstream ecosystem.

In case of Bataha river system, majority of activities under IPack 1 (forest restoration and afforestation) as well as IPack 2 (soil and water conservation) focus on upstream region where hill slopes are high and large degradation occurs in form of forest and soil loss. In addition, the river system's ecosystem is deteriorating because the Mirchaiya-Katari Road traverses Churia Hill without any risk mitigation or protective landscaping. IPack 1 and IPack 2 are expected to Interventions to control the forest and soil loss in upstream hilly areas will control the ecosystem degradation thus reducing sedimentation in the downstream region. This will subsequently reduce the flooding and damage of fertile land, river reclaimed areas and old floodplains in mid and downstream areas. In this sense CERP IPack designs also consider the connectivity and upstream-downstream linkages for ecosystem restoration.

Chapter 1: Introduction

1.1 Background

Churia landscape comprises 36 districts and extends from east to west covering 13.6% of the total landscape of the country and is regarded as home to about 60% of the total population of the country (NAST, 2012). It has significant social, ecological environmental and paleontological values as this region provides important source of biodiversity, fossils, and a basis for knowledge on evolution of Asian fauna. Bhavar ecological zone which recharges water for flat lands (Terai) via infiltration but newly emerging settlements, fragile geology and soils, road network and urbanization in this area is hindering infiltration and contributing to flash floods in Terai plains of Nepal. Despite its significant importance, the fragile composition of Churia region is degrading at an alarming rate due to increased (livestock grazing, timber smuggling, illegal tree felling, etc.). Consequently, these anthropogenic factors have accelerated the loss of soil biodiversity, floods, riverbank cutting and decreased farmland productivity, and which aggravated poverty and land degradation.

With accumulation of degradation on ecosystems in recent years, approaches towards ecosystem restoration have grown significantly with new ideas and opportunities (Choi, 2007; Davis and Slobodkin, 2004). Ecosystem restoration is an intentional human activity that initiates or accelerates the recovery of an ecosystem with respect to its health, integrity and sustainability (SER, 2004). Ecosystems have been degraded, damaged, transformed or entirely destroyed as direct or indirect result of human activities. In some cases, these impacts to ecosystems have been caused or aggravated by phenomena such as landslide, drought, erosion, wildfire, floods, to the point at which the ecosystem cannot recover to its prior-condition or its historic developmental trajectory (SER, 2004). The ecosystems sometimes may recover remarkably well without human inputs, especially enough to incorporate the changes and recover ecological processes. But where profound physical, chemical and/or biotic changes have occurred, restoration may require substantial and viable human intervention.

1.2 Rationale of CERP

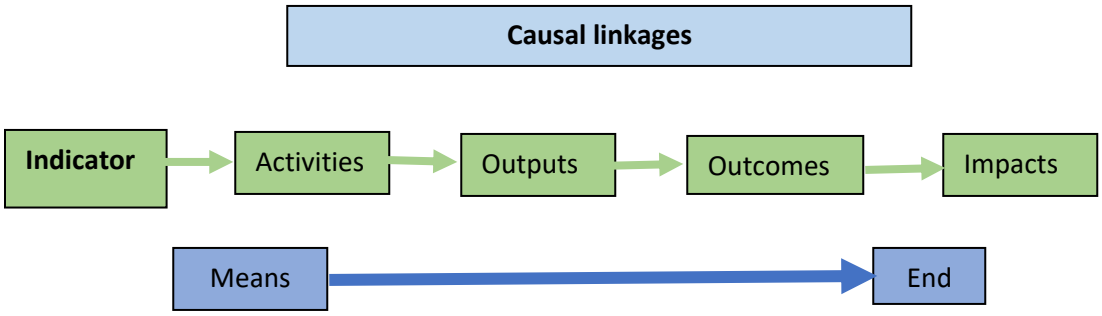
The development of CERPs will contribute to the provision of climate-informed extension and advisory services. It ensures that adaptation to Climate Change (CC) and Disaster Risk Reduction (DRR) has been integrated into provincial and local development planning. The project achieves this through promoting 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 – Sustainable Natural Resource Management (CR-SNRM).

The goal is that government and development partners together improve local and provincial service delivery through river system investments in integrated SNRM interventions. The CERP is also the basis for Monitoring and Evaluation (M&E) of ecosystem restoration actions in the landscape as well as outreach and targeted budgeting on local level. Additionally, the data generated in the annual follow-up of the CERP implementation packages, and their success will bring an array of ground level information in the areas of ecosystem restoration, SFM, sedimentation and forest gain in the river system. The reports on the cumulative impacts of the CERPs should be a part of the country's overall Nationally Determined Contributions (NDC) reporting on land use change and greenhouse gas emissions at national scale.

1.3 CERP and Theory of Change

The overall CERP development is based on the "Theory of change" approach which 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. A theory of change helps to identify solutions to effectively address the causes of problems that hinder progress and guide decisions on which approach should be taken (Figure 1). A theory of change also helps to identify the underlying assumptions and risks that will be vital to understand and revisit throughout the process of M&E of CERP at river system level.



(Source: CERP Manual, 2021)

Figure 1: Establishing causal linkages with theory of change analysis

Theory of Change can be seen as an "on-going process of discussion-based analysis and learning that produces powerful insights to support programme design, planning, strategy, implementation, evaluation and impact assessment, communicated through diagrams and narratives which are updated at regular intervals" (Vogel 2012, p5). It plays a strong role in cause-and-effect analysis using problem trees and solution trees. It helps in monitoring information and in learning framework development including indicators and in scaling up. The theory of change approach therefore encourages strategic and cost-effective interventions in the long run. Theory of change is reflected in CERP monitoring plan that is presented that consists of following elements:

- IPack or key result
- Risk reduction and benefit enhancement targets
- More than one indicator for each target
- Data source or data collection method
- Location of data to be collected
- Frequency of data to be collected
- Responsible person for data collection
- Relative cost of data collection: High, Medium or Low.

1.4 A River System and Ecosystem Restoration

A river system is a land mass of drainage basin where all river and its tributaries accumulate to have a common outlet. BRCRN follows the river system boundaries earlier identified and delineated by President Churia Master Plan (PTCMDB 2017). It is a part of watershed system that should ideally follow hydrological boundary, however river system delineation by president churia also considers land mass as a management unit that is delineated based on the geographical and socioecological variability. In that sense, all river system boundaries may not be true hydrological units.

A typical Churia river system can be divided into three zones based on its landform and river geomorphic behaviors as shown in figure (Figure 2). The upstream region which is the major source of sediment production acts as a sediment collection zone (Zone 1). Midstream region where meandering rivers transport sediment causing riverbank cutting and erosion (Zone 2). Downstream region where the sediment dispersal takes place forming river delta and rise of riverbed causing large flooding (Zone 3).

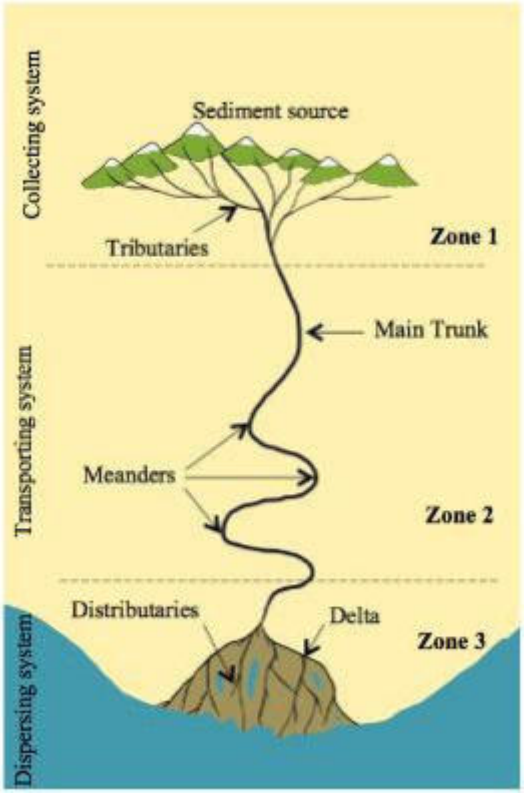


Figure 2: Upstream and downstream linkages in three distinct zones

Ecosystem restoration is the process of halting and reversing degradation, resulting in improved ecosystem services and enriched biodiversity. Ecosystem restoration encompasses a wide range of activities that contribute to protecting integral ecosystems and repairing degraded ecosystems. Such activities include, for example, enhancing organic carbon in agricultural soils, increasing fish stocks in overfished zones, remediating polluted sites, restoring ecological processes, restoring biodiversity and conserving fauna and flora that can assist in the restoration process. In landscapes where restoration is implemented, the economic benefits from restoration will need to be shared on equitable benefit-sharing mechanisms., according to rights particularly with those segments of society previously marginalized on the basis of gender, race, age, nationality or economic status. Land tenure policies and the rights of indigenous peoples will be of critical importance given that many landscapes eligible for restoration are currently used by indigenous peoples without land tenure security. The three main goals are:

- Enhancing global, regional, national and local commitments and actions to prevent, halt and reverse the degradation of ecosystems;
- Increasing our understanding of the multiple benefits of successful ecosystem restoration;
- Applying this knowledge in our education systems and within all public and private sector decision-making.

CERP focuses on river system scale intervention planning to achieve ecosystem restoration at landscape level. CERP is also in-line with the United Nations decade 2021-2030 of ecosystem restoration's principles (FAO, IUCN CEM and SER. 2021).

1.5 Spatial planning as base for CERP

Mapping and spatial analysis have a vital role in the CERP development process. Maps and spatial analysis are often generated by a combination of Geospatial tools (i.e. GIS, Remote Sensing), desk-based research and fieldwork. Large-scale maps were developed as working tools to be annotated during the workshops and these new digitized maps can be developed by the spatial planning team for further participatory analysis or inclusion in the final CERP document for implementation (Figure 3).

Preparatory Mapping

- National level Secondary Data Collection
- Remote Sensing Imagery Capture
- Large scale base maps preparation for stakeholder consultation
-

Spatial Analysis

- Multi-criteria Analysis
- Hotspot Mapping

Participatory spatial planning

- Map based stakeholder planning

Figure 3: Spatial Planning as a base for CERP

The CERP starts with preliminary assessment of climate variables to access the impacts of climate induced disasters over the changing land use/land cover patterns in river systems using Spatial Multi-Criteria Analysis (MCA). MCA process of CERP analyses a number of climate variables to pre-identify 'hotspot' sites of climate impacted locations to prepare ecosystem hotspot maps within the river systems that require interventions. These interventions are then planned and validated through a participatory process through problem and solution-tree analysis workshops. The stakeholders use the ecosystem hotspot maps as a base to demarcate the problem and solution sites, conduct site visits, identify interventions, perform suitability analysis, safeguards analysis, set monitoring protocols and identify budget for the appropriate interventions leading to an effective ecosystem restoration plan.

1.6 Mitigation and adaptation logic in CERP

The CERP objectives will be to balance both mitigation and adaptation resilience building as well as the social objective of creating resilient communities, taking into account the role of CERP as the core process of the project in identifying the problems and solutions that lead to project interventions (activities). In this regard, Mitigation and Adaptation potentials of the project are considered as primary entry points for MCA to identify hotspot sites and hence considered as major themes. Mitigation potential is addressed through identifying areas (hotspots) where BRCRN interventions have potential to reduce emissions and enhance the carbon stock. Similarly, Adaptation potentials are addressed through identifying areas (hotspots) where BRCRN interventions have potential to address vulnerable ecosystems and vulnerable communities. The variables related to key mitigation and adaptation themes are chosen based on joint discussions with project team considering the availability of spatial data across the 26 river systems. The results of MCA process to identify maps of critical area (hotspots) for forest loss, carbon stock enhancement and vulnerable ecosystems across the 26 river systems. The participatory mapping process in field have been carried out to plan the interventions during multi- local stakeholder consultative workshops.

Below graphics demonstrate adaptation and mitigation logic adopted for which careful choice of themes, variables, process and results were guided by MOFE approved CERP manual.

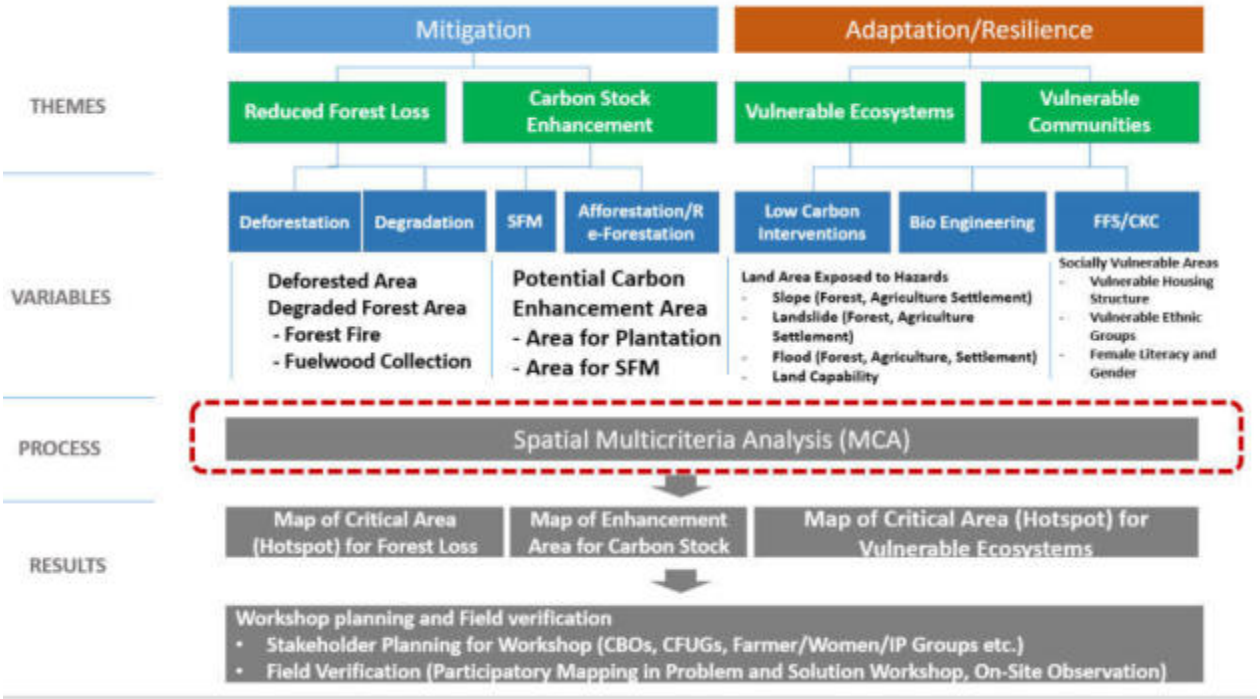


Figure 4: MCA process

The problems are especially concerned with the two thematic issues: climate change mitigation focused on deforestation and forest degradation; and climate change adaptation focused on agriculture, livestock management, and climate-induced disaster risk, vulnerable local communities, and ecosystems. A pair-wise ranking template was used to prioritize the listed problems and drivers in each working group. Discussion with interaction was done on the basis of prioritized problems to assess causes and effects. Discussion and interaction were also done with respect to GESI and IP issues related to the river system. The themes with the possible relevant indicators of the hotspot was discussed and finalized during the stakeholder's expert consultation workshop (Table 1).

Table 1: Variables considered as input data for Multi criteria spatial analysis (MCA)

SN	Theme	Indicators	Data available in terms of	Data Type/features	Source
1	Climate Change Mitigation	Deforested area	Forest loss present Forest gain present	Polygon	Hansen
		Degraded Forest Area	Present Absence	Polygon	Google Earth Imageries (2021)
		Forest Fire	Present Absence	Point	MODIS
		Fuelwood Collection	Household using firewood for cooking	Polygon	CBS, 2011
		Forest exposed to landslide hazard	Landslide Inventory in terms of coverage area depending on the river system: High Medium Low	Polygon	Google Earth Imageries (2021)
		Enhancement Area	Pond areas in terms of: Pond exist No Pond	Polygon	PCTMCDMP (PCTMCDB, 2016)
			Abandoned cultivated land & Riverbed		DoS, 1996
2	Climate Change Adaptation	Agriculture land in slope area	Slopes in 3-classes: <20^0 $20\text{-}30^0$ >30^0	Raster	ASTER (DEM 30m resolution)
		Agriculture exposed to landslide hazard	Landslide Inventory in terms of coverage area depending on the river system: High Medium Low	Polygon	Google Earth Imageries (2021)
		Agriculture exposed to	Flood susceptibility in terms of:	Raster	PCTMCDMP (PCTMCDB, 2016)

		flood hazard	Very High (Riverbed) High Medium		
		Land capability	Land class in 8 classes	Polygon	Soil and Terrain Database (SOTER) (FAO, 2009)
		Settlement exposed to landslide hazard	Settlement area exist Non-settlement area exist	Polygon	Maps.qed.ai
		Settlement exposed to flood hazard	Settlement area at Flood susceptibility: Very High (Riverbed) High Medium	(Raster)	Maps.qed.ai
		Landslide hazard Inventory	Landslide inventory: High Medium Low	Raster	PCTMCDMP (PCTMCDB, 2016)
		Flood hazard	Flood susceptibility in terms of: Very High (Riverbed) High Medium	Raster	PCTMCDMP (PCTMCDB, 2016)
		House structure	Indices	Polygon	CBS, 2011
		Female literacy (Gender)	Indices	Polygon	CBS, 2011

Chapter 2: Introduction to Bataha River System

2.1 Physiography, Land Cover and Hydrology

The Bataha River originates at an elevation of 624.9 masl on Churia Hill in Mirchaiya Municipality-9 in the north, flows to the south, and joins the Kamal River at an elevation of 82 masl. The Bataha River is 28.04 km long overall, but the aerial distance from North to South is only about 18.27 km. The Titariya, Chuniya, Jhakri, Moraha, and Bhalu, Jiwa, Mainawati, Suklaha are the major tributaries of the Batahai River System. The River System (RS) covers three physiographic regions, namely Churia 1,998 ha (15%), Bhabar 3,320 ha (25%), and Terai 8231 ha (60%) (DoS, 1996). The total area of the river system is about 13,549 hectares within the project's river system (Figure 5). Several thematic maps, including the river network of the river system is given in the report (Annex 1).

The river system is dominant with tropical mixed hardwood forest-dominant species Sal *(Shorea robusta*), Asna (*Terminalia tomentosa*), Karma (*Adina cordifolia*) Jamun (*Syzygium cumini*), Harro (*Terminalia chebula*), Barro (*Terminalia bellirica*) and forest in low land Sisau (*Dalbergiaa sissoo*), Khayer (*Acacia catechu*), Simal (*Bombax ceiba*).

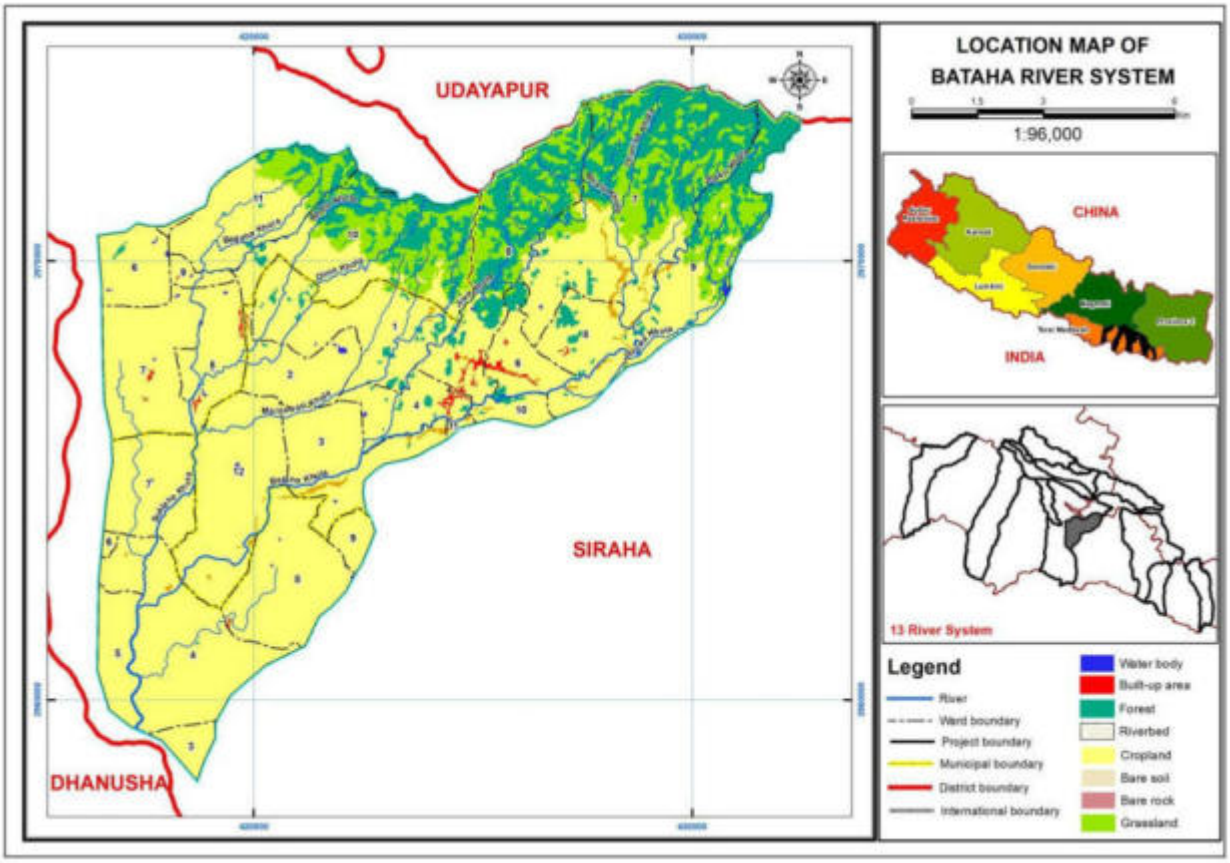


Figure 5: Location map of Bataha river system

The river system is composed of Lower Churia (LS) and Middle Churia (MS) (DMG, 2007). The LS of river system (RS) 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 small portion of thrust and fault line are present in the river system (Figure 6).

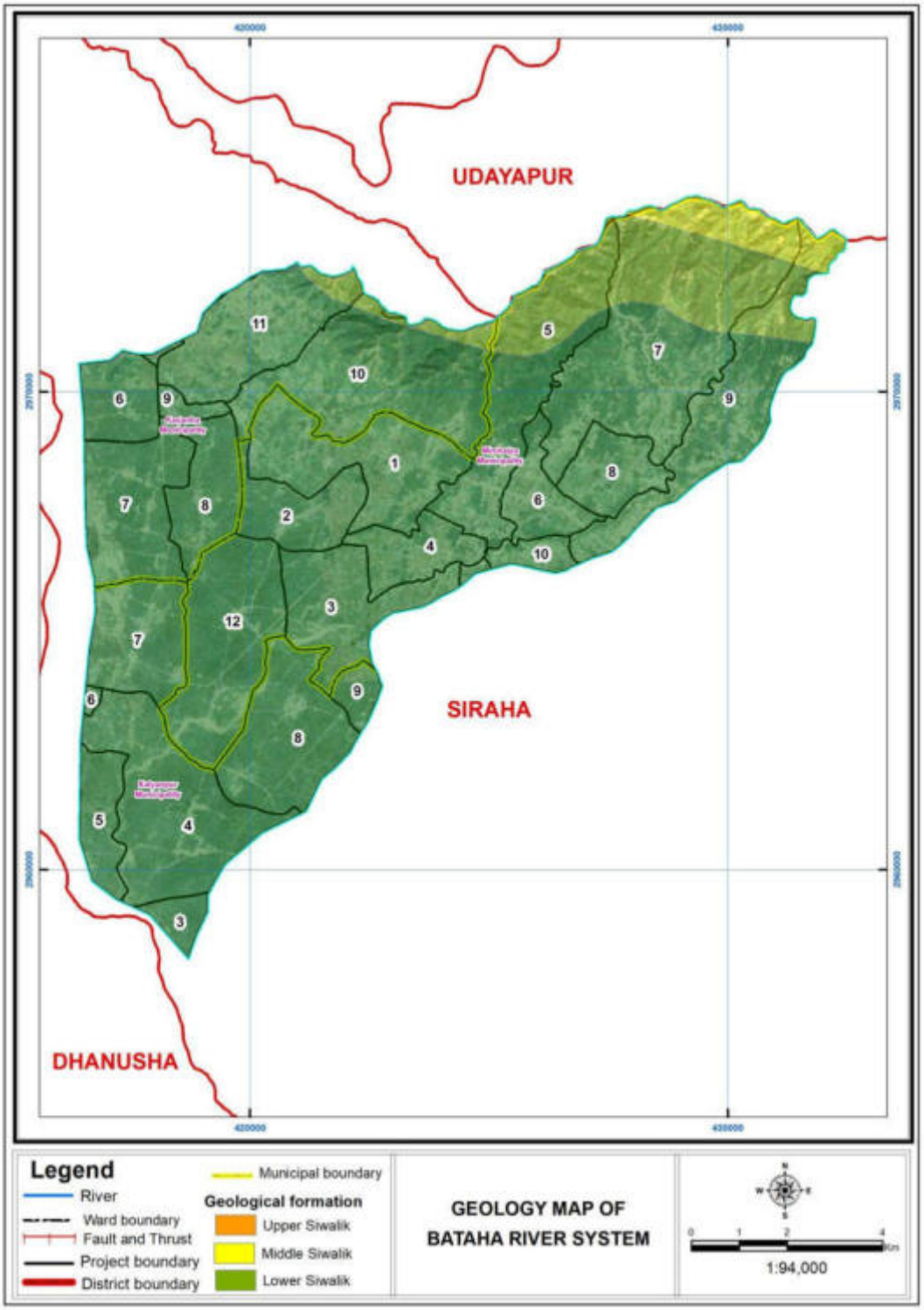


Figure 6: Geology of Bataha river system

Predominant land use of this river system are cultivation land, covering 72.61 percent of total area, which has been decreased at the rate of 0.10 percent per year in 19 years (2000-2019) and forest area also decreased at rate of 1.76 percent per year. But the built up area has increased at the rate of 10.33 percent per year over the period (Table 2).

Table 2: Land cover change in Bataha river system

Land cover	2000		2019		Change area (ha)	Rate of Change (% per yr)
	Area (ha)	Percentage (%)	Area (ha)	Percentage (%)		
Built-up area	17.3	0.14	51.2	0.42	33.9	10.33
Cropland	9116.4	74.06	8937.3	72.61	-179.1	-0.10
Forest	1714.5	13.93	1141.9	9.28	-572.6	-1.76
Grassland	1222.6	9.93	1411.3	11.47	188.7	0.81
Other wooded land	129.4	1.05	656.0	5.33	526.6	21.42
Riverbed	101.1	0.82	91.5	0.74	-9.6	-0.50
Waterbody	7.8	0.06	19.8	0.16	12.0	8.14

Source: ICIMOD, 2021

2.2 Climate Variables:

The river system is located in the Siraha district and has a tropical climate with significant monsoon influence (June-September), which received higher rainfall (1000-1500mm) (DHM, 2017). A recent study by DHM Nepal on observed climate trend analysis for the period of 1975- 2014 suggested a significant positive trend in annual maximum temperature data at the rate of 0.029◦ C/ year in Sirahai district (DHM, 2017). Moreover, Climate change scenario analysis performed for the National Adaptation Plan (NAP) process indicated that average annual mean temperature of Siraha district is likely to rise, Representative Concentration Pathway (RCP) 4.5 projected that the temperature would increase by 0.86^{0}C and 1.23^{0}C in the medium-term and long term respectively (Table 3). The highest rates of mean temperature increase are expected for the post-monsoon season followed by the winter season (VRA MoFE, 2019).

Table 3: Climate change scenario (MoFE, 2019)

	^{0}C	Change (^{0}C)			
	RCP 4.5			RCP 8.5	
Temperature	Reference Period (1981-2010)	Medium Term (2016-2045)	Long Term (2036-2065)	Medium Term (2016-2045)	Long Term (2036-2065)
	24.2	0.86	1.23	1.07	1.8
	mm	Change (%)			
	RCP 4.5			RCP 8.5	
Precipitation	Reference Period (1981-2010)	Medium Term (2016-2045)	Long Term (2036-2065)	Medium Term (2016-2045)	Long Term (2036-2065)
	1521	4.46	5.86	4.87	9.45

Source: MoFE 2019

Similarly, average annual precipitation is likely to change in both the medium-term and long-term periods. It is likely to increase by 5.86% and 9.45% in the long period based on RCP 4.5 and RCP 8.5 respectively.

2.3 Socio-ecological process

The drainage network and channel characteristics have significantly controlled the characteristics of river morphology in downstream low lands. The major tributaries are rain-fed drainage system which remain dry for 6-8 months (October-May). However, flash floods are common in these tributaries in monsoon season (June-September). Water holding capacity is very poor with limited time of concentration in upstream drainage network. As a result, monsoon floods especially in Bataha and Suklaha Khola disrupt the ecosystems and communities in the downstream. The Bataha river and its tributaries has provided different ecosystem services such as food, building materials, medicines, climate regulation, disease prevention, provision of clean air, water, soils, and landscape for cultural services and spiritual purpose. The communities are highly dependent on Churia regions for fodder, building materials, food for livestock. As a result, the ecosystem services, particularly the services such as food, fiber and water are lost in terms of quantity and quality. Likewise, the regulating services, mainly nature-based flood control process has also declined in the river system. The Bataha river system covers Kalyanpur, Karjanha and Mirchaiya with around 20,674 household (HHs), Mirchaiya municipalities in Siraha district with around 20,674 households (HHs)-Bastipur, Rampur Birta, Bagaha, Dhorna, Phulbariya are the major market centers of the river system.

The forests in the river system are managed by community forest user's group (FUGs). However, timely renewal and updating of operational plan has not been done by the FUGs. The high level of degradation has been observed in the river system due to weak forest management and governance within the committee and shortage financial resource. The weak governance has amplified encroachment, illegal logging, unsustainable extraction of forest products and forest fire events.

The agricultural practice is based on the rainfall received in the river system. Unavailability of water for irrigation has hindered the year-round agricultural practices. Thus, agriculture practices have been observed mainly during rainy season while the lands are kept fallow in other seasons. In addition, farmers use their own local seed and most agricultural lands in low fertile lands in the river system. Hence, the crop productivity is very low in the region. Likewise, livestock rearing practice has been decreased drastically in the river system due to insufficient fodder availability, decreased grassland and haphazard infrastructure development. The women are actively involved in controlling fire as well as management of forest. Hence, women are included in FUGs committee with no any clear roles and responsibility in the forest management.

2.4 Problem analysis

Theme 1: Climate change mitigation

2.4.1 Direct and underlying drivers of Deforestation and Forest Degradation (D&FD)

Several drivers and underlying causes of D&FD were identified in the problem tree analysis in the local user's consultative workshop and verified in the expert consultative workshop held at the river system level. The drivers and underlying causes also identified through community workshop, focus group discussion and consultation meeting with women led organization gender specific concerns, issues. The identified drivers and underlying causes are listed below (Table 4). Riverbank cutting and gully erosions, forest fire, open grazing, and encroachment are the major drivers contributing to forest loss in the river system.

Table 4: Drivers and underlying causes of D&FD in Bataha River System

Drivers	Priority	Underlying causes
Multi-hazards-River bank cutting and gully erosion, drought	I	a) Fragile geology b) Intense and frequent rainfall c) Spatial rainfall variability d) Limited capacity of community for controlling riverbank, torrent, streams, gullies erosion
Illegal logging	2	a) Ineffective forest management governance of user groups b) Inadequate resources for the provisions of forest watchers c) Absence of concern from local governments and communities d) Lack of sensitization and awareness e) Lack of coordination among CFUGs members and the general users
Encroachment		a) Inactiveness of Community Based Organization (CBOs) b) Political influences in informal settlements
Forest fire	3	a. Inadequate management of fire lines and trails b. Limited resources for the provision of forest watchers c. Limited forest fire control tools and equipment with users d. Lack of practices for the removal of dried leaves and branches e. Unavailability of water sources in and around forests f. Users' overconfidence in the emergence of new species and regrowth of grasses after forest fire g. Lack of forest management and service training, skills, and knowledge specially for women. h. Inadequate forest management training, skills, and knowledge among men and women. i. Carelessness and unawareness of herders/users
Open grazing	4	a) Lack of grazing lands allocated b) Carelessness and unawareness about the importance of species-fodder species and trees in forested areas c) Inadequate sensitization and awareness on the importance of goods and services
fuelwood collection	5	a) Lack of alternative energy sources b) Lack of skill trainings with equipment to promote cowdung materials in efficent energy uses c) Not able to effectively operate rules and operational plans, also for fuelwood management
Expansion of invasive alien species	6	a. Eupatorium adenophorum Sprengel (*Banmara*), an invasive species; b. Displacing or out-competing native plants, altering ecosystem

Source: Field consultation in the Problem Analysis Workshop, Bataha River System

Problem tree analysis was done in the workshop and is presented here (Figure 7). The first 6 drivers are briefly discussed below:

Multi hazards (flash flood, drought, landslide and erosion): According to the land features of the river system, the river system comprises of around 13 torrents (DoS, 1996). The users have noticed sheet erosion in bare soil in upstream triggered by the force of raindrops. The sheet erosion was found to get transformed into small channels with runoff water- called rill erosion and then gulley erosion which swept away trees and bushes, especially in the pre-monsoon (March-May) and monsoon period (June-September). The gullies are increasing in number as well as in width in the river system. The gulley width in the river system increased and varied from 18.94 m to 30.28 m in the period between 2000 and 2020 (source: Google earth analysis, 2000 & 2020).

Likewise, the occurrence of flood, landslide and soil erosion have been increasing expanding their area in the river system. The high intensity rainfall has accelerated flood, landslide and soil erosion. These hazardous events have degraded the forest area in the river system. In addition, landslide and erosion have resulted into loss of forest cover in Laxmi Community Forest, Hariyo Community Forest and Ram Krishna Community Forest (source: Problem Workshop and field visit, 2022). Impacts of Flood in the forest area are seen in different catchments, including Bhalu, Churia , Moraha and Jhakri catchments.

Illegal logging: Logging is in practice due to weak institutional capacity of forest user groups, lack of livelihood and income generating options of vulnerable community and interference of downstream communities in the river system. This is reflected in different regions mainly in Karjanha Municipality- 10,11 and Mirchaiya Municipality- 5,7 & 9, covering several community forests for examples in Ramkrishna community forest, Hariyo Danda community forest, Chure Danda community forest and Laxmi community forest. Bagaha Beldanda and Shree Jiwa Thakur community forests have high degraded area. Communities of Majhawa, Malabari, Jiwa, Sundarpur, Moraha are mostly dependent on forest products for their needs and survival and for cooking and heating.

Encroachment: According to the local people, forest encroachment is noted in Bataha river system. It is mainly due to the allocation of forest land for human settlements and shifting cultivation (*khoriya kheti*). Encroachment in community forests especially in Bagaha Yuwa, Sonamai, Shiva, Ramkrishna, Hariyodanda, Hattimunda and Ghurmidanda forest user's areas are seen in the river system. The exercise and trainings of Nepal Army in the forest land has also contributed in the depletion of forests in Shree Jiwa Thakur Community Forest and Hariyali Community Forest.

Forest fire: In the river system, every year (from March to May) two to three fire events happen in all community forests. In addition, careless human activity has also increased the occurrences of forest fire. Other underlying drivers of the forest fire in the river system include people's misconception on: sprouting of new grass after fire, prevention of attack from wild animal, like elephant, snake, and hunting wild animals.

Open grazing: open grazing are the main issues in the river system. Intense open and overgrazing is a general practice in the river system, for example, everyday around 400-500 goats and 100-150 cattle usually graze in the Churia forest area). Open grazing directly affects seedling, saplings and vegetation regrowth within forest through trampling effect resulting in soil compaction. Open grazing of livestock mainly goats, cause damage of saplings through browsing effects. Due to soil compaction, there is less infiltration on the upstream that increases runoff and results in flash flood downstream.

Excessive fuelwood collection: According to local stakeholders, the communities along East-West Highway are more responsible for exploitation of forest products. For examples, communities in Jiwa, Likhtol, Mohara, Sindarpur, Prayagpur, Bagaha, Karjanha, Malabari, and Majhawa usually collect fodder and fuel wood from the nearby forest. Likewise, according to local people, every household usually

collects around 45-50 kg fuel wood every alternate day in seven months (from November to May) in every year.

Expansion of invasive alien species: Eupatorium adenophorum Sprengel (*Banmara*), an invasive species is disrupting forest and shrubs lands. By displacing or out out-competing native plants, or altering ecosystem, such invasive species can devastate the fairly stable ecosystem and environment.

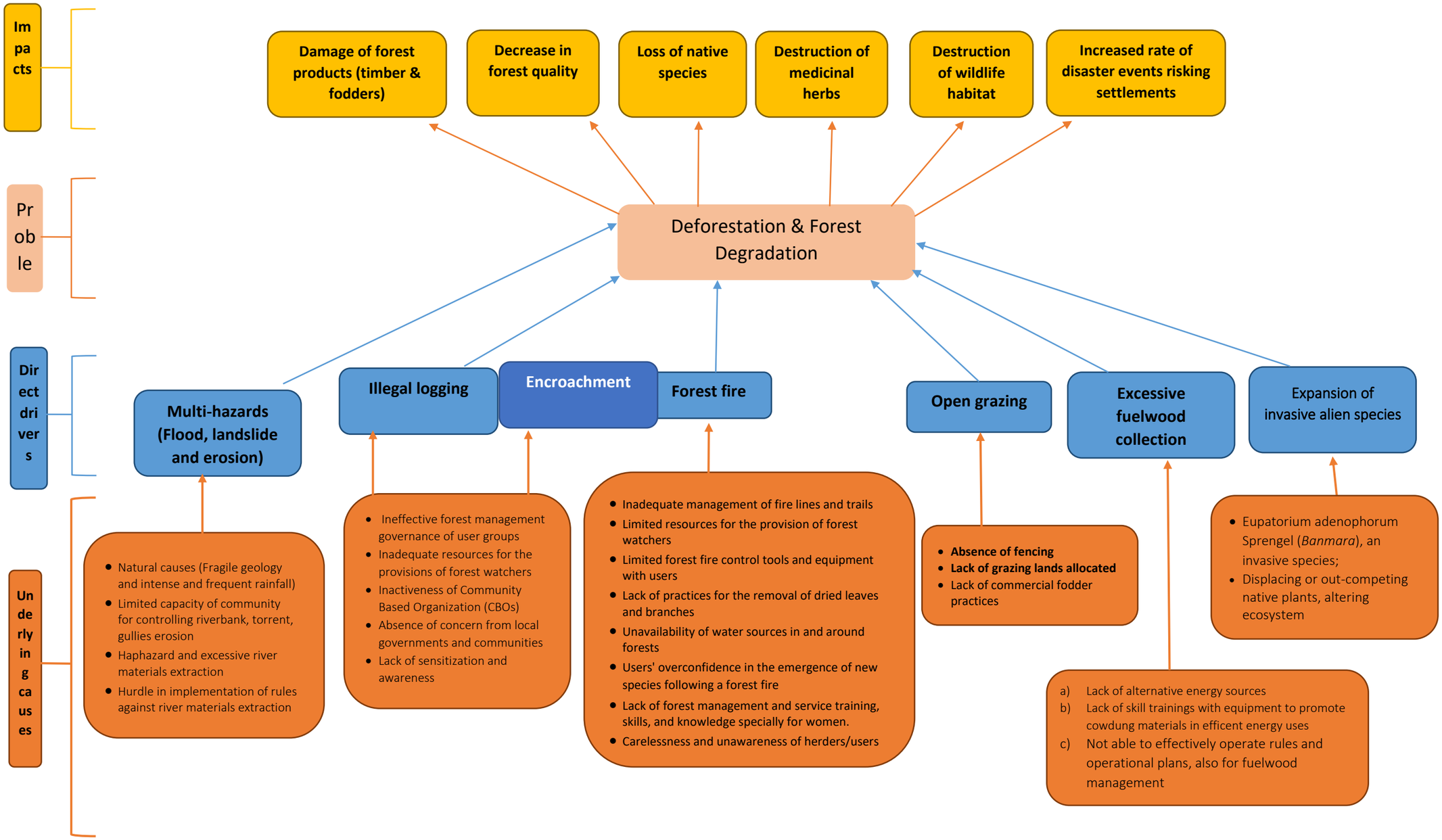


Figure 7: Direct drivers and underlying causes of D & FD in Bataha river system

2.4.2 Hotspot for forest loss (Multi-criteria Analysis Result Map 1)

- The forest covered area has decreased at rate of 1.76 percent per year and cultivation land also decreased at the rate of 0.10 percent per year in 19 years (2000–2019), whereas the built up area has increased at the rate of 10.33 percent per year over the period. However, the primary information (grazing areas, encroachment areas, and illegal logging, the major forest loss has been concentrated in small patches in the river system. In addition, the several drivers and underlying causes might have contributed to the degraded forest areas (cumulative area 421 ha), mainly in Karjanha Municipality-10,11 and Mirchaiya Municipality- 5,7 & 9.
- Deforestation and forest degradation are exacerbated by open grazing, encroachment, physical infrastructure development and illegal logging and over collection of fuelwood.
- Major landslides and rapid formation of gullies, mainly in Mirchaiya Municipality and Kalayanpur Municipality, have rapidly expanded and eroded the forest lands. The Mirchaiya-Katari road upstream of the river system contributes to increasing the landslide risk since there is not yet a stable measure adopted.

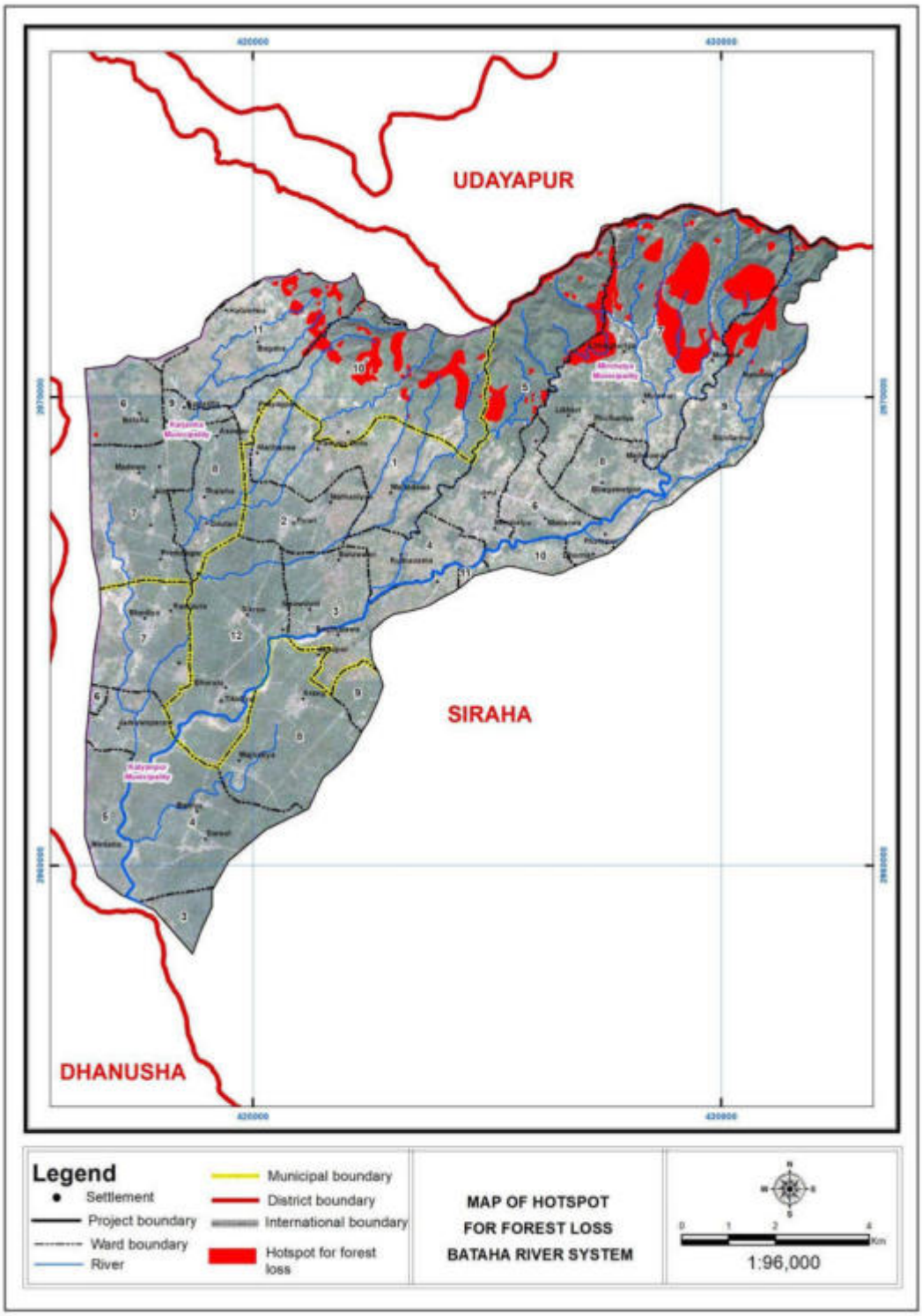


Figure 8: Map of Hotspot for Forest Loss in Bataha River System

2.4.3 Enhancement area for carbon stock -MCA Result Map 2

- About **421 ha of** area are degraded forests that can be restored through forest regeneration activities and contributes to both mitigation and resilience objectives. The degraded forest is situated on different catchments, Churia and Jhakri catchments in Mirchaiya Muncipality-5, 7 & 9 and Karjanha Muncipality-10 & 11. Also, the Churia Danda CFUGs are responsible for managing and monitoring the forest area (Figure 9).
- The river side plantation (afforestation) could be done on approximately 257 ha. Furthermore, afforestation needs to be carried out with different aspects of plantation, including a)) Community land plantation (**55 ha**), Demosntration Plantation (**32 ha**), Riparian plantation (65 **ha),** and Woodlots establishment (**105 ha**). Here, the potential demonstration plantation area is determined on the basis of access to roads (priority along the road), nearby community, and users' priority**.**

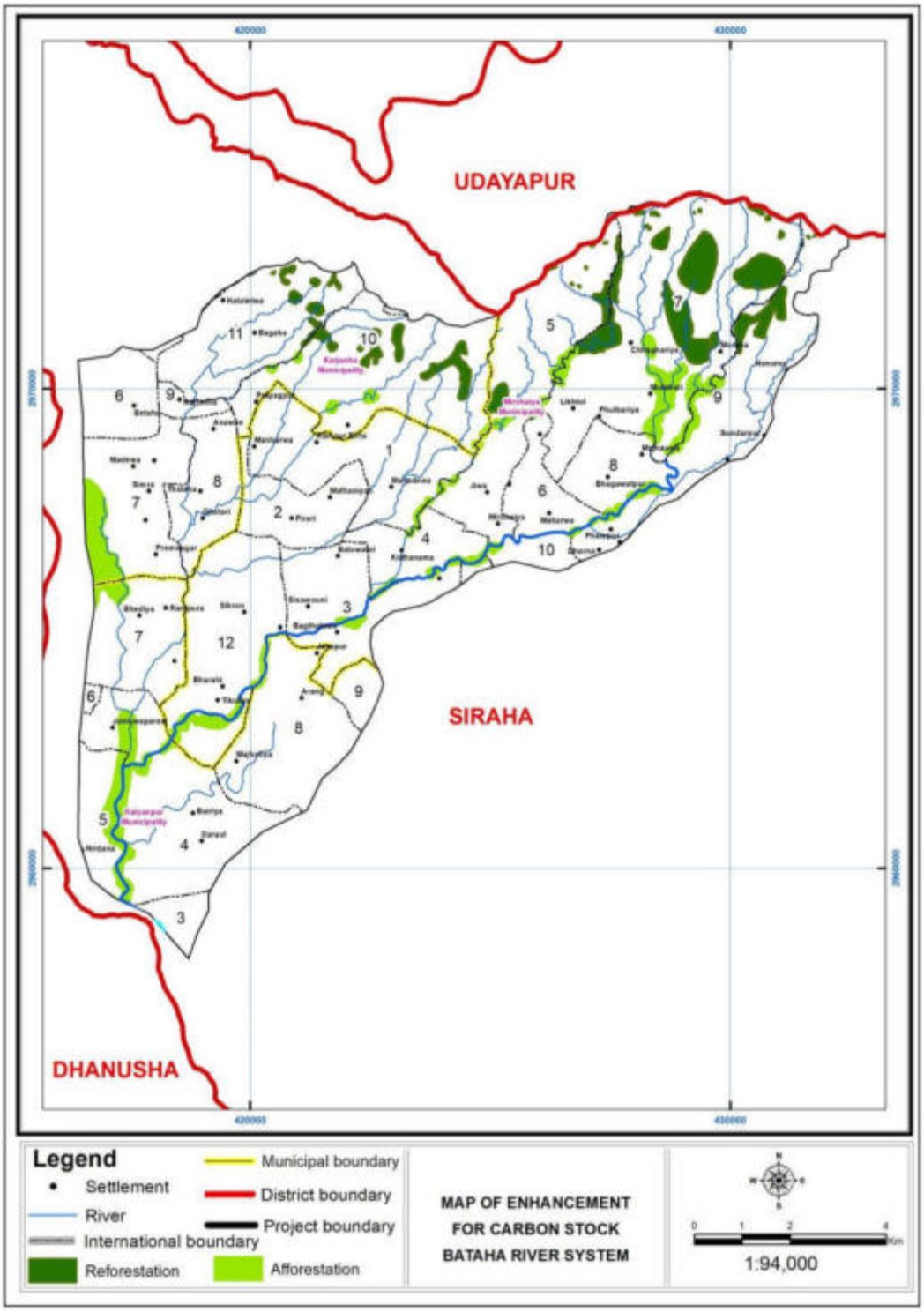


Figure 9: Enhancement for forest carbon stock in Bataha river system

Theme 2: Climate change adaptation

2.4.4 Direct drivers and underlying causes of vulnerable ecosystem and community in the river system

Direct drivers and underlying causes of vulnerable ecosystems and communities in the river system were identified from the problem-tree analysis carried out in the user's consultation problem tree workshop and site verification. The drivers and underlying causes also identified through community workshop, Focus Group Discussion (FGD) and consultation meeting with women led organization gender specific concerns, issues. The major drivers are associated with degraded agricultural landscapes; the uncertainty of climate extremes and their impacts on water sources; agriculture production; crop insects, pests, and diseases; traditional livestock rearing practices; flooding, erosion, and landslide risks; poor irrigation facilities; anthropogenic activities in the extraction of river-induced resources; and capacity-related activities. The identified major drivers with rankings and the underlying causes are listed in the table (Table 5). Here, the drivers were ranked by the participants themselves using participatory Problem Ranking Matrix.

Table 5: Drivers and underlying causes of vulnerable ecosystem and community in Bataha river system

Direct Drivers	Priority	Underlying causes
Inefficient irrigation facilities	I	a. Water shortage at sources in dry season b. Lack of well-managed irrigation infrastructure c. Decreased water table due to high runoff and low percolation d. Flooding occurs on a regular basis and damaging canal headworks in upstream in the river system. e. Women, Dalit and marginalized are not getting the access, information and support. f. Inadequate access, information and support to women, IPs, Dalit and marginalized people
Multi hazard (Flash floods, erosion, landslides, and stream-riverbank cuttings threaten agricultural lands and settlements)	2	a. Frequent and intense rainfall b. Fragile geology c. Inadequate community capacity for flood and riverbank-cutting control measures d. Encroachment of river/stream site lands and forest lands for agriculture practices and income generating activities e. Haphazardly extraction of river materials-stones, pebbles
Infestation of crop insects, pests and diseases	3	a. Lack of skills and knowledge for the selection of healthy seeds b. Lack of understanding of pesticide applications c. Unavailability of pesticides on time d. Lack of access, service, and information, specially among women, Dalits and vulnerable communities/households
Inadequate climate adaptation practices in the agriculture system, especially among women, IPs, Dalit and marginalized community	4	a. Inadequate technical knowledge, skills, tools, and technologies for agricultural practices on slope lands; b. Women farmers and marginalized farmer are not included in Sustianable Natural Resource Managmement (SNRM), technolodgy and practices. c. Not easily accessible to the climate services to support decision making in agriculture practices. Gender roles affect to decide to adopt new practices. d. Inadequate skills and knowledge of compost manure, organic

		manure, and fertilizer formation e. Inadequate support and priority for crop seed production f. Deterioration of soil nutrition in riverside and farmlands
Decreases soil fertility	5	a. Inadequate resources and knowledge to restoration of soil nutrition in riverside and farmlands b. Inadequate knowledge of how to use fertilizer properly in changing environmental conditions;
Inadequate practice with no access to the commercialization of agricultural production	6	a. Lack of agricultural production collection centers and storage b. In access to the market center and information directly c. Becoming expensive to use tools/machines in agriculture mechanization d. Insufficient knowledge, agri-extension service/materials targeted to women and vulnerable groups.
Conventional cultivation practices in sloppy lands	7	a. Absence of terracing practices in sloppy land b. Lack of training and skills for terracing practices c. Adoption of a conventional agriculture system
Inadequate gender-inclusive governance	8	a. Male- supremacy and dominance in decisions b. Limited access of women to information and communication (especially climate change and irrigation, information about exisiting facilicites, fund, notice, and subsidies) c. Less consultation with women regarding agenda and time of meetings d. Unavilability of disaggregated data e. Lack of recognition of traditional knowledge of women in SNRM f. Articulation of CRLUP/SNRM /DRR as scientifically complex subjects g. Limited knowledge on gender mainstreaming approach and value among officers/key people h. Gender power relations within households and in society and restricted mobility of women

Source: Problem tree analysis workshop,2022

The river system receives multi-hazards (drought, riverbank cutting, flood and landslide) due to climate impact and the impacts are magnifying due to its topographic settings and land use change. These phenomena cause the degradation of land resulting into decreased agricultural production resulting in community vulnerability (Figure 10).

The agriculture ecosystem in the river system is vulnerable to riverbank cutting in Terai region. The agriculture land is threatened by river cutting and sediment deposition, resulting into loss of soil and soil fertility. These drivers play negative role to decrease agricultural production in the river system. The riverbank cutting is mainly seen in several locations, particularly in near Chikna, Baluwatol, Phatepur, and Majhauwa regions in Kalyanpur Municipality-4 & 8; Karjanha Municipality-10 and Mirchaiya Municipality-1, 3, 4, 5, 6, 7, 8, 9, 10 & 12. The sediment deposition is seen around the several settlement regions such as Bhediya, Bhokraha, Nirdana and Chatari in Kalyanpur Municipality-4, Karjanha Municipality-7, 10 & 11 and Mirchaiya Municipality-1, 3, 4, 5, 7, 9, 10 & 12.

The farmer dependents heavily on rain water for irrigation in agriculture. The cultivation is done mainly during monsoon season (June-September) while these lands remain fallow during other seasons. The scarcity of water for irrigation has decreased both production and productivity in the river system.

Cultivation practices in sloppy lands have caused erosions in the river system. Soil erosion with runoff in the sloppy lands have created several problems especially weakening of irrigation system, less water holding capacity, and decreased cereal crops (maize and millet) production in Chure and Bhawar regions of the river system. About 32 ha in Jiwa, Phulbariya, Moraha, Chhaghariya, Majhauwa, Baluwatol, Bagawatpur, Kuthanam in Mirchaiya Municipality-7 falls under the sloppy lands, where no ground water or well irrigation facility exists.

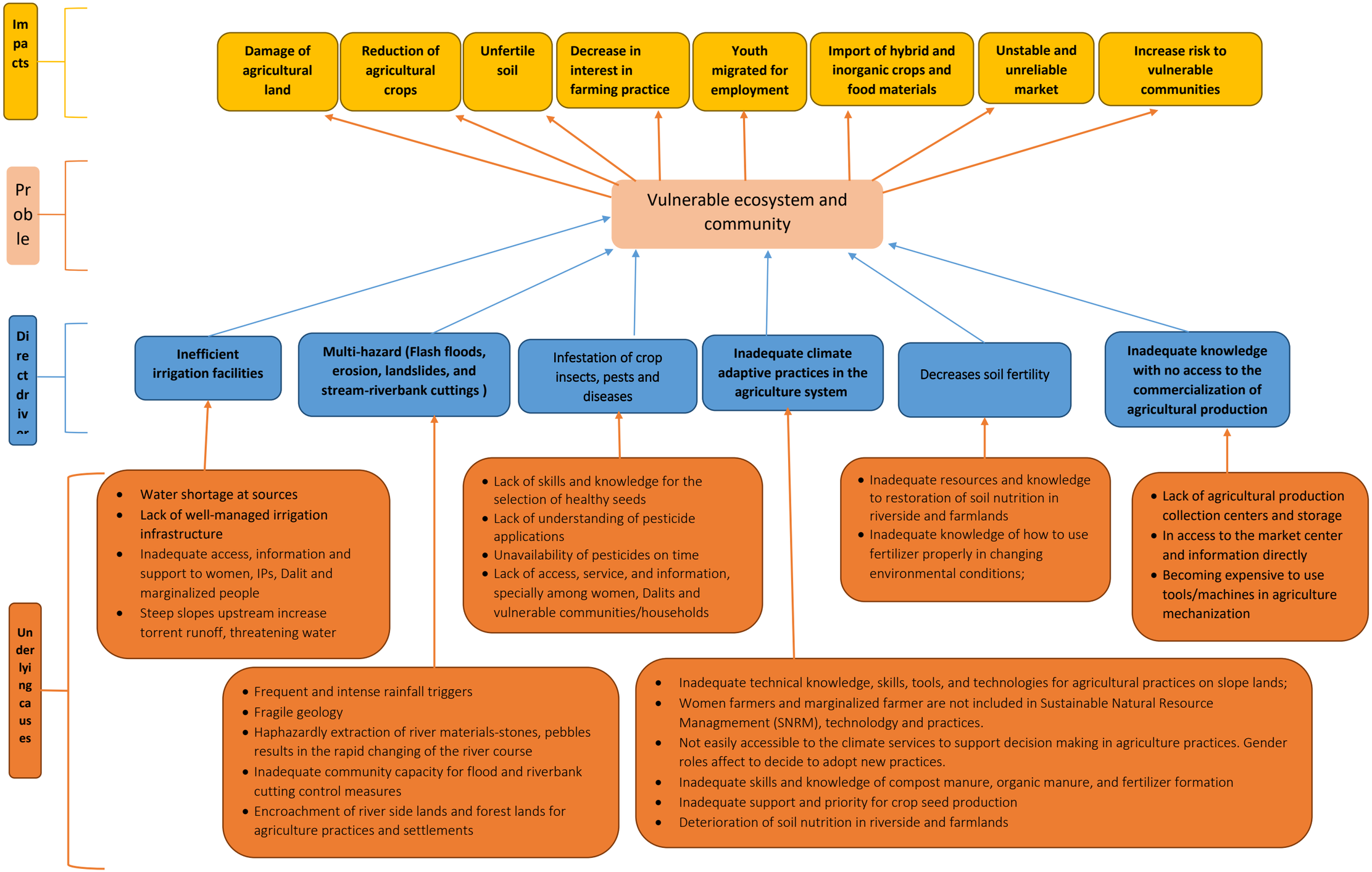


Figure 10: Direct drivers and underlying causes of vulnerable ecosystem and associated community in Bataha river system

2.4.5 Hotspot for vulnerable ecosystems- MCA Result Map 3

- Primary data on sediment deposition area, river bank cutting zone, landslides were also integrated into the hotspot maps;
- Sediment deposition has been in 257 ha area mostly in Kalyanpur Municipality-4, Karjanha Municipality-7, 10 & 11 and Mirchaiya Municipality-1, 3, 4, 5, 7, 9, 10 & 12 of the river system.
- The river system's ecosystem is deteriorating because the Mirchaiya-Katari road traverses Churia Hill without any risk mitigation or protective landscaping.
- The spatial distribution of the hotspot map showed the distribution of hotspot areas along gullies, the river bank with the most vulnerable communities with respect to riverbank cutting and flooding in the river system. The consequences of such a phenomenon reflect on social vulnerability, including:
  - The river bank cutting has mainly happened in different locations, particularly in the near Chikna, Baluwatol, Phatepur, Bhediya, Bhokraha, Nirdana, and Chatari and Majhauwa regions in Kalyanpur Municipality-4 & 8; Karjanha Municipality-10 and Mirchaiya Municipality-1, 3, 4, 5, 6, 7, 8, 9, 10 & 12 .
  - Soil erosion with runoff in the sloppy lands has created several problems, especially the weakening of the irrigation system, less water holding capacity, and decreased cereal crop (maize and millet) production in the Churia and Bhawar regions of the river system.
  - Sloppy lands cover approximately 32 ha in Mirchaiya Municipality-7 in Jiwa, Phulbariya, Moraha, Chhaghariya, Majhauwa, Baluwatol, Bagawatpur, and Kuthanam, where no well irrigation facility exists.
- The vulnerable ecosystem and associated community have been classified into three classes of vulnerability, i.e., high, medium, and low. The high vulnerability refers to settlement risk and forest loss due to multi-hazards; the medium vulnerability means agricultural land risk to floods and landslides; and the low vulnerability refers to the low impact of agriculture and settlements from floods and erosion risks (Figure 11).

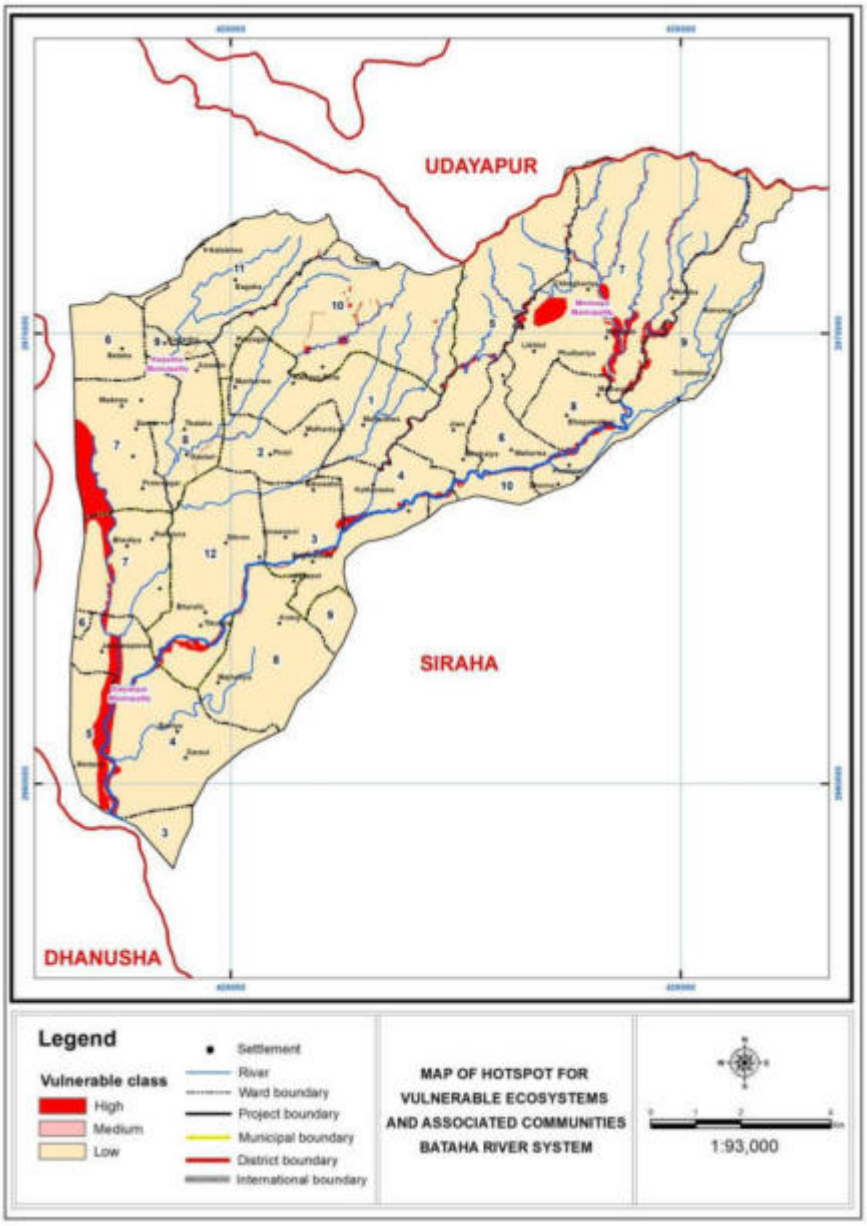


Figure 11: Map of Hotspot for Vulnerable Ecosystem and Community in Bataha River System

2.4.6 Linkage of GESI and IPs specific issues to forest loss and vulnerable ecosystems

Mainstreaming of Gender Equality and Social Inclusion (GESI) and Indigenous Peoples (IPs) are needed in the implementation of the restoration of the ecosystem in the river system. Because of some limitations, women and men have direct and indirect roles in degraded forests and ecosystems. Women in the river system have suffered from the impact of climate change and vulnerability. Women lacked relevant information on agriculture to share their views in planning, and women suffered during the disaster. Some of factors that indirectly contributes to forest loss and vulnerable ecosystems include:

- Usually, power imbalances happen when women, the elderly, and marginalized communities are excluded from capacity-building trainings and orientations on forest management-related activities.

- According to the local women, their active participation is limited because: a) training materials usually do not favor them; and b) women are not given more time to express their views on forest and natural resource management.
- Women's involvement in CFUGs committee is not significant, especially in the decision-making process in forest management activities and plantation.
- Involvement of women in conventional farming practices in sloppy lands exists in the river system with no effective and adequate farming knowledge and skills.
- Scaring wild animals, preventing snake, insect, and pest attacks, discarded cigarette butts, carelessness, low participation in fire control and management measures and training, and a lack of awareness about forest management are some of the drivers of forest fires influenced by women's direct and indirect involvement in the river system.
- There are no alternative options for women for income generation since most of the vulnerable communities depend on fuelwood collection in upstream
- Women from marginalized communities are not interested in vegetable cultivation and agricultural practices in the river system due to a lack of knowledge about crop pest and disease management, ineffective irrigation facilities, and insufficient skills for the preparation and use of pesticides and organic fertilizers.
- Low participation of women in fire control and management measures and training;
- In general, IPs women in the upstream of the river system depend on goat-farming for their income, where goat-rearing practice is open grazing.
- Some other drivers related to vulnerable ecosystems that posed constraints for women's capacity enhancements with respect to power in decision making and access to government facilities, including:
    - Increased climate-induced disaster risks in water management and human settlement;
    - Lack of technical knowledge and skills and irrigation problems
    - The minimum role given to women in irrigation management
    - The training location and general time allocation are unsuitable for female participants.
    - lack of women's involvement in CFUGs for forest management and also for soil and water conservation;
    - Women have little or no decision-making power in agricultural practices downstream.
    - Women have less knowledge about improved seed varieties and have less access to fertilizers.

2.5 Solution Analysis

2.5.1 Climate change mitigation: solution analysis of D&FD

Environmental impacts of D & FD include-damage and fragmentation of habitat, loss of biodiversity, disruption of water cycles, soil erosion, and desertification. The potential mitigation activities determined by the local users' community in the solution analysis workshop are presented in the graphics (Figure 12) in order to promote forest development for reducing D &FD in the river system. Such mitigation activities include- afforestation, Assisted Natural Regeneration (ANR) for reforestation, and capacity building for sustainable management of existing natural forest, with key supportive activities.

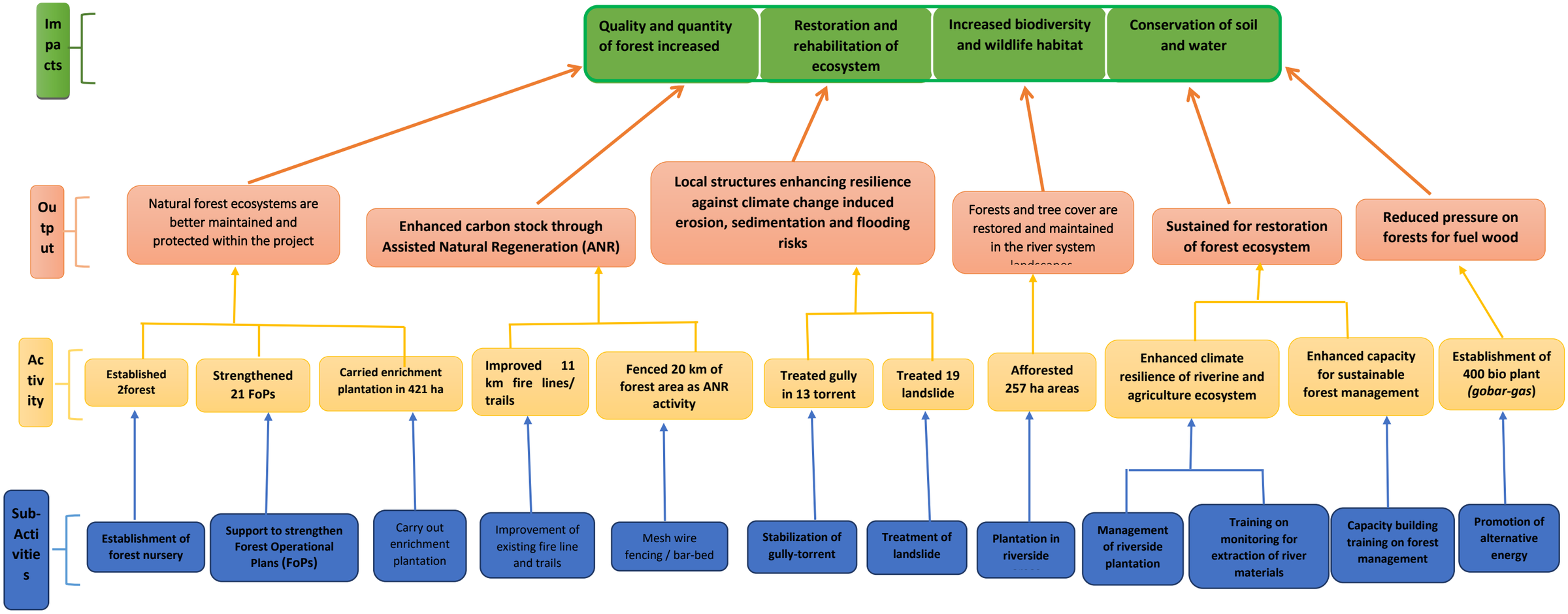


Figure 12: Solution tree analysis in Bataha river system: Climate change mitigation

Activities, Outputs and outcomes for reducing degraded forest and enhancing forests

Several activities are proposed in the solution tree workshop to reduce degraded forest and increase carbon stock for enhancing canopy cover and forest density. The details of the activities are given in the Intervention Packages (IPacks) with their feasibility and safeguards matrix (details given in Section 5). And the details solution with the location and activity code in the map with BRCRN priority are also given in the separate data spread-sheet. The outputs and outcomes of the activities in climate change mitigation are given in the table (Table 6).

Table 6: Activities, outputs and outcomes for reducing degraded forest and enhancing forests in the Bataha river system

Sub-activities	Activities	Outputs	Outcomes
Forest nursery establishment and enrichment plantation in degraded forest	Restoration of degraded natural forests	Output 1: Natural forest ecosystems are better maintained and protected within the project area	
Natural regeneration Management-Assisted Natural Regeneration (ANR) activities ➢ Reduction of forest fire hazards through cleanings and improvements of existing fire line and existing trails (extraction of bushes, leaf litters and forest residues) ➢ Fencing with mesh wire ➢ Provisions for forest watcher, ➢ Minimize grazing with alternatives; ➢ Provisions for forest fire response toolkits (toolkit include gloves, boots, first aid medicne, accidential insurance ➢ Adoption and linking of new technology (for example: Forest Watcher mobile app-the dynamic online forest monitoring and alert systems) for fire controls, ➢ Strengthening and reviewing forest operation plans to reinforce the forest management system. ➢ Empower CFUGs /LFUGs (considering women member) on forest management and forest governance; ➢ Prioritize women members of CFUG's in providing training, capacity development and other activity that affect			➢ Degraded forest managed ➢ Enhanced climate resilient in forest ecosystem ➢ Enhanced carbon stock in natural forest region

Sub-activities	Activities	Outputs	Outcomes
sustainable natural resource management.			
Orientation sensitization on forest fire control and management for herders and forest users groups Capacity buildings on forest management for: • users groups prioritizing women • government entities Capacity-buildings for local government on monitoring for sustainable extraction of river induced materials and mines; Facilitating support for sustainable extraction of riverbed materials at river system level in collaboration with the concerns (for examples: municipal government, province government and division forest offices, river mining's industries private sectors and relevant stakeholders)	Enhancement of capacity for sustainable forest management		Reduced barriers of sustainable forest management Sustained for restoration of forest ecosystem and services
Plantation in river site areas Post plantation management with irrigation facility and fencing Capacity buildings trainings for users on the management of plantation in new areas-river site areas	Enhancement of forest land in river side areas	Output 2: Forests and tree cover are restored and maintained in the river system landscapes.	➢ Enhanced forest cover and contributed in carbon stock (in 20-30 years from the plantation period) ➢ Enhanced livelihood capacity of vulnerable community ➢ Reduced human pressure on natural forest for woods, fodders and buildings materials ➢ Enhanced soil fertility of degraded lands in river site lands

Sub-activities	Activities	Outputs	Outcomes
			➢ Enhanced climate resilience of riverine and agriculture ecosystem
Stabilization of gullies with torrent controls in the torrent through innovative technology and local vegetative protective measures	Conserve soil and water source and Improve water retention	Output 3: Local structures are enhancing resilience against climate change induced erosion, sedimentation and flooding risks	
Treating landslides with vegetative conservation measures(priority basis)			
Facilitation for the Promotion of alternative renewable energy sources (improved cooking stoves, biogas, electric stoves) for women and vulnerable communities' dependent on the fuelwood for energy			

2.5.2 Climate change adaptation: solution analysis

The major solutions are associated with climate resilience in agriculture and land use practices; risk reduction of climate induced hazard floods, landslides, and droughts; and capacity building of farmers and users to enhance their climate resilience.

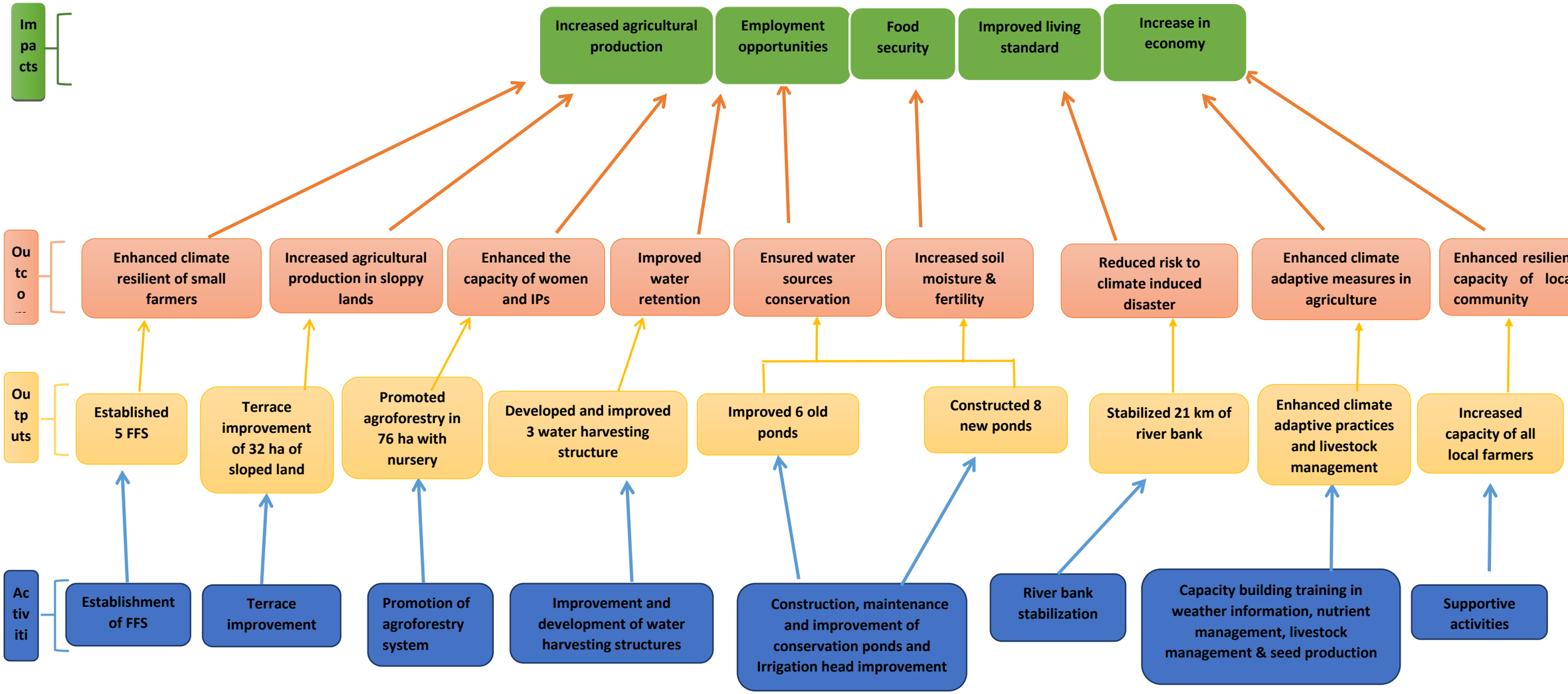


Figure 13: Solution tree analysis in Bataha river system: Climate change adaptation

Activities, outputs and outcomes for reducing vulnerable ecosystem and communities

In order to address drivers listed (Ref section 2.4), several activities have been proposed to reduce vulnerable ecosystem and increase climate resilience of local vulnerable communities in the river system. The details activities are given in the Intervention Packages (IPacks) with their feasibility and safeguards matrix (details in Chapter-5). And the details solution with the location and Activity Code in Map with BRCRN priority are also given (provided the separate data sheet-excel in Appendix of the report). The outputs and outcomes of the activities in climate change adaptation and resilience is presented in the table (Table 7).

Table 7: Activities, outputs and outcomes for reducing vulnerable ecosystem and communities in Bataha river system

Sub-Activities	Activities	Outputs	Outcomes
Construction of conservation ponds	Improve water retention and conserve water sources Reduce risk to water induce disasters and enhance coping capacity of vulnerable community	Output 3: Local structures are enhancing resilience against climate change induced erosion, sedimentation and flooding risks.	Enhanced coping and adaptation capacity of farmers to disaster risks Increased soil fertility Ensured water sources conservation and continuation of its services
Improvements and development of water harvesting local structures			
Riverbanks and torrent stream banks stabilization using local materials and bio-engineering			
Support on small irrigation facilities especially for small and medium enterprise farmers (for examples: support for surface flow management using cutoff wall chamber, irrigation canal headwork maintenance)			
Wetland improvement			
Capacity buildings for users and government entities Promotion of rainwater harvesting in upstream regions to increase water availability and reduce flash floods, as well as connecting them to community income generation-farming system.	Capacitate stakeholders in water and soil conservation		
Establish agroforestry system with mixed cropping in multi-year crop; fodder and grasses with horticulture plants	Establish agroforestry activities through cooperative systems Capacitate farmer groups and government officers to promote agroforestry system	Output 4: Farmers are skilled in using climate-resilient land use practices.	Enhanced climate resilient capacity of farmers Enhanced the capacity of women in agriculture system and livestock management Increased income capacity of women and IPs Ensured markets of the agricultural productions
Institutional support for improved agroforestry groups			
Capacity buildings for Agroforestry Users Groups and government staffs			
Establishment of FFS on several crops	Reduce risk to crop		Enhanced climate

Sub-Activities	Activities	Outputs	Outcomes
addressing several pests and diseases and facilitation for soil testing	pests and diseases Increase agriculture production		adaptive measures in agriculture
Support to farmers for seed production in the FFS locations			
Capacity-building training in the use of weather information and its application in agricultural practices;			
Provide training nutrition management landuse practices- (Following customary laws and practices adopted by Indigenous Peoples in land use patterns) - compost manure preparation, mulching, water retention capacity, green manure)	Enhance climate agricultural adaptive practices and increased livestock management practices		
Livestock management through FFS with and fodder bank and shed improvements			
Support to farmers' sensitization to save agricultural practices and production from wildlife threats	Develop wildlife risk friendly agricultural practices		
Support to link farmers with the market centers and market information;	Enhance farmers capacity in commercialization of agricultural productions		Ensured income of small farmers through the agricultural production
• 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 learnings in gendered governance, • Conduct rapid assessment on women's contribution and involvement in NRM/ CRLUP and management. • Provide gender mainstreaming trainings/ workshops to local government and CBOs and concerned stakeholders. • Conduct GESI focused social audits and public hearing. • Promote awareness on gender responsive information, available provisions and resources among	Gender-inclusive governance		• · 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 • Male engagement

Sub-Activities	Activities	Outputs	Outcomes
CBOs/ women groups. • Engage male involvement to advocate gender and women's issues and concern.			

2.5.3 Map of Planned Interventions MCA Result Map 4

The enhancement activities in the river system are divided into four intervention packages in the river system: I) Restoration and rehabilitation of degraded ecosystem through sustainable forest management, ii) Soil and water conservation iii) Agroforestry systems, and iv) Climate resilient agriculture technologies and practices. The major enhancement activities include: restoration of degraded forest and forest lands, plantation in river site lands and promotion of woodlots and increasing soil fertility in river site lands through agroforestry system and enhancement of farmers' capacity to adopt to climate change impacts on agriculture through the establishment of Farmer Field Schools (FFSs) in the river system. The "M" code in the planned intervention map referred to mitigation activities and "A" stands for adaptation activities in Bataha river system (Figure 14).

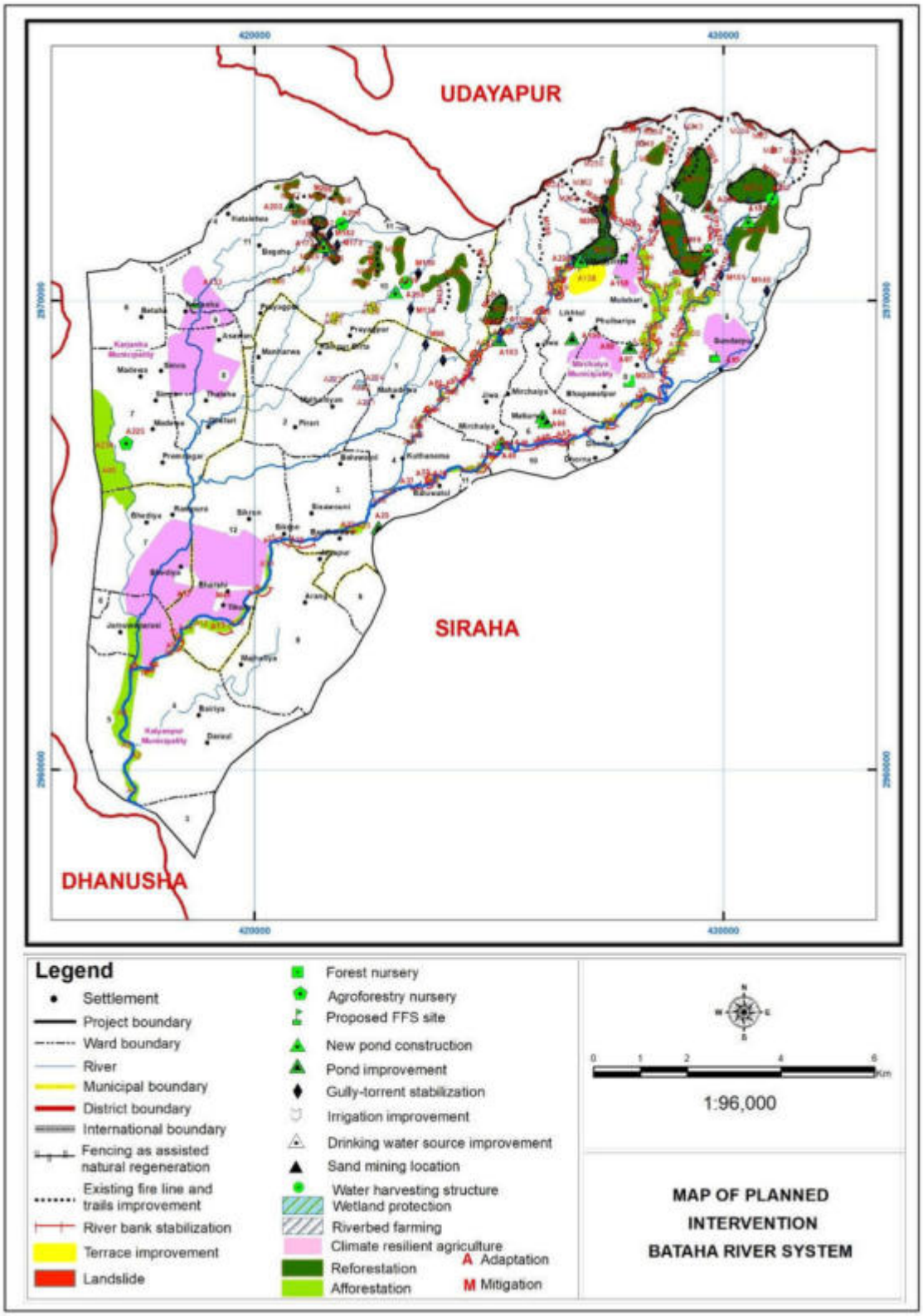


Figure 14: Map of Planned intervention (Mitigation and Adaptation) in Bataha river system

2.5.4 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, the 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 natural resource management sector.

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

- Increase financial investment in women's decision making capacity buildings, especially in forestry activities and horticulture for Churia's region women groups.
- 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.
- 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
- Minimize women's workload by engaging men in household or farm activities.
- Reduce social barriers (gender inequality, social and economic insecurity and lowered education and understanding level) for Dalit, indigenous people, 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 groups (AFG), FFS, and also in intercropping practices to ensure their incomes and knowledge enhancement.

d. Special attention on Free, Prior, and Informed Consent (FPIC) process is required for the implementation of the any activities highlighted in the CERP. For this, the following 6 steps that the implementing agency (CBOs) and project manager must consider in different actions during the CERP implementation in the river system, they include:
   - **Step 1:** Identification the Indigenous Peoples' concerns and their representatives based on land and territory
   - **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 a feedback and complaints mechanism
   - **Step 5:** Conduct participatory monitoring and evaluation of the agreement
   - **Step 6:** Document lessons learned and disclose information about project achievements

Chapter 3. Overall observations and findings

- The major drivers of deforestation and forest degradation in Bataha river system are Weak forest management, Flood, landslide and soil erosion, encroachment, Illegal logging, forest fire,

unsustainable uses and over exploitation of forest products (fodder, grasses and fuelwood), and expansion of invasive alien species;

- Low involvement of forest users committees, espeically women and users' goups in reducing major drivers of deforestation and forest degradation (open grazing, encroachment, forest fire, illegal logging).
- The additional hotspot areas with respect to inundation (downstream-around the confluence of the river and Kamala river), grazing, encroachment, flood plain areas are also identified the field visits;
- To meet the requirements of soil conservation, water retention, enhancement of incomes of women and marginalized communities, woodlots and fodder in the river system, some demonstration models for restoration practices such as the construction of conservation ponds and riverbed plantations with intercropping and agroforestry systems are required.
- Assisted Natural Regeneration (ANR) and enrichment plantation is needed to carry out the restoration of degraded forest in the natural forest region of the river system.
- Participants have an interest in the construction of embankments/dams on both sides along the river banks to protect agriculture lands damaged by floods, deposition, and siltation especially in lower Terai region;
- Promotion of alternative energy and energy saving technologies (bio-briquettes, bio-gas, solar and improved cook stoves) for forest dependent fuelwood energy users
- Policy advocacy is required for the government-managed degraded forest areas, particularly in Mirchaiaya Municipality, to be prioritized in collaboration with Municipal Government, and Province Government.
- A strong collaboration with the concerned municipal governments (Mirchaiya Municipality, Kalayanpur Municipality) and other concerned government agencies helps to make the implementation of the activities sustainable and for financial collaboration with BRCRN project.

Chapter 4: Intervention Packages (IPacks)

The identified solutions with intervention activities (solutions-activities) are grouped into five packages known as Intervention Packages (IPacks) for Building a Resilient Churia River in Nepal (BRCRN) to address the drivers of: a) climate change mitigation—hotspot of forest loss in upstream; b) climate change adaptation—hotspot of vulnerable ecosystems and associated communities in downstream and across the river system.

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. 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.

Five IPacks contain the activities that connect all the streams in the river system. In this sense CERP IPack designs also consider the connectivity for ecosystem restoration. The first two IPacks, IPack 1 (forest restoration and afforestation) and IPack 2 (soil and water conservation), primarily concentrate on the southern region of the river system and forest degradation are primarily observed. Additionally, these two IPacks will definitely and primarily control soil and forest loss, restoring the degraded land and forest ecosystems, and reducing sediment deposition in the lower regions.

IPack 3 (Agroforestry system) concentrates on the lower regions that will improve the fertility of agricultural lands in riverside areas in the regions of the river system. The IPack 3 also focuses on the livestock-dependent livelihoods of marginalized farmers by prioritizing fodder species and encouraging horticulture in riverside agricultural lands. IPack 4 (Climate resilient agriculture) deals with the agricultural sector's adaptation to climate change and primarily focuses on lower region farmers. In addition, the IPack 4 will help to enhance adaptation capacity of marginalized and small farmers through climate resilient technology and knowledge and skills in agriculture and water management. Finally, a cross-cutting IPack (Gender inclusive governance) is suggested to address gender-related issues that support the restoration of the river system's degraded ecosystems.

Each IPack contains a general description of the drivers, a list of the most significant initiatives for resolving problems with outputs and outcomes to address the drivers and the underlying causes and effects of the hotspots, implementing strategies, 5-year budget plan for carrying out the initiatives, monitoring plans, analyses the feasibility of the implementation and a brief Additionally, there are two categories of solution activities: capacity buildings and solution-activities in spatial mappings with activities area code (GIS data features: polygons, lines, and points). The suggested solution-activities in the plan also include beyond the BRCRN priority. Details about problem-solution-activities with the BRCRN priority code are given in the excel file (Referring appendix of the Plan).

IPack 1: Restoration of degraded forest (reforestation) and afforestation in riverside land

Why this IPack is needed?
The natural forest loss is about 421 ha, mainly reported in Karjanha Municipality-10,11 and Mirchaiya Municipality- 5,7 & 9 in the river system (from 2015 to 2021); (Source: ICIMOD,2015 and Google Earth Imageries,2021). This IPack is proposed to address the following drivers and underlying causes of Deforestation and Forest Degradation and exposures of river site regions for restoration and afforestation in the river system.

Multi hazards (flash flood, drought, landslide and erosion): According to the land features of the river system, the river system comprises of around 13 torrents (DoS, 1996). The users have noticed sheet erosion in bare soil in upstream triggered by the force of raindrops. The sheet erosion was found to get transformed into small channels with runoff water- called rill erosion and then gulley erosion which swept away trees and bushes, especially in the pre-monsoon (March-May) and monsoon period (June-September).

Likewise, the occurrence of flood, landslide and soil erosion have been increasing expanding their area in the river system. The high intensity rainfall has accelerated flood, landslide and soil erosion. These hazardous events have degraded the forest area in the river system. In addition, landslide and erosion have resulted into loss of forest cover in Laxmi Community Forest, Hariyo Community Forest and Ram Krishna Community Forest (source: Problem Workshop and field visit, 2022). Impacts of Flood in the forest area are seen in different catchments, including Bhalu, Churia, Moraha and Jhakri catchments.

Illegal logging: Large scale logging is in practice due to weak institutional capacity of forest user groups, lack of livelihood and income generating options of vulnerable community and interference of downstream communities in the river system. This is reflected in different community forests for examples in Ramkrishna, Hariyo Danda, Chure Danda and Laxmi in Mirchaiya Municipality-7 & 8. Bagaha Beldanda and Shree Jiba Thakur community forests have high degraded area. Communities of Majhawa, Malabari, Jiwa, Sundarpur, Moraha are mostly dependent on forest products for their needs and survival and for cooking and heating.

Encroachment: According to the local people, forest encroachment is noted in Bataha river system. It is mainly due to the allocation of forest land for human settlements and shifting cultivation (*khoriya kheti*). Encroachment in community forests especially in Bagaha Yuwa, Sonamai, Shiva, Ramkrishna, Hariyodanda, Hattimunda and Ghurmidanda forest user's areas are seen in the river system. The exercise and trainings of Nepal Army in the forest land has also contributed in the depletion of forests in Shree Jiwa Thakur Community Forest and Hariyali Community Forest.

Forest fire: In the river system, every year (from March to May) two to three fire events happen in all community forests. In addition, careless human activity has also increased the occurrences of forest fire. Other underlying drivers of the forest fire in the river system include people's misconception on: sprouting of new grass after fire, prevention of attack from wild animal, like elephant, snake, and hunting wild animals.

Open grazing: open grazing are the main issues in the river system. Intense open and overgrazing is a general practice in the river system. For examples: everyday around 400-500 goats and 100-150 cattle usually graze in the Churia forest area).

Excessive fuelwood collection: According to local stakeholders, the communities along East-West Highway are more responsible for exploitation of forest products. For examples, communities in Jiwa, Likhtol, Mohara, Sindarpur, Prayagpur, Bagaha, Karjanha, Malabari, and Majhawa usually collect fodder and fuel wood from the nearby forest. Likewise, according to local people, every household usually collects around 45-50 kg fuel wood every alternate day in seven months (from November to May) in every year.

Key activities include:

f. Enrichment plantation in the degraded forest: the potential native tree species, includes Bamboo *(Bambusa vulgaris*), Kimbu (*Morus alba*), Tanki (*Bauhinia purpurea*), Badhar (*Artocarpus lakoocha*), Nimaro (*Ficus auriculata*), Gutel (*Trewia nudiflora*),
Asna (*Terminalia tomentosa*),Sisau *(Dalbergia sissoo)*, Satisal (*Dalbergia latifolia)*, Khayer (*Acacia catechu)*, Jamun *(Syzygium cumini),* Simal (*Bombax ceiba*), Sa**l** (*Shorea robusta),* Karma *(Adina cordifolia);* Barrow (*Terminalia belerica),* Harrow *(Terminalia chebula),*

g. Establishment of forest nursery is recommended nearest to the potential areas of plantation (approaches: private, community and promotion in forest sub-divisions- Karjanha Municipality-7)

h. Natural regeneration management-ANR (Assisted Natural Regeneration) is needed by promoting several actions such as;
    a. Reduction of forest fire hazards through cleanings and improvements (extraction of bushes, leaf litters and forest residues) (about 11 km);
    b. Mesh-wire fencing for protection of existing forest as priority ANR activity (20 km),
    c. Provision of forest watcher,
    d. Minimizing grazing with alternatives;
    e. Provisions for forest fire response toolkits
    f. Adoption of new technology (for example: Forest Watcher mobile app-the dynamic online forest monitoring and alert systems) for fire controls,
    g. Strengthening and envisioning of forest management operation plans to reinforce the forest management system.
    h. Empower CFUGs on forest management and forest governance;

i. In addition, 257 ha of plantation is planned including community land plantation (**55 ha**), Demosntration Plantation (**32 ha**), Riparian plantation (65 **ha),** and Woodlots establishment (**105 ha**).

Objectives of the IPacks

- Improve forest cover through enrichment plantation;
- Improve forest quality through proper management;
- Build capacity of CFUGs to reduce forest fire hazard and risk;
- Reduce natural forest based fuelwood dependency;
- Increase forest cover in riversite area and link the production to the local community in income generation;

Strategies:

- Ensuing accessibility and availability of desirable forest species for plantation with priority to native species;
- Enhancing technical capacity of CFUGs/LFUGs in nursery establishment and seedlings production

- Adopting local measures for river bank stabilization to protect forest loss from flood risk in the riversite plantation
- Reducing grazing by providing alternatives (for examples: supports in fodder nursery in private lands and in community/local forest areas)
- Assisting alternative energy sources for the forest dependent communities in fuelwood collection;
- Ensuring irrigation facilities in plantation areas, especially in riversite plantation
- Enhancing capacity of government forest agencies through the support of equipments, skill based forest management training
- Developing collaboration with the concerned local governments in the river system for the intervention activities in public lands in river site;
- Assuring long-term management of plantations in riversite areas (for example: a community based three-year action plan can be developed and approved in coordination with local government and DFO).
- Visiting to successful demonstration model
- Facilitating on sustainable mining and river materials extraction to reduce environmental impacts, as well as physical infrastructure development in and through forest areas to reduce forest degradation; and for reducing illegal logging.

Incentives for participation & changing stakeholder practices:

- Fair and equitable disribution of benefit of resource to the CF users especially, marginalized forest users;
- Incentives for women and economically marginalised community for their active engagement in nursery establishment and enrichment plantation;
- Incentives for alternative bio-energy;
- Incentives for livestock sustainable management activities (promotion of profit making livestock farming, sheds improvement, fodder nursery- plantings of high quality fodder species)

Output, Activities and Sub-activities:

Output	Activity	Sub-Activities	Sub-Activity Area code	Remarks
Output1: Natural forest ecosystems are better maintained and protected within the project area	**Activity 1.1 : Restore degraded natural forests**	Forest nursery establishment/promotion **(2 locations) in** Mirchaiya Municipality-8 & 12	M41,M235	
		Natural forest regeneration management and Enrichment plantation in degraded forest lands **(421 ha)** in Mirchaiya Muncipality-5, 7 & 9 and Karjanha Muncipality-10 & 11	M185,M198,M175,M163,M178,M169,M201,M213,M180,M212,M217, M145,M214,M168,M210,M165,M170,M144,M211,M205,M208,M167, M192,M126,M207	
		Natural regeneration management-ANR (Assisted Natural Regeneration): • Cleaning of existing fire line and existing trails **(11 km) in** Mirchaiya Muncipality-5, 7 & 9 and Karjanha Muncipality-10 & 11 • Fencing around the natural forest lands **(20 km) in** Mirchaiya Muncipality-5 & 7 and Karjanha Muncipality-10 & 11 • Support on forest firefighting equipment/tools sets- **(21 sets)** • Support for fodder nursery approach-seedlings for fodder trees	M215,M216,M161,M206,M159,M137,M189,M209,M218,M216,M206, M159,M137,M209 M164, M226, M227, M228, M229, M230, M231, M232	Toolkit for forest fire control in accordance with government packages (Trolly with Water Tank if possible at district level) the river system has 21 CFUGs/LFUGs and forest firefighting equipment is proposed for one package for each 1 CFUGs

		(300 HHs)- • Support on the provisions of forest watcher (at least one in each CFUGs **(21 persons)** • Linking with existing ICIMOD mobile apps (Forest fire App) for forest fire monitoring and forest management (1**)**		
	Activity 1.2 Enhance capacity for sustainable forest management	a. Development of Community Based Forest Fire Fighting Groups (CB-FFFG) 21events b. Provide skill trainings on forest fire control and management **(21*3)=63 person for firefighter trainings**) c. Support for forest operational plan developments/reviews **(21 plans)** d. **Coaching on forest operational plan for forest users (21 events)** e. Provide 1-day orientation trainings for herders/livestock farmers on forest management (**300 herders);** f. Provide skill trainings on compost preparation using forest based resources-bushes and leaf litters**- 5 days training** (one for each two CFUGs) g. Develop Training of Facilitators (ToF) in		• The total number of CFUGs/LFUGs in the river system is about 21 • Operational plan will be reviewed with respect to climate change, regeneration management, enrichment plantation, forest pests & diseases management, GESI integration, promotion of native species, proportional benefit sharing to marginalized users, respect to culture and social values of IPs and other ethnicity...)- • Production through media/online publications in local language/printings leaflets-pictorial contents for general forest users) • One coaching class events for each CFUGs/LFUGS

		sustainable forest management (10 people in the river system); h. Capacity building trainings on forest management for government staffs (DFOs/ SDFOs) **(1 event-**3 days residential) i. Provide refresher trainings for CFUGs/LFUGs in forest management-3 days for each CFUGs/LFUGs **(21 events); each event include 20 persons/users** j. Celebration of Churia Conservation day (**5 events)** k. Capacity-buildings trainings on monitoring of sustainable extraction of riverbed materials and mines (with site demonstration)-3days residential for local governments l. **Facilitation for School course programme on sustianable forest management (1 event)** m. Production and dissemination of extension material on sustainable management of natural resources. Produce gender friendly materials. n. Facilitation support for alternative energy uses / biogas plants installation(400 HHs)		

Output 2: Forests and tree cover are restored and maintained in the river system landscapes.	**Activity 2.1 : Enhance forest land in riverside areas (afforestation)**	Plantation in river side area through sustainable management **(257 ha) in** Kalyanpur Municipality-4, Karjanha Municipality-7, 10 & 11 and Mirchaiya Municipality-1, 3, 4, 5, 7, 9, 10 & 12	A1,A2,A3,A4,A7, A9,A12,A14,A15, A18,A23,A24,A26,A27,A28,A33,A37,A38,A40,A43, A44,A45,A51,A52,A55,A57,A58,A60,A63,A67,A71, A73,A75,A76,A77,A80,A92,A100, A102,A109,A115 ,A117	

Budget Plan-5 years (NPRs)

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.

Outputs/Activities/sub-activity	**Unit**	**Quantity**	**Rate**	**Amount**	**Remarks**
Output1: Natural forest ecosystems are better maintained and protected within the project area					
Activity 1.1 : Restore degraded natural forests					
1.1.1 Construction/promotion of forest Nursery	no.	2	1,000,000	2,000,000	The cost includes structure of nursery of each capacity 50,000 for Multi-year seedlings production
1.1.2 Seedling production in Nursery (Multi-years seedlings)	No.	100,000	40	4,000,000	The cost includes water supply, seedling bed preparation, nursery *Naike*, forest soil collection, sand collection, poly bag purchasing, nursery shading, soil filling in poly bag, preparation of germination bed)

1.1.3 Enrichment plantation and regeneration management in degraded forest	Ha	744	250,000	186,000,000	The cost includes survey and alignment, pitting, seedling transportation, and plantation Clearance of leaf letter, bushes, dugout waterholes (30cm*30cm) and contour bund (for regeneration management)..
1.1.4 Cleaning of existing fire line and existing trails	km	11	50,000	550,000	In collaboration with municipal government and DFO
1.1.5 Construction/improvements of fencings in natural forest lands	km	20	500,000	10,000,000	adopt mesh wire/ bar-bed
1.1.6 Support on forest firefighting equipment/tools (21 sets)	no.	21	500,000	10,500,000	Total CFUGs/LFUGs in the river system is only 21 groups. 1 set of firefighting equipment is for 1 groups. need to collaborate with others for firefighting water tanker-big and small size, the cost does not include bigger tanker cost.
1.1.7 Support on provisions for forest watcher	persons	21	800,000	16,800,000	for 5 years salary with incentives
1.1.8 Support on fodder-seedlings for fodder trees promotion	hhs	300	5,000	1,500,000	focus for marginalized and livestock based livelihoods dependent community
1.1.9 Linking with existing mobile app system from ICIMOD for forest fire monitoring and forest management (1 event)	lump sum	1	200,000	200,000	
1.1.10 Development of Community Based Forest Fire Fighting Groups (CB-FFFG)	no.	21	20,000	420,000	The cost includes coordination and communication and meetings for the development of

					CBFFFG
1.1.11Provide skilled-based training capacity for CBFFFGs on forest fighter trainings-forest fire control and management for (21*3)=63 persons-firefighter trainings) for CFUGs/LFUGs	persons	63	30,000	1,890,000	3 persons from each CFUGs/LFUGs at community level Participants also include from local government disaster management unit Collaborate with National Disaster Risk Reduction and Management Authority (NDRRMA) and Armed Police Force
1.1.12 Support on Forest Operational Plan (FoP) renewals/reviews	no.	21	200,000	4,200,000	review with respect to climate change, regeneration management, enrichment plantation, forest fire, pests & diseases management, GESI integration, promotion of native species, proportional benefit sharing to marginalized users, respect to culture and social values of IPs and other ethnicity...
Sub-total				**238,060,000**	
Activity 1.2: Enhance capacity of forest management stakeholders (government units, CFUGs, forest management CSOs, users)					
1.2.1 Coaching on forest operational plan for forest users (21 events)	events	21	30000	630,000	Half day orientation on operational plan dissemination/sensitization to the users
1.2.2 Provide 1-day orientation trainings for Herders/livestock owners on importance of forest services and management (300 herders/livestock owners) ;	events	15	100,000	1,500,000	Coordination with cattle's' households' owner Collaboration with municipal government and Livestock Management Centers In 15blocks events, 20 persons can adjust in each block/event

1.2.3Provide skilled-based trainings to promote compost and green manure preparation using forest based resources-bushes and leaf-litters-3 days training (one event for each CFUGs/LFUGs)	events	21	300,000	6,300,000	Collaboration with municipal government 1 CFUGs can adjust in one event with one machine
1.2.4 Develop Training of Facilitator (ToF) on Forest Resource Management -7days (10 persons)	persons	10	100,000	1,000,000	Residential training for government staffs (DFO, Soil conservation Office, municipal government and forest management networks and stakeholders One event for 10 people
1.2.5 Capacity building trainings on forest management for government staffs (DFOs/ SDFOs) **(1 event-**3 days residential)	events	1	600,000	600,000	Participants from forest offices government and other related professional networks working in forest management in the river system Total participants 15-20 persons
1.2.6 Provide refresher trainings for CFUGs/LFUGs in forest management-3 days for each CFUGs (non-residential) at local level	event	21	200,000	4,200,000	The training facilitator-from the ToF receiver One event from each CFUG/LFUGs and the training should be at river system level-non-residential
1.2.7 Celebration of Churia Conservation Day (**5 events**) at river system level	event	5	100,000	500,000	1event for each year of the project period at river system level in collaboration with all relevant entities (Government, Non-government, private sector and School unit)

1.2.8 Capacity-buildings training on monitoring of sustainable extraction of riverbed materials and mines (with site demonstration)-3days residential for local governments	event	1	600,000	600,000	Participants from DFOs/ SDFOs/soil conservation office/Livestock service Expert Center/local government engineers/AKCs) Site demonstration needs to be incorporated in training schedules One event for each year of the project period 15-20 participants in each event in collaboration with the concerns (for examples: municipal government, province government and division forest offices, river mining industries private sectors, and other relevant stakeholders
1.2.9 Facilitation on school course programme on sustainable forest management (1 event)	event	1	300,000	300,000	
1.2.10 Production dissemination of sustainable management of natural resources	Lump sum	1	500,000	500,000	through publications in local language/printings leaflets-pictorial contents for general forest users,…
1.2.11 Facilitation support for alternative energy uses / biogas plants installation(400 HHs)	no.	400	5,000	2,000,000	In coordination with the municipal government
sub total				**18,130,000**	
Output 2: Forests and tree cover are restored and maintained in the river system landscapes.					
Activity 2.1 Enhance forest land in river side areas					
2.1.1 Plantation in river site area (forestry	Ha	257	700,000	179,900,000	The cost includes survey and alignment, pitting,

plantation)					transportation of seedlings, filling of fertile soil (30cm*30 cm) or (40cm *40cm); 4-5 kg organic soil, (assumed 20% pits), plantation. The cost also includes watcher, water supply, fencing Priority for 4-categories plantation (riparian plantation, community plantation, demonstration plantation and woodlot plantation) The cost for river bank stabilization with structure measures is required to manage in collaboration (MoU) with municipal government, Janatako Tatbanda, and others , (the cost is estimated in IPack2) Collaboration approach with MoU/working guide notes with other government agencies/local government
2.1.2 Capacity building trainings for users on the management of plantation in river site areas	No.	5	700,000	3,500,000	One training event in every year (for 5 years); demonstration in the plantation regions-river site sites The ToF receivers should be the trainers in the river system
Sub total				183,400,000	
Total cost				**439,590,000**	The total estimated budget is to be varied once the detailed technical feasibility is completed and the cost can be contributed by other government agencies, especially municipal governments. Thus, a strong collaboration (with a MoU) is

					needed with the concerned municipal government and soil conservation offices

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

Feasibility analysis:

Activities	Risks or obstacles	Risk reduction measures	Risk reduction targets	Indicators
Activity 1: Restored degraded forests				
Nursery establishment	• Unavailability of : appropriate site, (water, slope, fertile soil, accessible to plantation site etc. • Erratic rainfall decreases the growth of nursery plant	• Ensure water availability • Require site inspection with soil test and other aspect • Purchase seedling from private nursey. • Upgrade forest nursery under DFO • Provide shed for some days. • Adopt multi-year nursery plants (2-year) • Adopt Indigenous knowledge, skills and customary practices for measures due to erratic rainfall and climatic variability	• 100,000 seedlings purchased from private nursery • 1 DFO nursery upgraded • 2 Nurseries with shed	• No. of seedlings purchased from private nursery • No. of DFO nursery upgraded • No. of nurseries with shed
Seedlings production (multi-year seedlings)	• Unavailability of Multi-year seedlings for first year plantation • Conflict due to the communities interest in species selection(which grows fast with high monetary value) and project priority on locally adapted species for biodiversity conservation	• Production of seedlings should start from the first year of the implementation period to meet the demand of seedlings • Communities participation and consultation for the species selection • Hire well experience nursery *Naike*	• 100,000 seedlings produced in planning phase • Seedling species are selected as per the communities as well as project needs • At least 1 nursery *Naike* are well	• No. of seedlings produced in planning phase • Number of consultation for species selection • No. of well experience nursery Naike devoted.

			experienced among 2 *Naike*	
Carrying out plantation & regeneration in degraded forest	• Drought • Forest fire • Open grazing • Flash flood. • Less interest of CFUGs	• Selection of drought resistant species (sal, Khayer) • Construction of water hole • Contour plantation • Clearance of bushes and leaf-litter. • Fencing • Adopt rotational grazing /stall-feedings • MoU with CFUG/ LFUG for the protection of the plantation area	• 80% enrichment plantation species are drought resistant. • At least 32 ha is contour planted • 80% of seedlings protected	• % drought resistant species in enrichment plantation • Number of planted area fenced • % of seedlings protected • Number of MoU with the CBOs
Activity 2: Enhanced capacity of forest management stakeholders for sustainable forest management				
	• Participants may not have interest to receive training • Training event may not match with leisure time of participant. • Venue may not easy accessible to participants especially for women and other vulnerable people	• Provide DSA and transportation allowances to the participant. • Training period selected as per the demand of participants through Regular consultation with CFUG member in advance • Adopt seasonal calendar for training planning/schedule • Effective training through experimental exercise using related instruments • Selection of venue from consultation with participants • Residential training	• 90% of targeted CFUG members actively involved in the training. • 50% women, 13% Dalit and 31% Indigenous people are included in the training • 100% of CFUGs able to know knowledge & skills for forest management	• % of targeted CFUG members actively involved in the training.
	Marginalized beneficiaries may not receive the alternative energy	Require Proper analysis of marginalized beneficiaries.	• 90% of marginalized beneficiaries receive alternative	• % of actual beneficiaries receive alternative energy

			energy	
Activity 3: Developed forest lands in river reclaimed area				
Carrying out river side plantation (afforestation)	• Flash flood damages the plantation • Obstacle in Land ownership • Social conflict between communities of two river banks • No provision of government in post plantation management • River side is open grazing area in current situation and communities will be reluctant to carry out the plantation in that area. • Mass production of forest product may create problem in harvesting and marketing.	• Post monsoon plantation. • MoU with local government on the use of river side land for plantation • Vigorous consultation with user member • Involvement of local government • Enhance willingness of local community around public lands through several strategies (for examples: local community managed plantation in coordination with local government; sharing of products with the community) • Regular thinning and pruning with market assessment.	• Post monsoon plantation in 257 ha of river side land • 3 no. of consultation with local government to prepare guideline • 90% of users agreed to carry out plantation • 20% financial support from local government. • One thinning and one pruning/ year with market assessment or distribute to local users.	• Ha. of land (in post monsoon) planted • No. of consultation with local government to prepare guideline • % of users agreed to carry out plantation • % financial support from local government.

Safeguard analysis:

Outputs and activities/ tasks	Serious risks	Risk reduction measures	Risk reduction targets	Indicators
Nursery establishment	• Labor hired from outsider that includes women, IPs, Dalits, and marginalized people. • Conflict in resources utilization (water, forest soil etc.) • Expansion of invasive species	• Labor hired from local users. • Agreement with corresponding user group for use of local seeds and other germplasms	• 80% of labors hired from local users • Around 40% women and IPS/ dalit/marginalized groups of labors hired from local users • No conflict in resource utilization	• No. of labor hired from local user. • Agreement document • No. focal desk developed in government entities
Carrying out river side plantation (afforestation)	• Exotic species may pose risk to local biodiversity. • Mass production of forest product may create problem in harvesting and marketing. • The plantation area itself act as social illegal site.	• Promote native species for plantation. • Regular thinning and pruning with market assessment. • Regular patrolling mechanism should be established.	• 100% of the plantation species is native. • One thinning and one pruning/year with market assessment or distribute to local users. • No illegal event recorded in the area.	• % of native species planted • Event of thinning and pruning/year • Amount earned/year from the product • No. of illegal event recorded from the area.
Carrying out plantation & regeneration in degraded forest land	• Exotic species may pose risk to local biodiversity. • Huge biomass	• Promote native species for plantation. • Regular thinning and pruning with market	• 100% enrichment plantation species is native. • One thinning and one pruning/year	• % of native species planted • Event of thinning and pruning/year • Amount of forest product harvested/year • % of the users received compensation on wildlife

	forest product may create problem in harvesting and marketing. • Human wildlife conflict	assessment. • Compensation mechanism by CFUGs established.	with market assessment or distribute to local users. • 90% of the users received compensation on wildlife damages.	damages.
Carrying out training to CFUG members on sustainable forest managemennt.	• Right person (IPs, Dalits, marginalized groups). may be excluded in the training;	• Assure right person in training (training is organized as per CTNA)	• 80% of trained CFUG members involved in forest management.	• % of trained CFUG members involved in forest management.
Installation of alternative energy (biogas plants).for marginalized poor communities.	• Elite capture	• Assurance of beneficiaries highly dependent on fuelwood (IPs, Dalits, marginalized groups).	• 400 HHs of actual beneficiaries receive alternative energy (biogas plants).	• No. of actual beneficiaries receive alternative energy (biogas plants).
Benefits	The focus of IPack on restoration of degraded forest and plantation in river site , capacity buildings, and promotion of alternative energy improve the ecosystem of the river			

Benefits	**Benefit enhancement measures**	**Benefit enhancement targets**	**Indicators**	**Remarks**
Clarity on sustainable forest management and increase in forest productivity	Establish strong forest management system	421 ha natural degraded forest restored and 257 ha river exposer lands covered with forest 50% of women and 31% IPs and 13% dalit benefited	% of degraded lands restored % of river side area covered with forest including woodlot % of vulnerable and marginalized communities benefited	

IPack 2: Soil and Water Conservation
Why this IPack is needed?

Drivers and general descriptions: This IPack is proposed to address the following key drivers and underlying causes for conserving soil and water and enhancing greenery in the river system:

- **Gully erosion, landslides, fragile geology, frequent and intense rainfall, droughts**:
    - Landslides are natural phenomena which occur under the favorable terrain conditions and are usually triggered by heavy rainfall, human activities, including open grazing and haphazard development-road networks in fragile lands.
    - About 19 landslides covering about 10 ha in Mirchaiya Municipality-5, 7 & 9 are the major landslids in the river system. About 13 number of torrent streams is having a number of gullies that have led to degraded forest ecosystems; for example, mainly in Karjanha Municipality-10,11 and Mirchaiya Municipality-1,5,7,9 are the major ones in the locations that need to be stabilized by using local speicies and appropriate technologies (such as plantation of *Kus or vetiver (Vetiveria zizanioides), Amriso/broom grass (Thysanolaena maxima), bamboo (Bambusa vulgaris) , Babiyo(Eulaliopsis binata)* bio-engineering, checkdams, contour plantation, channel drainge or trenches).
    - Open and intensive grazing (for example: around 400-500 goats and 100-150 cattle grazed daily in Bhalu catchment) has increased the risk of erosion along the river and gully corridors
- **Inadequate community capacity for flood and riverbank-cutting control measures and conventional agricultrue practices in sloppy lands**
    - Inadequate rainwater harvesting techniques and water sources get impacts from road construction and drying due to several factors, including degraded forest;
    - Conventional farming in sloppy lands of about 32 ha accelerates soil erosions and contributes to gully formation in Mirchaiya Municipality-7
    - Encroachment of river/stream site lands and forest lands for agriculture practices and income generating activities
    - Haphazardly extraction of river materials-stones, pebbles from Jaruwa, Jiwa and Bataha
    - Inadequate resources to combat the flash flood risk and a lack of low cost conservation measures further intensified the problem in soil and water conservation.

The key activities include:

j. Landslide treatments-19 sites with vegetative measures in collaboration with local governments, soil conservation offices, forest offices and the community (of these very strongly recommended for the treatmens (3 landslide), strongly recommended (3 landslide), and recommended (13 landslide)
k. Stabilization of gully in the torrent (13 torrent)
l. Construction of water conservation ponds (8 ponds): Mirchaiya Municipality-3,5,7, 8
m. Improvement of existing ponds (6 pond) in Mirchaiya Municipality-3,5,7,8 and Karjanha Municipality-11
n. Improvement of sloppy lands-terracing, in 32 ha especially in Mirchaiya Municipality-7
o. Construction of water harvesting structure
p. Riverbank stabilization
q. Capacity buildings in water and soil conservation practices

- Skill based training for local community CFUGs/LFUGs on landslide and gullies stabilization with locally available treatment measures **(21events of 5 days)-1 CFUGs/LFUGs in one event**
- Orientation training on soil and water conservation measures for government officials (from agriculture knowledge centers, extensions, soil conservation offices, forest divisions/subdivisions, local governments, and other stakeholders (**5 events, each event for 3 days);**
- Demonstration visits on soil and water conservation programme (5 events)
- Production and dissemination of success stories of water and soil conservation practices for possible replication

Objectives:

- Minimize soil erosion and protect degraded lands in upstream and downstream
- Conserve water sources and increase soil moisture
- Reduce landslide, erosion and flood risks and protect vulnerable community from possible disasters
- Promote and engage women, IPs, Dalit and marginalized communities in water and soil conservation enhance capacity of community in income generation
- Increase the soil moisture and productivity

Strategy:

- Increasing the accessibility and availability of locally adapted and desirable vegetative species for soil cosnervation (for example, bamboo farming, Amrisho (Thysanolaena maxima), Amala (Phyllanthus emblica), Harro, Barro and linking these measures in income generation opportunities, particularly for women, dalit and IPs, Madhesi and othe margninalied community .
- Stabilizing gullies and river banks through community participation, by empowering their capacity
- Coordinating with local government for gully stabilization and pond construction and improvements;

Incentives for participation & changing stakeholder practices:

- Fair and equitable disribution of benefit of resource to the Community Forest (CF) users especially, marginalized forest users;
- Incentives for women and economically marginalised community for their active enagement in nursery establishment and enrichment plantation;
- Incentives for alternative bio-energy;
- Incentives for livestock sustianable management activities (promotion of livestock farming, sheds improvement, fodder nursery- plantings of high quality fodder species,)
- Providing a subsidy for conservation measures on private land.

Output Activities and sub activities:

Activities	**Sub-Activities**	**Sub-Activity Area code**	
Output 3: Local structures are enhancing resilience against climate change induced erosion, sedimentation and flooding risks.			
Activity 3.1 Conserved soil	3.1.1.Landslide risk reduction (treating 19 landslides):	Very strongly recommended for treatment	M239, M241, M242

and water source and Improved water retention		Strongly recommended for treatment	M23, M237, M238
		Moderately recommended for treatment	M240, M243, M244, M245, M246, M247, M248, M249, M250, M251, M252, M253, M254
	3.1.2 Gully stabilization in torrent (13 torrents) in Karjanha Municipality-10,11 and Mirchaiya Municipality-1,5,7,9	M90,M98,M107,M130,M140,M147,M150,M151,M173,M182,M186,M193,M200	
	3.1.3 Terrace improvements (slope stabilization) (32 ha) in Mirchaiya Municipality-7	A1, A22, A26, A27, A32, A40, A5, A50, A7, A8, A102, A13, A160, A17, A185, A19, A192, A195, A197, A199, A2, A20, A200, A202, A203, A204, A205, A206, A209, A210, A211, A213	
	3.1.4 Construction of water conservation ponds (8 ponds) in Mirchaiya Municipality-3,5,7, 8	A49,A62,A65,A139,A172,A195,A219,A220	
	3.1.5 Improvement of existing ponds (6ponds) in Mirchaiya Municipality-3,5,7,8 and Karjanha Municipality-11	A25,A97,A103,A105,A203, A204	
	3.1.8 Construction of water harvesting structure (Dam) (3 harvesting dams) in Karjanha Municipality-10 and Mirchaiya Municipality-9	A255, A256, A257	
	3.1.9 Riverbank stabilization (21km) in Kalyanpur Municipality-4 & 8; Karjanha Municipality-10 and Mirchaiya Municipality-1, 3, 4, 5, 6, 7, 8, 9, 10 & 12	A10, A101, A108, A11, A110, A111, A112, A113, A116, A119, A122, A123, A127, A129, A13, A135, A136, A141, A142, A143, A148, A152, A153, A154, A156, A157, A16, A160, A162, A171, A174, A176, A177, A179, A181, A183, A184, A187, A188, A19, A190, A191, A194, A196, A197, A199, A20, A202, A21, A22, A29, A30, A31, A32, A34, A35, A36, A39, A42, A46, A47, A48, A5, A50, A53, A54, A56, A59, A6, A61, A66, A68, A69, A70, A72, A74, A78, A79, A8, A81, A82, A83, A84, A85, A86, A87, A89, A91, A93, A94, A96, A99	
	3.1.10 Wetland protection (4 wetlands) in Mirchaiya Municipality 1&2	A221,A222,A223,A224	
Activity 3.2 Capacitated stakeholders in water and soil	3.2.1 Skill based training for local community CFUGs/LFUGs on landslide and gullies stabilization with	Skilled based training for local community (CFUGs/LFUGs and soil and water conservation groups);	

conservation	locally available treatment measures **(21 events of 5 days)-1 CFUGs/LFUGs in one event** 3.2.2 Orientation training on soil and water conservation measures for government officials (from agriculture knowledge centers, extensions, soil conservation offices, forest divisions/subdivisions, local governments, and other stakeholders (**5 events, each event for 3 days);** 3.2.3 Support on demonstration visits on soil and water conservation programme 3.2.4 Support on production and dissemination of success stories of water and soil conservation practices for possible replication	

Budget Plan (5 years)

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-Activity	**Unit**	**Quantity**	**Unit cost**	**Amount**	**Remarks**
Output 3: Local structures are enhancing resilience against climate change induced erosion, sedimentation and flooding risks.					
Activity 3.1 : Conserved soil and water source and Improved water retention					
3.1.1 Landslide treatments	No.	19	2,000,000	38,000,000	The estimated cost is for each landslide, with the bio-engineering and structures for all three types of priorities.

3.1.2 Gully stabilization in torrent	No.	13	2,000,000	26,000,000	13 (torrent streams with gullies)
3.1.3 Terrace improvement (slope stabilization)	Ha	32	150,000	21,150,000	
3.1.4 Construction of conservation pond	No.	8	700,000	4,900,000	Size approximately: 20*20*2 m3
3.1.5 Improvement of existing pond	No.	6	500,000	500,000	Including cleaning and maintenance
3.1.6 Construction of water harvesting structures (dams)	No.	3	1,000,000	6,000,000	
3.1.7 Riverbank stabilization	km	21	30,000,000	450,000,000	cost @ Rs. 30,000,000 per 1 km Riverbank stabilization with engineering structures
3.1.8 Wetland protection	Ha	5.2	1,000,000	5,200,000	
Sub-total				**551,750,000**	
Activity 3.2 : Capacitated stakeholders and enhanced water and soil conservations					
3.2.1 Skill based training for local community CFUGs/LFUGs on landslide and gullies stabilization with locally available treatment measures **(21 events);**	Events	21	250,000	5,250,000	Total 21 CFUGs/LFUGs in the river system, Each event includes 1 CFUG/LFUGs
3.2.2 Orientation training on soil and water conservation measures for government officials	Events	5	600,000	3,000,000	Government officers include from agriculture knowledge centers, extensions, soil conservation offices, forest divisions/subdivisions, local governments, and other relevant stakeholders –expected participants 10-15 persons
3.2.3 Support on demonstration visits on soil and water conservation programme	events	1	1,000,000	1,000,000	For government officials, other stakeholders and users

3.2.4 Sensitize on upstream and downstream linkages for ecosystem services	events	2	500,000	1,000,000	For users (women specific), government officials of the concerned municipalities of the river system (working on soil, water and natural resources management) in collaboration with the municipal government
3.2.5 Support on production and dissemination of success stories of water and soil conservation practices for possible replication	Lump sum	1	700,000	700,000	The cost is also propose on sensitization for school children competition on drawing/debates on soil and water conservation and linkages the upstream/downstream in natural resources management
Sub-total				**10,950,000**	
Total				**562,700,000**	The total estimated budget is to be varied once the detailed technical feasibility is completed in coordination, especially with municipal governments. Thus, a strong collaboration (with a MoU) is needed with the concerned municipal government and soil conservation offices.

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

Feasibility analysis of IPack

Outputs/ activities	**Risks or obstacles**	**Risk reduction measures**	**Risk reduction targets**	**Indicators**
Output 1: Conserved soil and water source and Improved water retention				
Gully treatment	Requires high input Low participation of local users	Needed to convince the importance of the gully's treatments	13 torrent with gullies treated	No. of gullies treated

		Incentive for local labor		
Terrace improvement	It is tedious work and it takes long time to form bio-terrace. Farmers might be reluctant to practice terrace farming.	Compensation should be provided to the farmer	100% of slopes lands treated	# ha of slope lands treated
Landslides treatment	Costly and time-consuming procedures Low participation of local users	Cost/benefit analysis for the treatment Incentive for local labor	Landslides treated with the feasibility 19 landslides treated	No. of landslides treated
Construction and improvement of Conservation pond	Site might not be available to construct the big sized ponds Siltation in the pond	Consult with communities on the size of the pond before implementation MoU with users for the management of the ponds Conservation of catchment of the pond	8 conservation ponds constructed 6 pond improved 100% MoU with the user committee on the pond management	No. of conservation ponds constructed or improved with conserving its catchment
Output 2: Capacitated stakeholders and enhanced water and soil conservations				
Carrying out training to CFUG members on soil and water conservation measures.	• Participants may not have interest to receive training • Training event may not match with leisure of participant. • Venue may not easy accessible to participants	• Provide DSA and transportation allowances to the participant. • Training period selected as per the demand of participants. • Selection of venue from consultation with participants • Residential training	• 200 targeted members actively involved in the training.	• No. of members actively involved in the training

Safeguard analysis

IPack outputs/ activities	**Serious risks**	**Risk reduction measures**	**Risk reduction targets**	**Indicators**
Landslide	• Risk of human casualty	• Application of safety	• No human casualty	• No. of human casualty in landslide treatment.

treatment.		instrument.	recorded in landslide treatment	
Gully-torrent stabilization	• Vegetative species used in treatment pose to threat local biodiversity. • Labor hired from outsider	• Use of locally available native species. • Labor hired from local users	• 100% of the native vegetative species used in treatment. • 80% of labor hired from local user	• % of the native vegetative species used in treatment. • % of labor hired from local users
Terrace improvement	• The vegetative species used for terrace improvement might threaten the local ecology	Indigenous species are used as far as possible for terrace improvement	No exotic species will be allowed in the activities.	• Negligible threaten to local ecology
Construction and improvement of Conservation pond	• Children and small animal submerged in the pond. • Splash erosion occur when raindrop hit barren surface	• Fencing around the pond. • Develop animal friendly ramps • Paving by grasses • Planting trees around the ponds	• No casualties recorded • No erosion from the inclined inward lands and barren surface	• Number of casualties recorded • Number of ponds with siltation problem
Carrying out training to CFUG members on soil and water conservation measures.	• Marginalized groups may be excluded in the training.	• Assure right person in training by assessing the CFUGs institutions members	• 80% of trained members involved in soil and water conservation measures.	• % of trained members involved in soil and water conservation measures.

Benefits	**Benefit enhancement measures**	**Benefit enhancement targets**	**Indicators**
Water pond for the recharging ground water	Water source for wildlife by planning recharge pond in the forest with minimum damage to the forest area Fire control and risk	19 landslides controlled, 13 gully-torrents stabilized and 32 ha of slope lands stabilized and	% of vulnerable ecosystem lands restored # of water retention structures available and # meter water table

	minimization Runoff water will be reduced, and it will reduce erosion Flash flood control	reduced soil erosion at the source in upstream. 14 ponds including new and old constructed, 6 sites water harvesting structures made and 5,2 ha of wetlands protected have resulted to conserve water and improved water retention in downstream of the river system 50% of women and 31% IPs and 13% dalit benefited	increased in downstream % of vulnerable and marginalized communities benefited

IPack 3: Agroforestry system

Drivers and general descriptions: This IPack is proposed to address the following key drivers and underlying causes for linking the agroforestry with the fodders and support for small marginalized farmers also linking to their livelihoods depending on the livestock.

- **Unsustainable harvesting of forest resources (especially fodders, fuelwood) and river-induced resources**: in order to reduce the dependency of the community on fodder and fuelwood, planting of fodder species on public and private lands is a priority through the agroforestry system.
- **Deterioration of soil nutrition in riverside lands:** The riverside areas are expected to be enriched with soil nutrition once the agricultural crops are intercropped in woodlot areas. The riverbank and stream banks are required to be stabilized with local resources and bamboo plantations along the riverbank.
- **Increasing women's engagement in fuelwood and fodder collection in forests:** Involving women and marginalized communities in agroforestry helps enhance their income generation capacity and secure household consumption. Efficient agroforestry systems can reduce forest encroachment pressures and reduce forest degradation by increasing on-farm forest products. The Farmer Field School (FFS) approach is recommended for several potential enterprises to learn riverside management and select species and other management practices.

The key activities include:

- Establishment of Agroforestry nursery in the river system in different potential locations near to the agroforestry plantation areas. Some of the potential locations include: Karjanha Municipality-7
- Adoption of Agroforestry system in the potential areas of the riverside of about 76 ha, mostly in the Karjanha Municipality-7 regions.
- Providing supports for irrigation facilities
- Formulation of groups called Agroforestry Groups (AFGs), it is advised as 2 groups (25-30 members in each group)
- Providing Training on improved AF (Agroforestry) practices for 60 group members (30*2) and providing learnings and techniques through FFS approach.
- Capacity building training on administration and management
- Providing institutional support and office equipment to make work easy for the groups.
  Providing capacity building for government officers on the promotion of agroforestry system (technical representative includes foresters, soil conservation officers, agriculture extension officers, local government planners, etc.) -3days (residential)

Strategies:

- Establishing Farmer Field School (FFS) for convincing the community, and learnings, particularly for the marginalized community dependent on river claimed land for seasonal livelihood activities
- Establishing agroforestry activities with agroforestry nursery
- Promoting the existing groups if available; otherwise, formulating farmer groups (Agricultural Forestry Groups for efficient operation) in the hotspots by promoting gender with a clear role of women as an integral part of the agroforestry system to obtain optimal benefits ensuing at different stages of agroforestry intervention.
- Assuring women's participation by 50% from the beginning of the agroforestry system establishment
- Establishing tree woodlots for firewood, fodder, building materials

- Linking the AF system with income generation of women and marginalized community
- Increase farmers' access to market information and commercialization of AF products
- Developing a strong coordination with the local governments to promote agroforestry in public land
- Assuring water availability
- Potential trees and agriculture species for agroforestry system in the river system are: Multi-year crops-mixed cropping, fodder and grass with trees
- Enhancement of soil fertility by planting nitrogen fixing species of forest and agriculture (multi-year crops-mixed cropping, fodders and grass with forest trees)
- Clearing land demarcation between private/public (ownership of the lands-private and public lands);
- Requiring feasibility assessment for the finalization of agroforestry systems to be implemented in the hotspots once the baseline study report is ready.

The following species are potential in the river system:

- Fruit/Citrus species: *Bel (Aegle marmelos), Bayer (Ziziphus mauritiana), Mango(mangifera indica)*, Lemon, Legume crops, Papaya, Banana, Oal, Sugarcane, Katahar (*Jackfruit*), Lichi (Lychee), Banana,
- Spices species: Tejpat (*Cinnamomum tamala)*, Timbur, Ginger/turmeric, Chilly,
- Fodder: Neem (*Azadirachta indica*), Kimbu(*Morus alba*), Bakaino (*Melia azedarach*), Moringa (*Moringa oleifera*), Koiralo (*Bauhinia Variegata*), Kus or vetiver (*Vetiveria zizanioides), Amriso/broom grass (Thysanolaena maxima), , Babiyo(Eulaliopsis binata) Nimaro (Ficus roxburghii),*
- Multipurpose: *bamboo (Bambusa vulgaris)* Amala (*Phyllanthus emblica*), Jamun (*Syzygium cumini*), Khayar (*Acacia catechu*) Satisal (*Dalbergia latifolia*), Harro (*Terminalia chebula*), Barro (*Terminalia bellirica*)

Objective:

- Diversify agricultural land production for generating livelihoods.
- Enhance soil nutrition in river-claimed lands.
- Promote timber and fuel wood production from improved agroforestry systems.
- Enhance the income-generating capacity of marginalized and vulnerable communities.

Incentives for participation & changing stakeholder practices:

- Developing a provision for the lease of lands to interested farmer groups in public lands where BRCRN work.
- Facilitating the easy access to desirable forest species for plantation.
- Making provisions for providing incentives ensuring the participation of women, IPs and marginalised people in training activities.

Outputs, Activities and sub-activities

Activities	**Sub-Activities**	**Sub-Activity Area code**
Output 4: Farmers are skilled in using climate-resilient land use practices.		
Activity 4.1 : Established	4.1.1 Establishing Agroforestry Nursery (1) in Karjanha Municipality-7	A225

agroforestry activities through group systems (1 agroforestry group) agroforestry activities	4.1.2 Establishment of AF activities in the potential areas (76 ha. of river abandoned land) Karjanha Municipality-7	A45
	4.1.3 2 Agro-Forestry Group committee established	
	4.1.4 2 Agro-Forestry Group received institutional support and office equipment.	
	4.1.5 Coordination meeting as a part of 30 monitoring and evaluation (5 years)	
Activity 4.2: Capacitated communities'/farmer groups and government officers to promote agroforestry system	4.2.1 Training for AFG members on administration and management (60 AFG members from 2 AFG)	
	4.2.2 Training on improved AF practices (60 AGF members)	
	4.2.3 Providing capacity building for government officers on the promotion of agroforestry system	
	4.2.4 Audio/visual aids-dissemination of AF program	

Budget Plan -5 years (NPRs)

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.

Activity	**Unit**	**Quantity**	**Unit Costs**	**Budget (NPr)**	**Remarks**
Output 4: Farmers are skilled in using climate-resilient land use practices.					
Activity 4.1 : Established agroforestry activities					
4.1.1 Establishment of Agroforestry Fodder Nursery	No.	1	500,000	500,000	Cost Include tunnel-protection measures
4.1.2 Purchasing seedlings of horticulture species for agro-forestry focus on multiyear seedling production	No.	10,000	200	2,000,000	Multiyear seedling nursery on horticulture
4.1.3 Support agroforestry activities in the potential lands	ha	76	500,000	38,000,000	Transportation, fertilizer, support for matching fund,
4.1.4 Irrigation facility (small	No.	2	500,000	1,000,000	Shallow tubes/water harvesting dam-cutoff wall chamber /water

irrigation facility)					boring/ improvement of water source in collaboration with municipal government
4.1.5 Formation of AFG focusing on women farmers	No.	2	30,000	60,000	
4.1.6 Institutional support and office equipment for women group	No.	2	200,000	400,000	
4.1.7 Coordination meetings (5 years)	No.	10	25,000	250,000	Two meetings/ year/ Group
Subtotal				**42,210,000**	
Activity 4.2 Capacitated communities'/farmer groups and government officers to promote agroforestry system (2 AFG)					
4.2.1 Training for agroforestry groups on sustainability, principle of administration and management-3 days residential	persons	60	30,000	1,800,000	60 person
4.2.2 Training on improved AF practices (promotion for small enterprises for the production)-5 days residential	persons	60	30,000	1,800,000	
4.2.3 Providing capacity building for government officers on the promotion of agroforestry system-3days residential	events	3	500,000	1,500,000	For 5 years
4.2.4 Support on production and dissemination of success stories AF system replication	No.	1	500,000	500,000	Dissemination for 5 years
Subtotal				**5,600,000**	

Total	**47,810,000**	The total estimated budget is to be varied once the detailed technical feasibility is completed in coordination, especially with municipal governments. Thus, a strong collaboration (with a MoU) is needed with the concerned municipal government and soil conservation offices

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

Feasibility analysis

Activities	**Risks or obstacles**	**Risk reduction measures**	**Risk reduction targets**	**Indicators**
Capacitated communities'/farmer groups to promote agroforestry system and Established agroforestry system and well-functioning through agroforestry group				
Establish Agroforestry Groups (AFG)	• Flash flood damages the AF activities. • Clearing land demarcation between private/public	• Needed river bank and gully stabilization (spur and embankment, bamboo plantation along the bank) • Approval of guideline from local unit to use river side land.	• 76 ha river abandoned land converted to AF activities adopting customary land practices for risk reduction approach.	• Hectares river side land converted to AF activities.
	• Actual beneficiaries (IPS, dalit, marginalized groups) may exclude from AGF committee.	• Assurance of actual beneficiaries.	• 2 AFG committee established	• No. of AFG committee established
Train on cooperative principles, administration and management	• Participants may not have interest to receive training • Training event may not match with leisure of participant especially women with household duties (morning and evening).	• Provide DSA and transportation allowances to the participant. • Training period selected as per the demand of participants. • Selection of venue from	• 60 AFG member trained on, administration and management	• No. of AFG members trained

		consultation with participants • Residential training		
Support institutional support and office equipment.	• Insufficient support and office equipment	• Assure sufficient support and quality equipment.	• 2 AFG received institutional support and office equipment.	• No. AFG received institutional support and office equipment.
Train AFG members trained on improved AF practices	• Participants may not have interest to receive training	• Provide DSA and transportation allowances to the participant.	• 60 AFG members trained on improved AF practices.	• No. of AFG members trained on improved practices.

Safeguard analysis

Risks	**Risk reduction measures**	**Risk reduction targets**	**Indicators**
Reduction in indigenous crops that are staple food of poor	• Implement multi-level AF practices with a focus on indigenous crops.	• 60 HHs consuming indigenous crop products from AF systems	• % of total AF area under hybrid/exotic species cultivation
Elite capture of grants	• Establish a transparent grant approval with more engagement of vulnerable and marginalized communities • Strong Monitoring & reporting mechanism.	• 60 poor/marginalized HHs receiving grants	• No. of poor/marginalized HHs receiving AF grants
Biodiversity risk due to hybrid/exotic species replacing indigenous species	• At least 50% of trees in AF extension/credit packages are indigenous species.	• % of total AF area under hybrid/exotic species cultivation	• Grants & input provision with at least 50% indigenous species
Benefits	**Benefit enhancement measures**	**Benefit enhancement targets**	**Indicators**
Livestock based livelihood will be promoted	Fodder plantation	50 % of the fodder plants used	Proportion of the fodder plant used
Horticulture promotion	Linkages of private nursery for horticulture seedling. It will promote private forest	50 % of the linkages with private nursery	Proportion of the linkages of private nursery for horticulture seedlings

IPack 4: Climate resilient agriculture and land use practices

Drivers and general descriptions: This IPack is proposed to address the following key drivers and underlying causes for building climate resilience of small farmers by supporting climate resilient farming practices and adaptation measures in agriculture sector.

- **Climate induced multi-hazards (extreme temperature, frequent and intense rainfall, drought, floods, inundation) and Infestation of crop insects, pests, and diseases**:
- 3 FFS and around 969 ha of agricultural land are planned for Climate Resilient Agriculture (CRA), representing with the codes (A270, A266, A267, A268, A269)
- The potential three-FFS (with respect to hotspot to climate extremes, crop varieties with different problems, farmer willingness, and access) are listed to estimate the budget.
- For example:
  - Rice crop:sheath blight
  - Vegetables: Blight disease in potato
  - Pest and disease affecting intercropping practices
- **Inefficient irrigation facilities :** Farmers suffer from irregualr irrigation facility due to the deplation of water source and heavily riverbed raised causes impacts of irrigation heads and lacks of surface water flow in the river ssytem.
- **Lack of improved seeds and fertilizers**: Farmers have a lack of knowledge and information about the availability of agricultural inputs, including quality seeds, agriculture production, and market and marketing costs of different commodities. As a result, the willingness of farmers in agriculture is becoming insufficient.
- **Inadequate climate agricultural adaptive practices** : Farmers suffer from having inadequate decision-making support on how to provide agricultural inputs in changing weather systems and seasonal changes. Furthermore, the effective application of climate resilient agriculture technologies and practices on crops and the environment can improve vulnerable and marginalized farmers' coping and adaptation capacity, as well as increase crop and vegetable production and productivity through FFS approach,
- **Lack of support for livestock management practices**: livestock management in the river system is inadequate .

The potential key activities include:

a. Establishment of 3 FFS to provide skill, knowledge and improved agriculture practices to address

b. following problems related to pest and diseases in different crops in the river system:

   - FFS on vegetables (Blight disease in potato) in Mirchaiya Municipality-9
   - FFS on Rice crop-sheath blight in Kalyanpur Municipality-7
   - FFS approach in Intercropping in Mirchaiya Municipality-9

c. Capacity-building training in the use of weather information and its application in agricultural practices;
d. Capacity building on livestock management practices
e. Support to farmers for seed production (improved seeds for climate induced disaster resilient varieties) in the location where the FFS approach is to be adopted in potato) in Mirchaiya Municipality-9 (for 3 years)

f. Provide training to adopt and apply climate resilient landuse practices (for examples: compost manure preparation, mulching, water retention capacity, green manure).
g. Promote women on income generation activities (for example: intercropping in fruit Crops-Mango orchard with spice crops-ginger, turmeric in downstream or legumes and Banana with legumes/spice crops in upstream) to ensure their incomes in off seasons and also throughout the year
h. Support to farmers' sensitization to save agricultural practices and production from wildlife threats such as wild boar, monkey, blue bull, and antelopes.
i. Support to link farmers with the local market centers and market information;

Objective

- Improve farmers' coping and adaptation capacity to adopt to weather stress, manage crop pest and disease
- Increase agricultural productivity and improve livestock management practices;
- Enhance local technology in irrigation improvements
- Increase farmers' access to markets and enhance incomes of marginalized farmers;

Strategies:

- Working with at least 25 farmers in each group to establish FFS;
- Increasing the capacity of FFS members, including women and IPs, in group dynamics, FFS administration, demonstration of climate-resilient technology and practices, improved tools and equipment, and marketing-related aspects
- Establishing FFS to enhance and disseminate climate resilient farming technologies and practices and build farmers' capacities to be climate resilient;
- Enhancing FFS members' capacity to give site demonstrations of relevant technologies and practices to other farmers in their community, and
- Introducing climate-resilient varieties of crops (drought and flood-tolerant varieties)

Incentive for participation & changing stakeholder practices

- Farmers benefit directly from increased crop and vegetable production and productivity as a result of the use of climate-resilient farming practices.
- Increased access to quality inputs, particularly seeds and established linkage of the production system with the market;
- Enhanced participation of IPs, women, and poor and marginalized farmers in capacity-building activities on farms and fields

Output, Activities and sub-activities

Output/Activities	Sub-Activities	Sub-Activity Area code
Output 4: Farmers are skilled in using climate-resilient land use practices.		
Activity 4.3 **:** Established three FFSs and increased farmers' ability in seed production in Mirchaiya Municipality-9 and Kalyanpur Municipality-7	4.3.1 Establish 3 FFSs on the crops listed above, 4.3.2 Capacity building on livestock management practices 4.3.3 Support to farmers for seed production (improved seeds) through FFS approach in Potato crop (for 3-years)	A17, A95, A158
Activity 4.4 Enhanced farmers'	4.4.1Capacity building trainings on using	

capacity in climate resilient farming practices	weather information and its application skills in farming practices; 4.4.2 Engage women (particularly Dalits, IPs, Madhesi and vulnerable people) in intercropping farming 4.4.3 Provide training to adopt and apply climate resilient land use practices (for examples: compost manure preparation, mulching, water retention capacity, green manure, Sesbania manure); 4.4.4 Support to link farmers with the local market centers and market information;	
Activity 4.5 : Increased coping strategies for wildlife depredation in crops	4.5.1 Support to farmers' sensitization to save agricultural practices and production from wildlife threats	

Budget Plan (5 years)

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-Activity	Unit	Quantity	Unit Costs	Budget (NPr)	Remarks
Activity 4.3: Established three FFSs and increased farmers' ability in seed production.					
4.3.1 Establish 3 FFSs	No.	3	350,000	1,050,000	3 locations (referred in the area code)
4.3.2 Capacity building on livestock management practices-sheds improvements crop depredation by wildlife	No.	3	200,000	600,000	At 3 locations of FFS
4.3.3 Support to farmers for seed production (Potato) through FFS approach	No.	1	600,000	600,000	For 3-years for crops-potato in Mirchaiya in collaboration with AKC and municipal government
Sub-total				**2,250,000**	
Activity 4.4 : Enhanced farmers' capacity in climate resilient farming practices					
4.4.1 Capacity building trainings on using weather information and its application skills in	No.	3	200,000	600,000	In collaboration with Nepal Agriculture

farming practices;					Research Center (NARC), AKC
4.4.2 Promote women for income generation activities through inter-cropping farming in upstream and downstream	No.	2	500,000	1,000,000	
4.4.2 Provide training to adopt and apply climate resilient land use practices (for examples: compost manure preparation, mulching, water retention capacity, green manure,	Events	3	300,000	900,000	With demonstration for the FFS locations
4.4.3 Support to link the farmers with the local market centers and know the market information;	No.	3	200,000	600,000	produce market linkage—link with municipal level AKC's Unit
Sub-total				**3,100,000**	
Activity 4.6 Increased coping strategies for wildlife threats in crops					
4.6.1 Sensitization orientation on wildlife threats and risk reduction in agriculture	No.	3	300,000	900,000	At Municipality levels in upstream and downstream for vulnerable farmers
Sub-total				**900,000**	
Total				**6,250,000**	

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

Feasibility analysis

IPack outputs/ activities	**Risks or obstacles**	**Risk reduction measures**	**Risk reduction targets**	**Indicators**
Activity 1: Established four FFSs and increased farmers' ability in seed production				
Establish 3 FFSs on the listed crops	Lack of priority about FFS in local government policy and programs ;	Continuous coordination with Palikas and promote them to incorporate FFS approach into their plans and programs	Providing knowledge through FFS approach to farmers-directly to more than 75 farmers in the river system by adopting basic aims of FFS (skill development, empowerment, will power and capacity of decision making)	Number of FFS for different crops in four locations in the river system established
Develop and use FFS manuals of respective crops	Lack of crop focus guidelines/manuals of local	Adoption of available manual recommended by	Developing decisions making capacity of marginalized HHs	Number of farmers capacitated

IPack outputs/ activities	Risks or obstacles	Risk reduction measures	Risk reduction targets	Indicators
to address the major drivers	governments to address the drivers and to function and sustain the FFSs	FAO system and other institutions in the local contexts	(indirectly 750 farmers=25X10X3) on how to deal with impacts of climate change and crop pests and diseases with weather conditions in crop growth and development	
Support in irrigation system to address the impacts of water stress and increase farmers skill in FFS approach	Even though FFS is innovative approach, farmers interest is more focused on to have assured irrigation in wet and dry periods	Ensure irrigation service regularly in both seasons in collaboration with local governments and make the FFS approach effective	Supporting 50% of vulnerable farmers in FFS by providing support for small irrigation structures	Number of vulnerable farmers supported for small irrigation structures
Support farmers to link with the market centers and obtain market information	Poor access to market information and limited financial resources for the development of market centers and road networks	Disseminate market and other information during FFS conduction and link farmers with local FM radio and local government information units	Placing display boards (at 3 places where the FFS established)	Number of display boards placed
Output 2: Capacitated farmers in climate resilient agriculture practices				
Build coping capacity of marginalized farmers, including women in seed production	Poor accesses to quality and variety of seeds Often priority is given only to elite farmers not to marginalized farmers in capacity building Lack of modern tools and knowledge with equipment for seed production	Promote seed production program to increase production productivity and enhance commercial vegetable production Increase labor productivity, reduce cost and labor on women through the adoption of modern tools and equipment	Starting with 25 women farmers in seed FFS and building their capacity so that they can further disseminate technology to 500 new women farmers (25 *10) for upscaling the seed production technology;	Number of women farmers trained for quality production

IPack outputs/ activities	Risks or obstacles	Risk reduction measures	Risk reduction targets	Indicators
Provide technical weather information and its application skills in farming practices	Lack of producing weather forecasts information at farm level, resulting to obstruct in its applications in decision making process	Adopt existing weekly agromet bulletin published by NARC and customize the advisory in local context	Building capacity of 750 FFS (25*10*3) farmers and 250 women seed producers and they are able to take decision making in agriculture practices and applications of technologies and skills and learnings to adopt to climate change and cope with insect pest and diseases problems	Number of farmers able to cope with climate change in agriculture
Provide training on improved compost manure preparation	Weak willingness of farmers to pay attention in the compost manure preparation (vermicomposting) due to lack of knowledge and skilled technical persons at local level. Lack of financial resources- for materials and equipment, complex in processes, environmental problems-odors and dust	Encourage women farmers and vulnerable farmers by providing technical and financial supports through the project in making compost in the field	Providing trainings on preparation of compost manure for 75 persons, comprising women, Indigenous People (IPs), Dalit and other vulnerable and marginalized people	Number of persons trained and become trainer or training (ToT)

Safeguard analysis

	Activities	Social & Environmental risk	Risk reduction measures	Risk reduction targets	Indicators
Activity 1: Established three FFSs and increased farmers' skill in seed production					
	Establish 3 FFSs on crops	• Low participation of women, Dalits and IPs during group	• Maximum involvement through capacity building and awareness	• 50 % women, 13 % Dalit and 31 % Indigenous	• % of Dalit, Indigenous Peoples and women in

		formation • Change in agriculture practice might have negative impacts on some members • Inadequate options for women to participate in the programme • Pesticide toxicity	• Capacity building training to the marginalized groups and prioritizing the communities linking crop cycle and disease cycle • Need to integrate daily allowances to manage opportunity cost ; • Enhancement for women interest with their suitable time to participate in the programme (appropriate time is afternoon for women's involvement in the capacity building activities) • Mapping out groups working/involving in the river system to enhance existing groups capacity • Use of Integrated Pest Management (IPM) practices	Peoples are included in the group	the group
	Support to link farmers with the market centers and market information	• Lack of sufficient market information and authentic data on market • Variation in market pricing of agriculture products	• Confirmed participation of local authorities (local government) in cooperation with local communities	• Identified all the possible market areas of the river system • Fixed pricing of the agriculture products	• Number of market centers
Activity 2: Capacitated farmers in climate resilient farming practices					

	Capacity building trainings on using weather information and its application skills in farming practices	Difficulty in understanding weather technical terminologies Women, indigenous peoples, and Dalits, may face obstacles	Ensure participation and active involvement	50 % women, 13 % Dalit and 31 % Indigenous Peoples are included in the group	% of Dalit, Indigenous Peoples and women in the group
	Provide training to adopt and apply climate resilient landuse practices	•Women, indigenous peoples, and Dalits, may face obstacles	Ensure participation and active involvement	50 % women, 13 % Dalit and 31 % Indigenous Peoples are included in the group	% of Dalit, Indigenous Peoples and women in the group

Benefits	**Benefit enhancement measures**	**Benefit enhancement targets**	**Indicators**
Promote small farmers	Promotion of organic manure, Integrated Pest Management	lands fertile and improved for high production	# ha of lands fertile
Increased productivity	Enhanced soil fertility Reduced damage due to pest and disease infestation Increased decision making in climate informed agricultural practices	Farmers decision with climate informed	# no of farmers able in decision making practices as changes of weather # production increased

Ipack 5: Advocacy campaign: Gender-inclusive governance for SNRM
Drivers

- Lack of gender integration in governance (planning and implementation)
- Social norms and values
- Women lack access and resources
- Lack of resources
- Gender has to be top-priority in the governance of all structures
- Lack of transparency regarding gender and marginalized groups.
- Inadequate budget for gender related projects and activities.
- Exclusion of women and marginalized groups in governance.
- Inadequate interest and motivation of concerned institutions regarding gender.

General Description

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.

Activities include:

- Developing and implementing awareness-raising sessions targeting government, civil society, grassroots organizations, and rural communities.
- Create informal learning and sharing platforms for grassroots-level women by utilizing local schools, eco clubs, and youth associations.
- Collect local-level best practices for learning and policy influence to ensure gender responsiveness and women's participation, access, control, and leadership.
- Provide gender mainstreaming training/ workshops to local government and CBOs
- Conduct GESI-focused social audits and public hearings

Objectives

- Increase women's leadership in NRM, CCA, and DRR
- Building women's knowledge and skills in natural resource conservation and management Increase women's participation in decision-making forums
- Increase the commitment of local stakeholders, decision managers, and local representatives/leaders to gender equality and women's empowerment.
-

Strategies

Build network among women and women-led organizations for an enabling environment. And increase male engagement in the advocacy campaign.

Incentive for participation

- 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.

1. General information of Intervention Package (Ipack)

IPack 5: Advocacy campaign: Gender-inclusive	Lack of gender integration in SNRM, CCA, and DRR	The underrepresentation of women in the decision-making process has resulted in	• Increase awareness of gender equality and promote women's empowerm	• Raise awareness about gender issues and the advantages on gender equality for	• Increase women capacities, leadership and agency, • Include transformative gender activities

governance for SNRM and Resilience	planning and implementation process	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.	ent. • Increase women's leadership in SNRM, CCA, and DRR • Building women's knowledge and skills in resource conservation and management Increase women's participation in decision-making forums	sustainable socio-economic development that benefits not only women, but also whole societies. • Build a network of allies and supporters of gender equality aiming to create an enabling environment when gender equality and women's rights can flourish • Build network among women and women-led organizations for an enabling environment.	at community level, community radio, flyers, training targeting men and women, etc • Consider women's convenience while setting meeting agenda and venue. • Provide transportation costs for attending the trainings. • Ensure that women are aware of meeting or activities in an appropriate way. • Provide opportunity to participate in learning events /platforms for women leaders and women champions.

2. Outputs and activities

Intervention packages	Outputs	Activities and sub activities
IPack3: Advocacy Campaign: Gender-inclusive governance for SNRM and Resilience	**Raise awareness campaign on gender issues for both men and women with a special focus on men to engage as allies**	1. Developing and implementing awareness-raising sessions targeting government, civil society, grassroots organizations, and rural communities (includes preparing a strategy with issues, objectives, actions/products) i. Prepare and disseminate short videos on gender and governance, SNRM, and climate resilience in the river system. ii. Prepare community radio programs and short messages, PSA (public service announcement), radio jingles on gender and governance, SNRM, and resilient by utilizing local radio. iii. Prepare drama and role play by involving local

	Integrated gender equality in local planning, implementation to contribute in SNRM and climate resilience	school/eco club in awareness-raising campaigns on SNRM, gender inclusive governance, and youth involvement for climate resilience. iv. Engage males, especially stakeholders of the river system, and involvement in advocating gender and women's issues and concern through awareness-raising activities by eco-club. The activity should be conducted during the day celebration: women's day, environment day, Indigenous people's day, Churia day, etc. v. Create informal learning and sharing platforms for grassroots-level women by utilizing local schools, eco clubs, and youth associations. 2. Collect local-level best practices for learning and policy influence to ensure gender responsiveness and women's participation, access, control, and leadership. This should be linked with project level activity- collecting community and indigenous knowledge collection packages-compendium development. 3. Provide gender mainstreaming training/ workshops to local government and CBOs and concerned stakeholders. The activity should be linked with project level activity: building capacity of project implementer, government staffs and other stakeholders. 4. Conduct GESI-focused social audits and public hearings to understand the allocation of gender-responsive activities, budgeting, and implementation concerning GESI-inclusive practice at local level.

3. Feasibility analysis

Activities		Activities Risks and obstacles	Risk reduction measures	Indicators
• **IPack3: Advocacy Campaign: Gender-inclusive governance for SNRM and Resilience**				
Increased access of women to NRM/ CRLUP and management knowledge and information.	5. Developing and implementing awareness-raising sessions targeting government, civil society, grassroots organizations, and rural communities (includes preparing a strategy with issues, objectives, actions/products)	Social norms and values restricting women to participate and give time for informal learning and sharing platforms. Women and youth lack access and resources about local level policies making them vulnerable. Lack of resources	Identification of social and structural barriers faced by women through sensitization measures Awareness and sharing of policies. Ensure availability of resources.	Social norms and barriers that prevent women's participation are identified. 3 videos developed. 3 dissemination activity in the river system. Event/ activity report At least 70% of target population participated.
	vi. Prepare and disseminate short videos on gender and governance, SNRM, and climate resilience in the river system.		Raise awareness about long-term benefits of information dissemination.	At least one report containing five best practices published and disseminated. 50 radio programs in local language
	vii. Prepare community radio programs and short messages, PSA (public service announcement), radio jingles on gender and governance, SNRM, and resilient by utilizing local radio.		Raise awareness about long-term benefits, social prestige.	Number of events between institutions and women groups/ CBOs. 3 drama and event conduct in the river system.
	viii. Prepare drama and role play by involving local school/eco club in awareness-	Inadequate interest and motivation of concerned institutions.		

	raising campaigns on SNRM, gender inclusive governance, and youth involvement for climate resilience. ix. Engage males, especially stakeholders of the river system, and involvement in advocating gender and women's issues and concern through awareness-raising activities by eco-club. The activity should be conducted during the day celebration: women's day, environment day, Indigenous people's day, Churia day, etc.	Less priority		4 events conduct in the river system. 50 % of male participation engaged. Frequency of male involvement in gender and women's issues and concerns.
Integrated gender in local planning processes in SNRM and climate resilience	2. Collect local-level best practices for learning and policy influence to ensure gender responsiveness and women's participation, access, control, and leadership. This should be linked with project level activity- collecting community and indigenous knowledge collection packages-compendium development.	Inadequate budget	Explore budget availability.	Assessment reports. 2 Best practices collected.
	3.Provide gender mainstreaming training/ workshops to local government and CBOs and concerned stakeholders. The activity should be linked with project level activity:	Gender is not a priority.	Raise awareness about long-term benefits after participating in gender workshops/ workshops.	1 trainings conducted.

	building capacity of project implementer, government staffs and other stakeholders.			
	4. Conduct GESI-focused social audits and public hearings to understand the allocation of gender-responsive activities, budgeting, and implementation concerning GESI-inclusive practice at local level.	Lack of transparency. Inadequate budget. Exclusion of women and marginalized groups.	Increase practices for transparency through networking meetings, regular meetings. Policy guidance for ensuring intersectionality in social audits and public hearing. Adopt participatory tools for public hearing such as roleplays.	1 event conducted. Percentage of women including Dalits and Ips participation. Number of issues raised on intersectional issues.

5. Safeguard Analysis

Safeguard analysis (risk)

Outputs	Activities	Social & Environmental risk	Risk reduction measures	Risk reduction targets	Indicators
Increased access of women to SNRM and increase resilience.	1. Developing and implementing awareness-raising sessions targeting government, civil society, grassroots organizations, and rural communities (includes preparing a strategy with issues, objectives, actions/products) x. Prepare and disseminate short videos on gender and governance, SNRM, and climate resilience in the river system. xi. Prepare community radio	• Social changes not acceptable by some men and women of the society and IPs not inclusive	• Promotion of women, IPs, Dalit and marginalized groups • Advocating GESI and women's issues among male and inform on transformative change and recognizing women's voice for change, reduce GBV	• Informal learning and sharing platform benefited by grassroots level women, IPs, Dalits and marginalized groups • % of CBOs and women groups made aware on gender responsive information and access to resources increased • % of male engagement in GESI and women's issues	• At least 30% of Grassroots level women, IPs, Dalits and marginalized empowered • Gender responsive information and availability access made easy • Male involvement increased

	programs and short messages, PSA (public service announcement), radio jingles on gender and governance, SNRM, and resilient by utilizing local radio. xii. Prepare drama and role play by involving local school/eco club in awareness-raising campaigns on SNRM, gender inclusive governance, and youth involvement for climate resilience. xiii. Engage males, especially stakeholders of the river system, and involvement in advocating gender and women's issues and concern through awareness-raising activities by eco-club. The activity should be conducted during the day celebration: women's day, environment day, Indigenous people's day, Churia day, etc.	• Men not interested in social change and not supportive too • Women participation not ensured in SNRM/CRLUP and management. • 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	help change the social norms and values	in advocacy of GESI and women's issues and minimized social disparities
	2. Collect local-level best practices for learning and policy influence to ensure gender responsiveness and women's participation, access, control, and	• 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	• 50% men and women know about the GESI policy and integration strategies	• Province and local level policy reviewed

	leadership. This should be linked with project level activity-collecting community and indigenous knowledge collection packages-compendium development		the GESI initiatives		
	3. Provide gender mainstreaming training/ workshops to local government and CBOs and concerned stakeholders. The activity should be linked with project level activity: building capacity of project implementer, government staffs and other stakeholders.	• Gendered governance restricting women to participate. • Women participation in NRM sectors can pose threat to social change	• Document of good and best practices in gendered governance that has minimized social discrimination and women empowered reducing GBV as well	• Gendered governance best practices documented, and learning shared for social change	• Best practices in gendered governance documented and published
Integrated gender in local planning processes in SNRM and resilience.	4.Conduct GESI-focused social audits and public hearings to understand the allocation of gender-responsive activities, budgeting, and implementation concerning GESI-inclusive practice at local level.	Women not being empowered could hinder their participation. Leadership discrimination among women and elite captures GESI not prioritized. Inclusive transparency and practices limited and not prioritized	Rapid assessment on women's contribution and involvement in NRM/CRLUP and management to be conducted and shared for minimizing social barriers. Trainings to be provided to mainstream gender increasing the trend of preparing action plans as GESI priority. Regularly conduct GESI focused audits and public hearing to	% of women's contribution and involvement analyzed and further plans developed % of understanding level and mainstreaming of GESI well adopted % Of local institutions practice GESI focused social audits and public hearing for social and strong governance practice	Rapid assessment conducted. GESI mainstreaming training and workshops raised awareness. GESI focused social audit and public hearing conducted regularly

			increase transparency and good governance		

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.

Output 5: Advocacy Campaign: Gender-inclusive governance for SNRM and Resilience				
Activity 5.1				
5.1.1 Developing and implementing awareness-raising sessions targeting government, civil society, grassroots organizations, and rural communities (includes preparing a strategy with issues, objectives, actions/products)	Event/episode	Activity/episode/events	Amount	Total
5. Prepare and disseminate short videos on gender and governance, SNRM, and climate resilience in the river system.	Event	3	150,000	4,50,000
5.1.2 Prepare community radio programs and short messages, PSA (public service announcement), radio jingles on gender and governance, SNRM, and resilient by utilizing local radio.	Episode	50	10,000	500000
5.1.3 Prepare drama and role play by involving local school/eco club in awareness-raising campaigns on SNRM, gender inclusive governance, and youth involvement for climate resilience.	Event	3	50,000	150,000
5.1.4 Engage males, especially stakeholders of the river system, and involvement in advocating gender and women's issues and concern through awareness-raising activities by eco-club. The activity should be conducted during the day celebration: women's day, environment day, Indigenous people's day, Churia day, etc.	Event	4	100000	400000
5. Create informal learning and sharing platforms for grassroots-level women by utilizing local schools, eco clubs, and	Event	2	40,000	80,000

youth associations (number of event-.				
5.2 Collect local-level best practices for learning and policy influence to ensure gender responsiveness and women's participation, access, control, and leadership. This should be linked with project level activity- collecting community and indigenous knowledge collection packages-compendium development.	Event	3	20,000	60,000
5.3 Provide gender mainstreaming training/ workshops to local government and CBOs and concerned stakeholders. The activity should be linked with project level activity: building capacity of project implementer, government staffs and other stakeholders.	Event	1	150,000	150,000
5.4 Conduct GESI-focused social audits and public hearings to understand the allocation of gender-responsive activities, budgeting, and implementation concerning GESI-inclusive practice at local level.	Event	1	1,00000	1,00000
Total Budget (NRs)				**18,90,000**

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

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	Output 1 Natural forest ecosystems are better maintained and protected within	3	2	2	3	3	13

	the project area						
	Output 2: Forests and tree cover are restored and maintained in the river system landscapes	2	2	3	2	2	11
Ipack 2	Output 3: Local structures are enhancing resilience against climate change induced erosion, sedimentation and flooding risks	2	2	2	3	3	12
Ipack 3:	Output 4: Farmers are skilled in using climate-resilient land use practices.	3	3	3	2	3	14
Ipack 4:	Output 4: Farmers are skilled in using climate-resilient land use practices.	3	3	3	2	3	14
Ipack 5	Output 5: Integrated Gender inclusive governance ensured in Natural resource management and increased access of women to NRM/ CRLUP	2	3	1	1	3	10

	and management knowledge and information.						

Monitoring and Reporting:

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

Expected Results	**Objectively verifiable Indicator**	**Baseline**	**Target**	**Means of verification**	**Assumptions**
Output1 natural forest ecosystems are better maintained and protected within the project area	Density of forest area in terms of biomass in the river systems.	Forest land total biomass: 136.02 ton/ha Other wooded land total biomass: 39.69 ton/ ha (Baseline survey report 2022)	Forest density increased by 2%	Baseline survey report Endline survey report	This river system has 1122.3 ha of forest and 656.4 ha of other wooded land (Baseline survey report)
	Area (in ha.) of natural forest restored through ANR and enrichment plantation	0	At-least 421 ha of natural forest restored through ANR and enrichment plantation	PPMU/DFO records Maps Reports	CBOs adopt climate resilient land use practices River system has 656.4 ha of other wooded land (Baseline survey report)
	xx forestry user groups manage xx has of forest through updated forest management plan	0 forestry user groups manage 0 ha. of forest	Atleast 10 community forest user groups manage 2115 ha. of forest	DFO/Group/PPMU record	Community based forestry groups implement renewed forest management operational plan

Output 2 Forests and tree cover are restored and maintained in the river system landscapes.	Xx ha of new plantation outside forest area; and their survival rate (public land forestry and private forestry)	Area: 0 ha. Survival rate: NA	Area: At least 257 ha. Survival rate: 80%	Municipal /DFO/PPMU record Field verification Report	Local government supported and owned public land and private forestry initiatives under their own jurisdiction
Output 3: Local structures are enhancing resilience against climate change induced erosion, sedimentation and flooding risks.	Volume of sedimentation	0 cubic meter of soil volume per unit area	25% in comparison to before constructing structures	In-person assessments at lower gabions.	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 are skilled in using climate-resilient land use practices.	Ha. of agricultural land under climate resilient farming system	0 ha	32 ha agricultural land	FFS record PPMU 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 by the end of PY4 report that they have begun to apply project-promoted climate-resilient land use practices in the season following their training	Assessment 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. Advocacy campaign: Gender-inclusive governance	% of women in leadership positions of CBO's executive committee	25 out of 53 (47.2%) womens are in leadership position	At least 50% women in leadership position	DFO/Group record/PPMU	Proportional representation of all social groups ensured
	Access of women in Natural resources management, CRLUP, knowledge and information		At least 50% women participation in all events	Group record/PPMU record	Proportional representation of all social groups ensured
	Integrate gender in local planning processes in NRM/ CRLUP and management		At least 10 no.of Gender sensitive plan (To be decided)	DFO/Group/PPMU record	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.

Annexes:

Annex-1 Result Framework of Bataha Critical Ecosystem Restoration Plan

Vision: Climate resilient and sustainably managed Natural Resources and communities in Bataha River system (by 2040)

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 (proxi indicators 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 indicator**: Area of (1) Deforestation rate: (2) Sustainable forest management area: 0 ha (3) ANR area: 0 ha (4) Plantation area: 0 ha (5) Area of Climate Resilient Agriculture (CRA): 0 ha	**Proxy indicator**: Area of (1) Deforestation rate: 0 (2) Sustainable forest management area: 2115 ha (3) ANR area: 421 ha (4) Plantation area: 257 ha (5) Area of Climate Resilient Agriculture (CRA): 32	PPMUs/PMU report GCF/BRCRN GHG mitigation calculation tool-based calculation sheet	Total natural forest area in this river system is 1578.7ha including 1122.3 ha forest and 456.4 ha other wooded land (Baseline survey report 2022) Out of 1578.7 ha, 10 forestry user groups are managing 2115 ha forest area (CBO profile report 2022) CERP land use data shows changes in forest area between 2000 and 2019 is -572.6 ha. (deforestation rate: 1.76% per year)
GCF core indicator (Adaptation)	Total number of direct and indirect beneficiaries (gender disaggregated)	0	Direct (male: 4226, female: 4561)	Periodic reports PMU/PPMU record	CBOs adopt climate-resilient land use practices. In this river system,1824 HHs associated with forest user groups with 9087 population (4226

					male and 4561 female)
Outcomes					
M9.0 Improved management of land or forest areas contributing to emissions reductions	M9.1 Hectares of land or forests under improved and effective management that contributes to CO_2 emission reductions	0	At least 32 ha of climate resilient agricultural practices implemented At least 2115 ha of forest ecosystems sustainably managed At least 421 ha community-managed natural forests restored through assisted regeneration At least 257 ha of new planted forests established	Maps/remote sensing Project reports	Beneficiaries adopt climate- resilient land use practices
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	4526 men 4561women 9087 total	PMU/PPMU record	Beneficiaries are interested in adopting climate resilient land use practices. 1824 HH (9087 peoples) are members of forest user groups
Outputs					
Output1 natural forest ecosystems are better maintained and protected within the	Density of forest area in terms of biomass in the river systems.	-Forest land total biomass: 136.02 ton/ha Other wooded land total biomass: 39.69 ton/ ha (Baseline survey report	Forest density increased by 2%	Baseline survey report Endline survey report	This river system has 1122.3 ha of forest and 656.4 ha of other wooded land (Baseline survey report)

project area		2022)			
	Area (in ha.) of natural forest restored through ANR and enrichment plantation	0	At least 421 ha of natural forest restored through ANR and enrichment plantation	PPMU/DFO records Maps Reports	_River system has 656.4 ha of other wooded land (Baseline survey report)
	xx forestry user groups manage xx has of forest through updated forest management plan	0 forestry user groups manage 0 ha. of forest	Atleast 10 community forest user groups manage 2115 ha. of forest	DFO/Group/PPMU record	Community based forestry groups implement renewed forest management operational plan ~~Improved density of forest~~
Output 2 Forests and tree cover are restored and maintained in the river system landscapes.	Xx ha of new plantation outside forest area; and their survival rate (public land forestry and private forestry)	Area: 0 ha. Survival rate: NA	Area: At least 257 ha. Survival rate: 80%	Municipal /DFO/PPMU record Field verification Report	Local government supported and owned public land and private forestry initiatives under their own jurisdiction
Output 3: Local structures are enhancing resilience against climate change induced erosion, sedimentation and flooding risks.	Volume of sedimentation	Xx cubic meter of soil volume per unit area	25% in comparison to before constructing structures	In-person assessments at lower gabions.	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 are skilled in using climate-resilient land use practices.	Ha. of agricultural land under climate resilient farming system	0 ha	32 ha	FFS record PPMU 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 by the end of PY4 report that they have begun to apply project-promoted climate-resilient land use practices in the season following their training	Assessment report Progress 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. \ Advocacy campaign: Gender-inclusive governance	% of women in leadership positions of CBO's executive committee	25 out of 53 (47.2%) womens are in leadership position	At least 50% women in leadership position	DFO/Group/PMU/PPMU record	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	Progress report Group record, PMU/PPMU record	Proportional representation of all social groups ensured
	Integrate gender in local planning processes in NRM/ CRLUP and management	0	10 no. of Gender sensitive forest management plan	Progress report PMU/PPMU record	Gender dimensions ensured in climate resilient plan including forest management operational plan of groups

Activities:

Activities	Description	Sub-activities	Remarks
Output1 natural forest ecosystems are better maintained and protected within the project area			
Activity 1.1: Restoration of degraded natural forests		1.1.1 Construction/promotion of forest Nursery 1.1.2 Seedling production in Nursery (Multi-years' seedlings) 1.1.3 Enrichment plantation and regeneration management in degraded forest 1.1.4 Cleaning of existing fire line and existing trails 1.1.5 Construction/improvements of fencings in natural forest lands 1.1.6 Support on forest firefighting equipment/tools (21sets) 1.1.7 support on provisions for forest watcher 1. 1.8 Support on fodder-seedlings for fodder trees promotion 1.1.9 Linking with existing mobile app system from ICIMOD for forest fire monitoring and forest management (1 event) 1.10 Development of Community Based Forest Fire Fighting Groups (CB-FFFG) 1.11 Provide skilled-based training capacity for CBFFFGs on forest fighter trainings-forest fire control and management for (21*3) = 63 persons-firefighter trainings) for CFUGs/LFUGs 1.12 Provide 1-day orientation trainings for Herders on importance of forest services and management (300 herders/livestock owners); 1.13 Provide skilled-based trainings to promote compost and green manure preparation using forest based resources-bushes and leaf-litters-3 days training (one event for each CFUGs/LFUGs)	
Activity 1.2: Enhanced capacity of forest management stakeholders (government units, CFUGs, forest management CSOs, users)		1.2.1 Support on Forest Operational Plan (FoP) /reviews 1.13 Coaching on forest operational plan for forest users (210 events) 1.2.2 Develop Training of Facilitator (ToF) on Forest Resource Management -7days (10 persons) 1.2.3 Capacity building trainings on forest	

		management for government staffs (DFOs/ SDFOs) (1 event-3 days residential) 1.2.4 Provide refresher trainings for CFUGs/LFUGs in forest management-3 days for each CFUGs (non-residential) at local level 1.2.5 Celebration of Churia Conservation Day (5 events) at river system level 1.2.6 Facilitation on school course programme on sustainable forest management (1 event) 1.2.7 Production dissemination of sustainable management of natural resources 1.2.8 Facilitation support for alternative energy uses / biogas plants installation(400 HHs)	
Output 2 Forests and tree cover are restored and maintained in the river system landscapes.			
Activity 2.1: Enhanced forest land in river site areas (afforestation)		2.1.1 Plantation in river site area (forestry plantation) 2.1.2 Capacity building trainings for users on the management of plantation in river side areas	
Output 3: Local structures are enhancing resilience against climate change induced erosion, sedimentation and flooding risks.			
Activity 3.1 Conserved soil and water source and Improved water retention		3.1.1Landslide treatments 3.1.2Gulley stabilization in torrent stream (13 torrents) 3.1.3Terrace improvement (slope stabilization) 3.1.4Construction of conservation pond 3.1.5Improvement of existing pond 3.1.6Drinking water source improvement 3.1.7 Improvement of irrigation services 3.1.8 Construction of water harvesting structures (dams) 3.1.9 Riverbank stabilization 3.1.10 Wetland improvement	
Activity 3.2 Capacitated stakeholders and enhanced water and soil conservations		3.2.1 Skill based training for local community CFUGs/LFUGs on landslide and gullies stabilization with locally available treatment measures (21 events); 3.2.2 Orientation training on soil and water conservation measures for government officials 3.2.3 Support on demonstration visits on soil and water conservation programme 3.2.4 Sensitize on upstream and	

		downstream linkages for ecosystem services 3.2.5 Support on production and dissemination of success stories of water and soil conservation practices for possible replication	
Output 4: Farmers are skilled in using climate-resilient land use practices.			
Activity 4.1: Established agroforestry activities		4.1.1 Establishment of Agroforestry Fodder Nursery 4.1.2 Purchasing seedlings of horticulture species for agro-forestry focus on multiyear seedling production 4.1.3 Support agroforestry activities in the potential lands 4.1.4 Irrigation facility (small irrigation facility) 4.1.5 Formation of AFG focusing on women farmers 4.1.6 Institutional support and office equipment for women group 4.1.7 Coordination meetings (5 years)	
Activity 4.2: Capacitated communities'/farmer groups and government officers to promote agroforestry system (1 AFG)		4.2.1Training for agroforestry groups on sustainability, principle of administration and management-3 days residential 4.2.2 Training on improved AF practices (promotion for small enterprises for the production)-5 days residential 4.2.3 Providing capacity building for government officers on the promotion of agroforestry system-3days residential 4.2.4 Support on production and dissemination of success stories AF system replication	
Activity 4.3 established three FFSs and increased farmers' ability in seed production.		4.3.1 Establish 3 FFSs 4.3.2 Capacity building on livestock management practices-sheds improvements crop depredation by wildlife 4.3.3 Support to farmers for seed production (potato) through FFS approach	
Activity 4.4: Enhanced farmers' capacity in climate resilient practices		4.4.1 Capacity building trainings on using weather information and its application skills in farming practices; 4.4.2 Provide training to adopt and apply climate resilient land use practices (for examples: compost manure preparation, mulching, water retention capacity, green manure, 4.4.3 Support to link the farmers with the local market centers and know the market information;	

Activity 4.5: Increased coping strategies for wildlife threats in crops		4.5.1 Sensitization orientation on wildlife threats and risk reduction in agriculture	
5. Advocacy campaign: Gender-inclusive governance			
5.1 Increased access of women to NRM/ CRLUP and management knowledge and information.		5.1.1Create informal learning and sharing platforms for grassroots-level women 5.1.2 Conduct local level policy to ensure gender responsiveness and women's participation, access, control and leadership. 5.1.3 Produce and publish best practices and learnings in governance	
5.2 Integrated gender in local planning processes in NRM/ CRLUP and management.		5.2.1 Conduct rapid assessment on women's contribution and involvement in NRM/ CRLUP and management. 5.2.2 Provide gender mainstreaming trainings/ workshops to local government and CBOs and concerned stakeholders. 5.2.3 Conduct GESI focused social audits and public hearing. 5.2.4 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.	

Annex-2: Planned Activities, Location and Description

Note: The location coordinates of planned activity sites listed in table below are the result of participatory mapping exercise conducted with local stakeholders who demarcated the intervention location in the map with google image in background. Some of the locations (approximately 30% of the sites) are verified in the field for their accuracy and validity. However, due to time and resource constraint for field verification, all identified location coordinates are not verified in field. Hence, location coordinates mentioned in CERP activity sites need further field verification before the implementation. Locations are subjected to change as per the field findings and verification result. Intervention site coordinate mentioned in this CERP Annexes should be taken only as initial guidance to start the field process and, if they are found inappropriate during the field verification, the technical team from PPMU can conduct location changes with proper documentation of field condition.

SN	Activity	Location	Lat	Long	Code	Unit	Description
1	Fencing as Assisted Natual Regeneration	Mirchaiya Municipality-5	26.8495	86.24872	M230	1.7	Length (KM)
2	Fencing as Assisted Natual Regeneration	Karjanha Municipality-10	26.85673	86.21158	M232	2.0	Length (KM)
3	Fencing as Assisted Natual Regeneration	Mirchaiya Municipality-7	26.8571	86.2911	M164	4.9	Length (KM)
4	Fencing as Assisted Natual Regeneration	Karjanha Municipality-11	26.86369	86.20986	M231	1.0	Length (KM)
5	Fencing as Assisted Natual Regeneration	Mirchaiya Municipality-7	26.86768	86.26968	M228	4.6	Length (KM)
6	Fencing as Assisted Natual Regeneration	Mirchaiya Municipality-7	26.87111	86.30648	M227	2.8	Length (KM)
7	Fencing as Assisted Natual Regeneration	Mirchaiya Municipality-7	26.87785	86.29176	M226	3.1	Length (KM)
8	Assisted Natural Regeneration	Mirchaiya Municipality-9	26.86309	86.3018	M185	44.5	Area (Ha)
9	Assisted Natural Regeneration	Karjanha Municipality-11	26.8666	86.2041	M198	4.5	Area (Ha)
10	Assisted Natural Regeneration	Mirchaiya Municipality-7	26.86069	86.26814	M175	43.6	Area (Ha)
11	Assisted Natural Regeneration	Karjanha Municipality-10	26.85706	86.22006	M163	13.5	Area (Ha)
12	Assisted Natural Regeneration	Karjanha Municipality-11	26.86173	86.20828	M178	2.2	Area (Ha)
13	Assisted Natural Regeneration	Karjanha Municipality-10	26.85886	86.20699	M169	2.8	Area (Ha)
14	Assisted Natural Regeneration	Mirchaiya Municipality-5	26.86724	86.26865	M201	8.9	Area (Ha)
15	Assisted Natural Regeneration	Mirchaiya Municipality-5	26.87195	86.27147	M213	14.5	Area (Ha)
16	Assisted Natural Regeneration	Mirchaiya Municipality-7	26.86185	86.28593	M180	67.2	Area (Ha)
17	Assisted Natural Regeneration	Mirchaiya Municipality-7	26.87184	86.30157	M212	54.1	Area (Ha)
18	Assisted Natural Regeneration	Mirchaiya Municipality-7	26.878	86.28074	M217	9.6	Area (Ha)
19	Assisted Natural Regeneration	Karjanha Municipality-10	26.85311	86.23666	M145	30.9	Area (Ha)
20	Assisted Natural Regeneration	Mirchaiya Municipality-7	26.87346	86.28872	M214	67.0	Area (Ha)
21	Assisted Natural Regeneration	Mirchaiya Municipality-7	26.85884	86.29195	M168	4.0	Area (Ha)
22	Assisted Natural Regeneration	Karjanha Municipality-11	26.87123	86.19945	M210	0.2	Area (Ha)
23	Assisted Natural Regeneration	Karjanha Municipality-10	26.8575	86.2119	M165	2.6	Area (Ha)
24	Assisted Natural Regeneration	Karjanha Municipality-10	26.85966	86.20992	M170	4.8	Area (Ha)
25	Assisted Natural Regeneration	Karjanha Municipality-10	26.8528	86.21753	M144	2.1	Area (Ha)
26	Assisted Natural Regeneration	Karjanha Municipality-11	26.87153	86.2025	M211	3.2	Area (Ha)
27	Assisted Natural Regeneration	Karjanha Municipality-11	26.86951	86.20825	M205	2.1	Area (Ha)
28	Assisted Natural Regeneration	Karjanha Municipality-11	26.86959	86.2123	M208	2.7	Area (Ha)
29	Assisted Natural Regeneration	Karjanha Municipality-10	26.85832	86.2257	M167	10.7	Area (Ha)
30	Assisted Natural Regeneration	Karjanha Municipality-11	26.86448	86.20839	M192	6.0	Area (Ha)
31	Assisted Natural Regeneration	Mirchaiya Municipality-5	26.84772	86.24661	M126	18.1	Area (Ha)
32	Assisted Natural Regeneration	Karjanha Municipality-11	26.86956	86.20203	M207	1.0	Area (Ha)
33	Establishment of forest nursery	Mirchaiya Municipality-8	26.83424	86.27535	M235	1.0	Number
34	Establishment of forest nursery	Mirchaiya Municipality-12	26.79075	86.19072	M41	1.0	Number
35	Farmer Field School	Kalyanpur Municipality-7	26.79598	86.17687	A17	1.0	Number
36	Farmer Field School	Mirchaiya Municipality-8	26.83775	86.26773	A88	1.0	Number
37	Farmer Field School	Mirchaiya Municipality-9	26.84029	86.29416	A95	1.0	Number

38	Farmer Field School	Karjanha Municipality-11	26.84964	86.18216	A133	1.0	Number
39	Farmer Field School	Mirchaiya Municipality-7	26.85644	86.27374	A158	1.0	Number
40	Establishment of agroforestry nursery	Karjanha Municipality-7	26.82174	86.16736	A225	1.0	Number
41	Pond Improvement	Mirchaiya Municipality-3	26.80578	86.22173	A25	1.0	Number
42	Construction of conservation ponds	Mirchaiya Municipality-5	26.82221	86.24806	A49	1.0	Number
43	Construction of conservation ponds	Mirchaiya Municipality-6	26.82644	86.25741	A62	1.0	Number
44	Construction of conservation ponds	Mirchaiya Municipality-6	26.82732	86.25678	A65	1.0	Number
45	Pond Improvement	Mirchaiya Municipality-8	26.84088	86.27545	A97	1.0	Number
46	Pond Improvement	Mirchaiya Municipality-5	26.84211	86.24742	A103	1.0	Number
47	Pond Improvement	Mirchaiya Municipality-7	26.84248	86.26309	A105	1.0	Number
48	Construction of conservation ponds	Karjanha Municipality-10	26.85116	86.22508	A139	1.0	Number
49	Construction of conservation ponds	Karjanha Municipality-10	26.85998	86.20957	A172	1.0	Number
50	Construction of conservation ponds	Mirchaiya Municipality-9	26.86529	86.30076	A195	1.0	Number
51	Pond Improvement	Karjanha Municipality-11	26.86794	86.20266	A203	1.0	Number
52	Pond Improvement	Mirchaiya Municipality-7	26.86812	86.2922	A204	1.0	Number
53	Construction of conservation ponds	Mirchaiya Municipality-7	26.85975	86.29209	A219	1.0	Number
54	Construction of conservation ponds	Mirchaiya Municipality-7	26.85746	86.26476	A220	1.0	Number
55	Water harvesting structure (Dam)	Karjanha Municipality-10	26.85291	86.22729	A255	1.0	Number
56	Water harvesting structure (Dam)	Karjanha Municipality-10	26.86418	86.21346	A256	1.0	Number
57	Water harvesting structure (Dam)	Mirchaiya Municipality-9	26.86949	86.3059	A257	1.0	Number
58	Wetland protection	Mirchaiya Municipality-1	26.83428	86.21158	A223	1.0	Number
59	Wetland protection	Mirchaiya Municipality-2	26.83334	86.21762	A222	1.0	Number
60	Wetland protection	Mirchaiya Municipality-1	26.8346	86.22069	A224	1.0	Number Number
61	Wetland protection	Mirchaiya Municipality-2	26.82981	86.21892	A221	1.0	
62	Riverbank stabilization with bio-engineering structures	Kalyanpur Municipality-4	26.77783	86.16974	A5	0.2	Length (KM)
63	Riverbank stabilization with bio-engineering structures	Kalyanpur Municipality-4	26.77819	86.17212	A6	0.0	Length (KM)
64	Riverbank stabilization with bio-engineering structures	Kalyanpur Municipality-4	26.77819	86.1727	A6	0.2	Length (KM)
65	Riverbank stabilization with bio-engineering structures	Kalyanpur Municipality-4	26.77842	86.17037	A5	0.0	Length (KM)
66	Riverbank stabilization with bio-engineering structures	Kalyanpur Municipality-4	26.78221	86.17862	A8	0.1	Length (KM)
67	Riverbank stabilization with bio-engineering structures	Kalyanpur Municipality-4	26.78224	86.17869	A8	0.0	Length (KM)
68	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-12	26.7835	86.17949	A10	0.1	Length (KM)
69	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-12	26.78361	86.1789	A11	0.1	Length (KM)
70	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-12	26.78373	86.17905	A10	0.0	Length (KM)
71	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-12	26.78374	86.17815	A11	0.1	Length (KM)
72	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-12	26.78539	86.18885	A13	0.3	Length (KM)
73	Riverbank stabilization with bio-engineering structures	Kalyanpur Municipality-8	26.79306	86.19741	A16	0.3	Length (KM)
74	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-3	26.80239	86.20451	A19	0.7	Length (KM)

75	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-3	26.8029	86.20685	A20	0.5	Length (KM)
76	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-12	26.80326	86.20029	A21	0.2	Length (KM)
77	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-3	26.80528	86.21559	A22	0.1	Length (KM)
78	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-3	26.80551	86.21362	A22	0.3	Length (KM)
79	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-4	26.81357	86.22882	A29	0.1	Length (KM)
80	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-4	26.81368	86.2305	A30	0.1	Length (KM)
81	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-4	26.8139	86.23263	A32	0.2	Length (KM)
82	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-4	26.81416	86.22952	A31	0.2	Length (KM)
83	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-4	26.81449	86.2329	A32	0.0	Length (KM)
84	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-4	26.81462	86.23256	A35	0.0	Length (KM)
85	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-4	26.81462	86.23256	A34	0.0	Length (KM)
86	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-4	26.81483	86.23246	A34	0.1	Length (KM)
87	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-4	26.81515	86.23214	A35	0.0	Length (KM)
88	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-4	26.81515	86.23214	A34	0.0	Length (KM)
89	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-4	26.81519	86.23455	A36	0.2	Length (KM)
90	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-4	26.81562	86.23401	A35	0.4	Length (KM)
91	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-4	26.81697	86.24401	A39	0.2	Length (KM)
92	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-4	26.81704	86.24282	A39	0.1	Length (KM)
93	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-10	26.8195	86.24764	A42	0.4	Length (KM)
94	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-10	26.81953	86.24587	A42	0.0	Length (KM)
95	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-5	26.82036	86.24509	A46	0.2	Length (KM)
96	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-5	26.82118	86.25217	A48	0.7	Length (KM)
97	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-5	26.82191	86.24826	A47	0.4	Length (KM)
98	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-6	26.82244	86.25873	A50	0.7	Length (KM)
99	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-6	26.82299	86.25976	A53	0.9	Length (KM)
100	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-1	26.82308	86.2305	A54	0.2	Length (KM)

101	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-9	26.82411	86.26611	A56	0.1	Length (KM)
102	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-9	26.82454	86.26648	A56	0.0	Length (KM)
103	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-1	26.82523	86.22948	A59	0.2	Length (KM)
104	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-9	26.82547	86.27169	A61	0.2	Length (KM)
105	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-9	26.82562	86.27072	A61	0.0	Length (KM)
106	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-1	26.82608	86.22996	A59	0.0	Length (KM)
107	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-5	26.82788	86.23196	A66	0.1	Length (KM)
108	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-5	26.82827	86.23225	A66	0.0	Length (KM)
109	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-5	26.82867	86.23339	A69	0.1	Length (KM)
110	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-1	26.82868	86.23202	A68	0.1	Length (KM)
111	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-9	26.82981	86.27728	A70	0.2	Length (KM)
112	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-5	26.83009	86.23504	A72	0.1	Length (KM)
113	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-9	26.83048	86.2826	A74	0.2	Length (KM)
114	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-5	26.83066	86.2351	A72	0.0	Length (KM)
115	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-8	26.8309	86.27726	A78	0.0	Length (KM)
116	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-8	26.83168	86.27733	A78	0.2	Length (KM)
117	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-5	26.83185	86.23767	A79	0.3	Length (KM)
118	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-9	26.83273	86.28211	A81	0.2	Length (KM)
119	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-1	26.83281	86.23542	A82	0.2	Length (KM)
120	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-9	26.83316	86.28428	A83	0.3	Length (KM)
121	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-5	26.83372	86.23879	A84	0.4	Length (KM)
122	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-5	26.83452	86.24073	A85	0.4	Length (KM)
123	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-5	26.83468	86.24095	A85	0.0	Length (KM)
124	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-5	26.83468	86.24095	A84	0.0	Length (KM)
125	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-5	26.83468	86.24095	A85	0.0	Length (KM)
126	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-5	26.83468	86.24095	A84	0.0	Length (KM)

127	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-9	26.83619	86.28221	A86	0.2	Length (KM)
128	Riverbank stabilization with bio-engineering structures	Karjanha Municipality-10	26.83771	86.24187	A87	0.1	Length (KM)
129	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-9	26.8378	86.28343	A89	0.2	Length (KM)
130	Riverbank stabilization with bio-engineering structures	Karjanha Municipality-10	26.83824	86.24292	A91	0.2	Length (KM)
131	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-9	26.83843	86.28394	A89	0.0	Length (KM)
132	Riverbank stabilization with bio-engineering structures	Karjanha Municipality-10	26.8392	86.24163	A93	0.3	Length (KM)
133	Riverbank stabilization with bio-engineering structures	Karjanha Municipality-10	26.83944	86.24309	A94	0.2	Length (KM)
134	Riverbank stabilization with bio-engineering structures	Karjanha Municipality-10	26.83948	86.24217	A94	0.0	Length (KM)
135	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-7	26.8403	86.28086	A99	0.9	Length (KM)
136	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-5	26.84053	86.24421	A96	0.2	Length (KM)
137	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-9	26.84151	86.28682	A101	0.0	Length (KM)
138	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-5	26.84368	86.24811	A110	0.1	Length (KM)
139	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-7	26.84381	86.28629	A108	0.2	Length (KM)
140	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-7	26.84412	86.27915	A99	0.3	Length (KM)
141	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-5	26.84422	86.25379	A112	0.2	Length (KM)
142	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-5	26.84424	86.25002	A111	0.1	Length (KM)
143	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-9	26.84444	86.28807	A113	0.2	Length (KM)
144	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-5	26.8447	86.25265	A116	0.2	Length (KM)
145	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-5	26.84563	86.25413	A119	0.2	Length (KM)
146	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-7	26.84564	86.2824	A122	0.4	Length (KM)
147	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-7	26.84593	86.28686	A123	0.2	Length (KM)
148	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-5	26.84768	86.25636	A129	0.0	Length (KM)
149	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-5	26.84777	86.25697	A129	0.1	Length (KM)
150	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-5	26.84792	86.25609	A127	0.2	Length (KM)
151	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-7	26.85041	86.26028	A136	0.2	Length (KM)
152	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-7	26.85069	86.28291	A135	0.2	Length (KM)

153	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-5	26.85195	86.25851	A141	0.4	Length (KM)
154	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-7	26.85249	86.27846	A143	0.4	Length (KM)
155	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-9	26.85255	86.29489	A142	0.2	Length (KM)
156	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-5	26.85272	86.25838	A141	0.0	Length (KM)
157	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-5	26.85358	86.26076	A148	0.1	Length (KM)
158	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-5	26.85375	86.26098	A148	0.1	Length (KM)
159	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-7	26.85482	86.29163	A152	0.1	Length (KM)
160	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-5	26.85487	86.25989	A153	0.1	Length (KM)
161	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-7	26.85499	86.27872	A154	0.2	Length (KM)
162	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-5	26.85561	86.26034	A153	0.1	Length (KM)
163	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-7	26.85603	86.29142	A156	0.1	Length (KM)
164	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-7	26.85622	86.27852	A154	0.0	Length (KM)
165	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-5	26.85625	86.26261	A157	0.1	Length (KM)
166	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-5	26.85658	86.26284	A157	0.0	Length (KM)
167	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-9	26.85663	86.29684	A162	0.1	Length (KM)
168	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-5	26.85691	86.26191	A160	0.1	Length (KM)
169	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-5	26.85707	86.26245	A160	0.1	Length (KM)
170	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-9	26.85715	86.29723	A162	0.1	Length (KM)
171	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-7	26.85976	86.29335	A171	0.1	Length (KM)
172	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-7	26.86011	86.27786	A174	0.1	Length (KM)
173	Riverbank stabilization with bio-engineering structures	Karjanha Municipality-10	26.86071	86.20989	A177	0.0	Length (KM)
174	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-7	26.86087	86.2794	A176	0.1	Length (KM)
175	Riverbank stabilization with bio-engineering structures	Karjanha Municipality-10	26.86101	86.21058	A177	0.2	Length (KM)
176	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-7	26.86174	86.28016	A179	0.1	Length (KM)
177	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-7	26.86209	86.29273	A181	0.1	Length (KM)
178	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-7	26.86276	86.29347	A183	0.1	Length (KM)

179	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-7	26.86302	86.28074	A184	0.1	Length (KM)
180	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-7	26.86329	86.29266	A187	0.1	Length (KM)
181	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-7	26.86404	86.27686	A188	0.2	Length (KM)
182	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-7	26.86404	86.27459	A190	0.2	Length (KM)
183	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-7	26.86415	86.29293	A191	0.1	Length (KM)
184	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-7	26.86506	86.27144	A194	0.1	Length (KM)
185	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-7	26.86555	86.29316	A196	0.1	Length (KM)
186	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-7	26.86555	86.27176	A197	0.1	Length (KM)
187	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-7	26.86604	86.27164	A197	0.0	Length (KM)
188	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-7	26.86713	86.29303	A199	0.1	Length (KM)
189	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-7	26.86737	86.28101	A202	0.1	Length (KM)
190	Riverbank stabilization with bio-engineering structures	Mirchaiya Municipality-7	26.86775	86.28124	A202	0.0	Length (KM)
191	Woodlot establishment in private land	Kalyanpur Municipality-4	26.77599	86.16804	A4	71.1	Area (Ha)
192	Demonstration plantation	Mirchaiya Municipality-7	26.84258	86.27955	A106	8.2	Area (Ha)
193	Community land plantation	Mirchaiya Municipality-5	26.85394	86.26041	A149	8.2	Area (Ha)
194	Demonstration plantation	Mirchaiya Municipality-7	26.85789	86.27831	A166	5.4	Area (Ha)
195	Promotion of agro-forestry system with riverbank stabilization	Karjanha Municipality-7	26.82006	86.16364	A45	75.6	Area (Ha)
196	Riparian plantation	Mirchaiya Municipality-4	26.81116	86.22204	A26	0.4	Area (Ha)
197	Riparian plantation	Mirchaiya Municipality-4	26.81261	86.22416	A27	0.2	Area (Ha)
198	Demonstration plantation	Mirchaiya Municipality-4	26.81327	86.225	A28	0.2	Area (Ha)
199	Woodlot establishment in private land	Mirchaiya Municipality-12	26.79709	86.1974	A18	4.0	Area (Ha)
200	Riparian plantation	Mirchaiya Municipality-9	26.82482	86.26695	A57	0.3	Area (Ha)
201	Woodlot establishment in private land	Mirchaiya Municipality-9	26.83014	86.27612	A71	1.6	Area (Ha)
202	Demonstration plantation	Mirchaiya Municipality-9	26.82677	86.27139	A64	3.0	Area (Ha)
203	Riparian plantation	Mirchaiya Municipality-9	26.82549	86.26988	A60	0.7	Area (Ha)
204	Riparian plantation	Mirchaiya Municipality-9	26.8228	86.26295	A52	0.7	Area (Ha)
205	Community land plantation	Mirchaiya Municipality-5	26.81988	86.24684	A44	0.5	Area (Ha)
206	Demonstration plantation	Mirchaiya Municipality-10	26.81791	86.24361	A40	1.2	Area (Ha)
207	Riparian plantation	Mirchaiya Municipality-5	26.81973	86.24545	A43	0.4	Area (Ha)
208	Community land plantation	Mirchaiya Municipality-4	26.81716	86.2406	A37	2.5	Area (Ha)
209	Community land plantation	Mirchaiya Municipality-4	26.81718	86.23751	A38	0.7	Area (Ha)
210	Demonstration plantation	Mirchaiya Municipality-4	26.81488	86.23335	A33	1.1	Area (Ha)
211	Community land plantation	Mirchaiya Municipality-12	26.78771	86.18971	A15	7.3	Area (Ha)
212	Community land plantation	Mirchaiya Municipality-12	26.78482	86.18207	A12	9.5	Area (Ha)
213	Woodlot establishment in private land	Mirchaiya Municipality-3	26.80559	86.21717	A23	2.3	Area (Ha)
214	Community land plantation	Mirchaiya Municipality-12	26.7865	86.18076	A14	1.1	Area (Ha)
215	Community land plantation	Kalyanpur Municipality-4	26.77841	86.17251	A7	3.9	Area (Ha)
216	Community land plantation	Mirchaiya Municipality-12	26.78259	86.17822	A9	1.4	Area (Ha)
217	Woodlot establishment in private land	Kalyanpur Municipality-4	26.76356	86.16787	A3	2.4	Area (Ha)

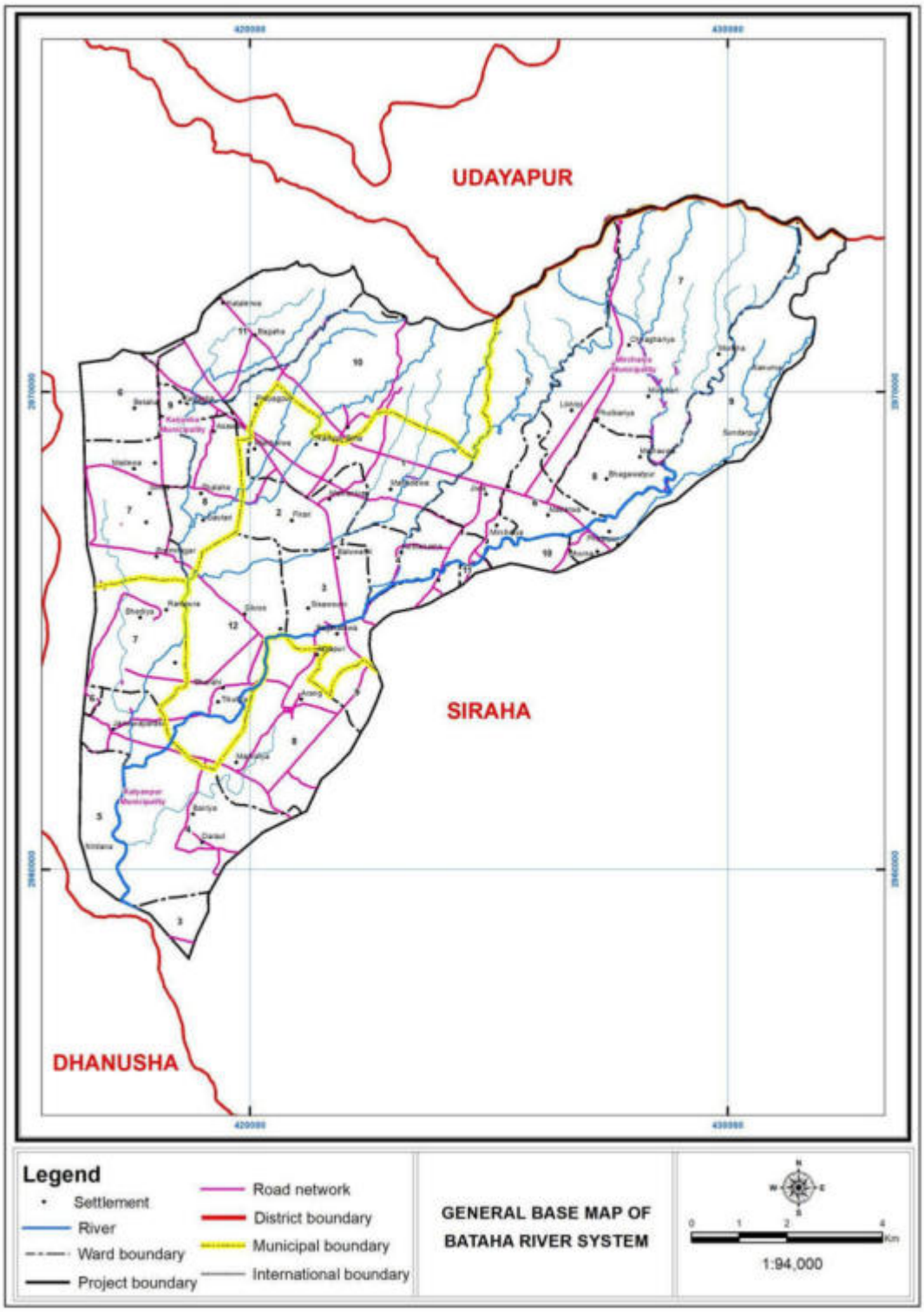
218	Woodlot establishment in private land	Kalyanpur Municipality-4	26.75807	86.16902	A2	6.9	Area (Ha)
219	Community land plantation	Kalyanpur Municipality-4	26.75482	86.16894	A1	2.8	Area (Ha)
220	Community land plantation	Mirchaiya Municipality-9	26.84932	86.28991	A132	13.7	Area (Ha)
221	Woodlot establishment in private land	Mirchaiya Municipality-9	26.84133	86.28576	A100	7.4	Area (Ha)
222	Woodlot establishment in private land	Mirchaiya Municipality-1	26.82237	86.22844	A51	0.3	Area (Ha)
223	Woodlot establishment in private land	Mirchaiya Municipality-1	26.82372	86.22992	A55	0.3	Area (Ha)
224	Community land plantation	Mirchaiya Municipality-1	26.82533	86.22983	A58	0.2	Area (Ha)
225	Riparian plantation	Mirchaiya Municipality-1	26.82669	86.23053	A63	0.4	Area (Ha)
226	Community land plantation	Mirchaiya Municipality-5	26.82842	86.23245	A67	0.3	Area (Ha)
227	Woodlot establishment in private land	Mirchaiya Municipality-1	26.83044	86.23477	A73	0.2	Area (Ha)
228	Woodlot establishment in private land	Mirchaiya Municipality-5	26.8309	86.23521	A75	0.4	Area (Ha)
229	Woodlot establishment in private land	Mirchaiya Municipality-5	26.8315	86.23487	A77	0.2	Area (Ha)
230	Woodlot establishment in private land	Mirchaiya Municipality-5	26.83236	86.23758	A80	0.6	Area (Ha)
231	Woodlot establishment in private land	Karjanha Municipality-10	26.83908	86.2425	A92	1.0	Area (Ha)
232	Woodlot establishment in private land	Karjanha Municipality-10	26.8421	86.24489	A102	1.6	Area (Ha)
233	Demonstration plantation	Mirchaiya Municipality-5	26.8436	86.24794	A109	2.5	Area (Ha)
234	Community land plantation	Mirchaiya Municipality-5	26.84514	86.25277	A118	0.4	Area (Ha)
235	Community land plantation	Mirchaiya Municipality-5	26.84511	86.25352	A117	0.6	Area (Ha)
236	Community land plantation	Mirchaiya Municipality-5	26.84475	86.25397	A115	0.3	Area (Ha)
237	Riparian plantation	Mirchaiya Municipality-5	26.84548	86.25522	A120	0.4	Area (Ha)
238	Riparian plantation	Mirchaiya Municipality-5	26.84747	86.25645	A125	0.4	Area (Ha)
239	Community land plantation	Mirchaiya Municipality-3	26.80574	86.21518	A24	1.2	Area (Ha)
240	Woodlot establishment in private land	Karjanha Municipality-10	26.84785	86.22002	A128	1.6	Area (Ha)
241	Demonstration plantation	Karjanha Municipality-10	26.84854	86.22023	A131	0.5	Area (Ha)
242	Woodlot establishment in private land	Karjanha Municipality-10	26.84559	86.21191	A121	0.6	Area (Ha)
243	Woodlot establishment in private land	Karjanha Municipality-10	26.8463	86.21205	A124	1.1	Area (Ha)
244	Woodlot establishment in private land	Karjanha Municipality-11	26.85535	86.20474	A155	0.7	Area (Ha)
245	Woodlot establishment in private land	Karjanha Municipality-10	26.85311	86.19929	A146	0.5	Area (Ha)
246	Woodlot establishment in private land	Mirchaiya Municipality-9	26.83116	86.27939	A76	3.2	Area (Ha)
247	Demonstration plantation	Mirchaiya Municipality-7	26.84995	86.28206	A134	9.7	Area (Ha)
248	Riparian plantation	Mirchaiya Municipality-7	26.84995	86.28206	A134	4.9	Area (Ha)
249	Riparian plantation	Mirchaiya Municipality-7	26.84995	86.28206	A134	8.7	Area (Ha)
250	Riparian plantation	Karjanha Municipality-7	26.82006	86.16364	A234	45.8	Area (Ha)
251	Torrent-Gully stabilization through check dams, contour planting, stone walls etc.	Mirchaiya Municipality-1	26.83805	86.23542	M90	1.0	Number
252	Torrent-Gully stabilization through check dams, contour planting, stone walls etc.	Mirchaiya Municipality-1	26.84102	86.23163	M98	1.0	Number
253	Torrent-Gully stabilization through check dams, contour planting, stone walls etc.	Mirchaiya Municipality-5	26.84342	86.24779	M107	1.0	Number
254	Torrent-Gully stabilization through check dams, contour planting, stone walls etc.	Karjanha Municipality-10	26.84789	86.22835	M130	1.0	Number
255	Torrent-Gully stabilization through check dams, contour planting, stone walls etc.	Mirchaiya Municipality-9, Jaruwa Khola	26.85174	86.30482	M140	1.0	Number
256	Torrent-Gully stabilization through check dams, contour planting, stone walls etc.	Mirchaiya Municipality-7, Moraha Khola	26.85326	86.28981	M147	1.0	Number
257	Torrent-Gully stabilization through check dams, contour planting, stone walls etc.	Karjanha Municipality-10, Dima Khola	26.85471	86.22999	M150	1.0	Number

258	Torrent-Gully stabilization through check dams, contour planting, stone walls etc.	Mirchaiya Municipality-9, Khakri Khola	26.85473	86.2949	M151	1.0	Number
259	Torrent-Gully stabilization through check dams, contour planting, stone walls etc.	Karjanha Municipality-10, Bhalu Khola	26.86009	86.21248	M173	1.0	Number
260	Torrent-Gully stabilization through check dams, contour planting, stone walls etc.	Karjanha Municipality-10, Sukla Khola	26.86216	86.21086	M182	1.0	Number
261	Torrent-Gully stabilization through check dams, contour planting, stone walls etc.	Karjanha Municipality-11, Bagaha Khola	26.86319	86.20799	M186	1.0	Number
262	Torrent-Gully stabilization through check dams, contour planting, stone walls etc.	Mirchaiya Municipality-7, Chuniya Khola	26.86478	86.28099	M193	1.0	Number
263	Torrent-Gully stabilization through check dams, contour planting, stone walls etc.	Mirchaiya Municipality-5, Bhalu Khola	26.86721	86.2698	M200	1.0	Number
264	Climate Resilient Agriculture		26.79421	86.18193	A258	523.0	Number
265	Climate Resilient Agriculture		26.84213	86.18361	A259	252.8	Number
266	Climate Resilient Agriculture		26.8383	86.26766	A260	84.0	Number
267	Climate Resilient Agriculture		26.85518	86.27459	A261	29.2	Number
268	Climate Resilient Agriculture		26.84236	86.29639	A262	80.2	Number

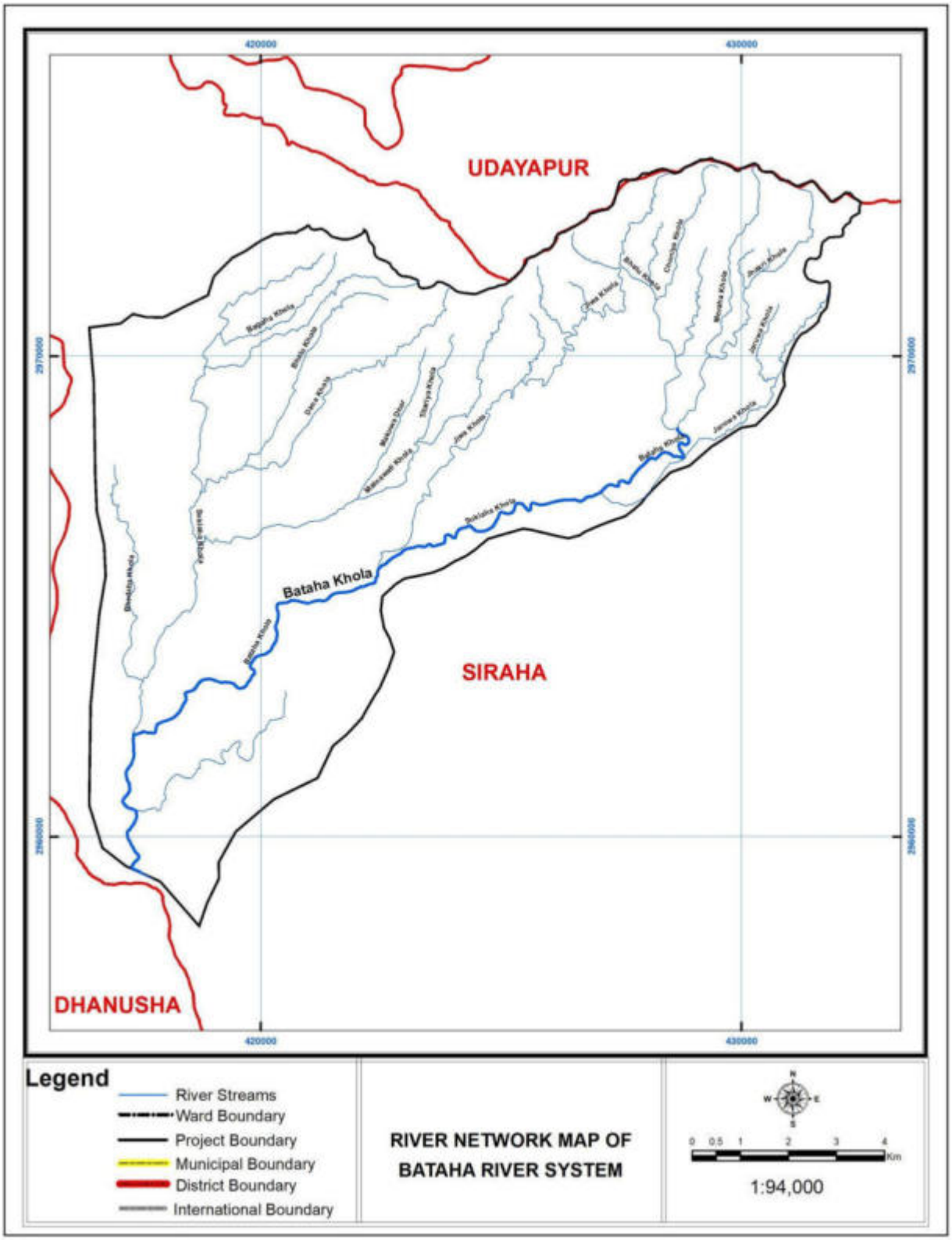
Note:

Activity location and coordinates are subjected to change based on field condition before the implementation. BRCRN PPMU offices can make the necessary changes with proper documentation of field condition.

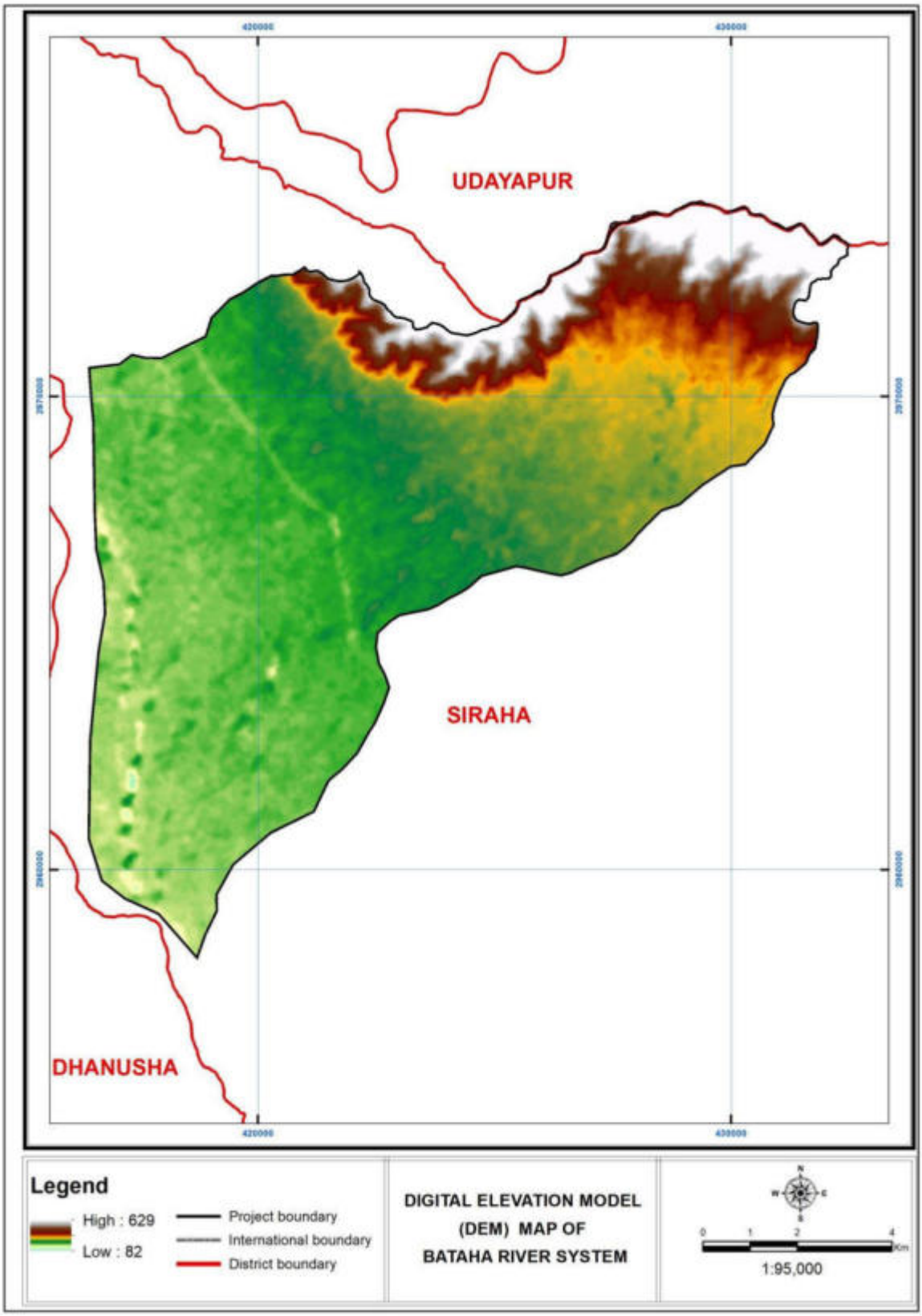
Annex 3: Thematic Maps of the Bataha river system



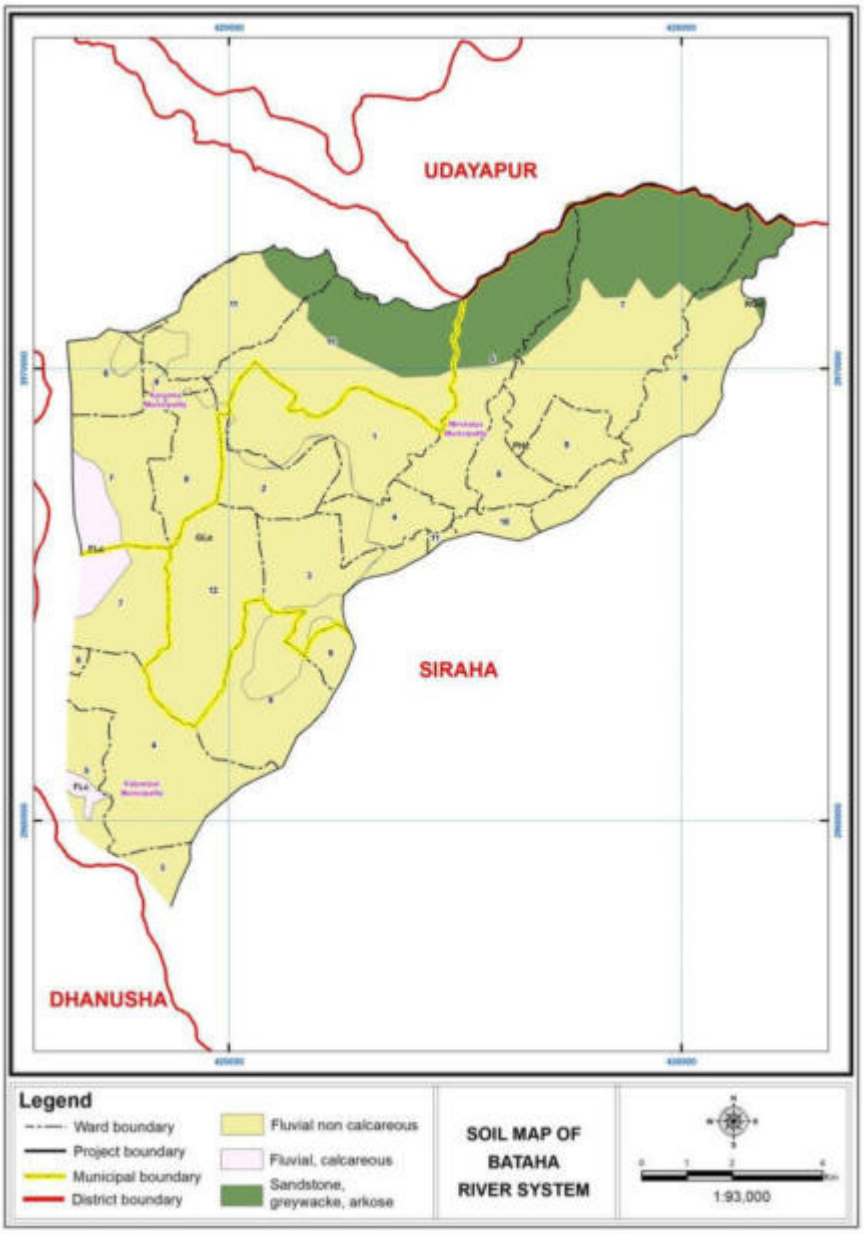
Base Map of Bataha river system



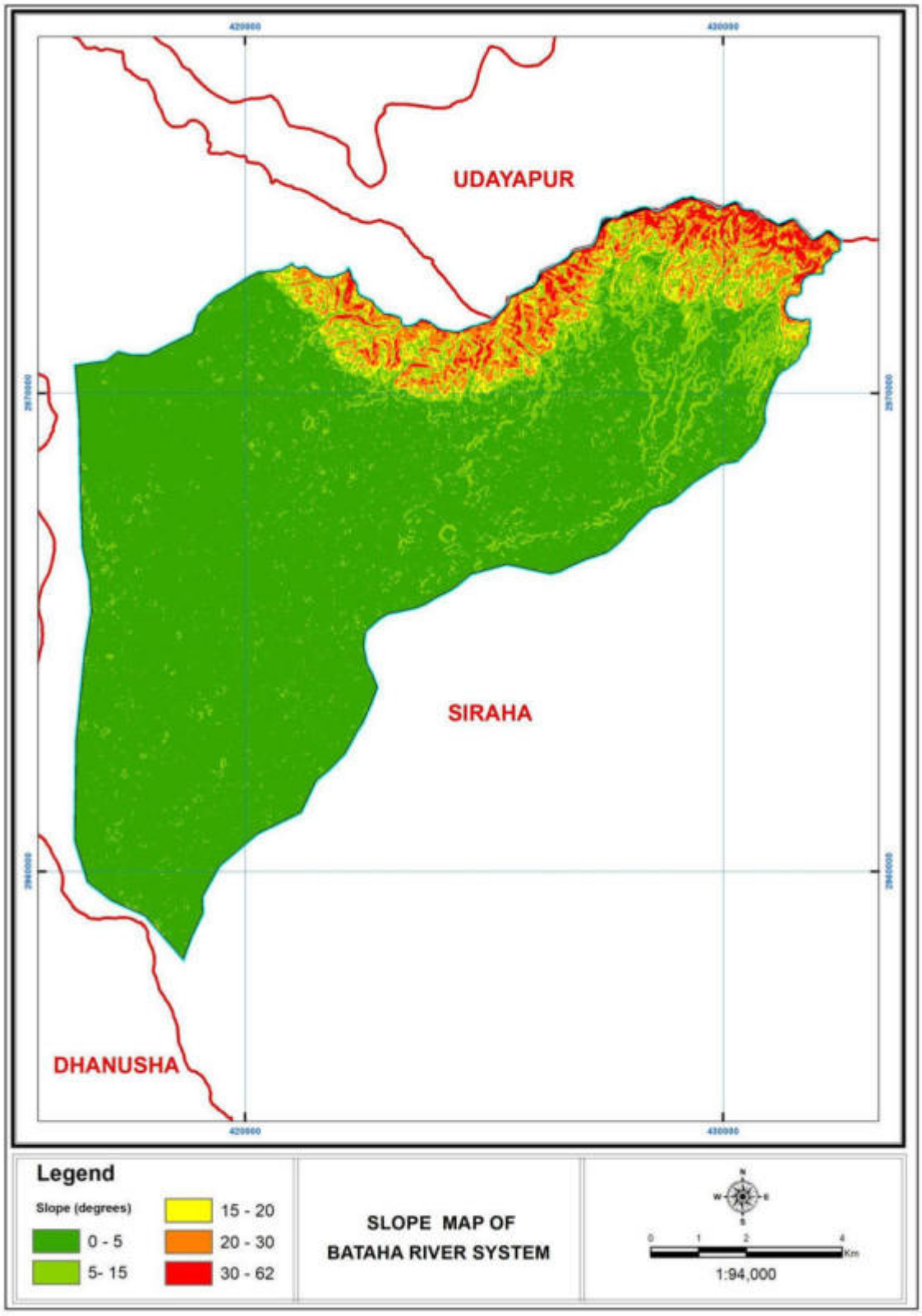
River network of Bataha river system



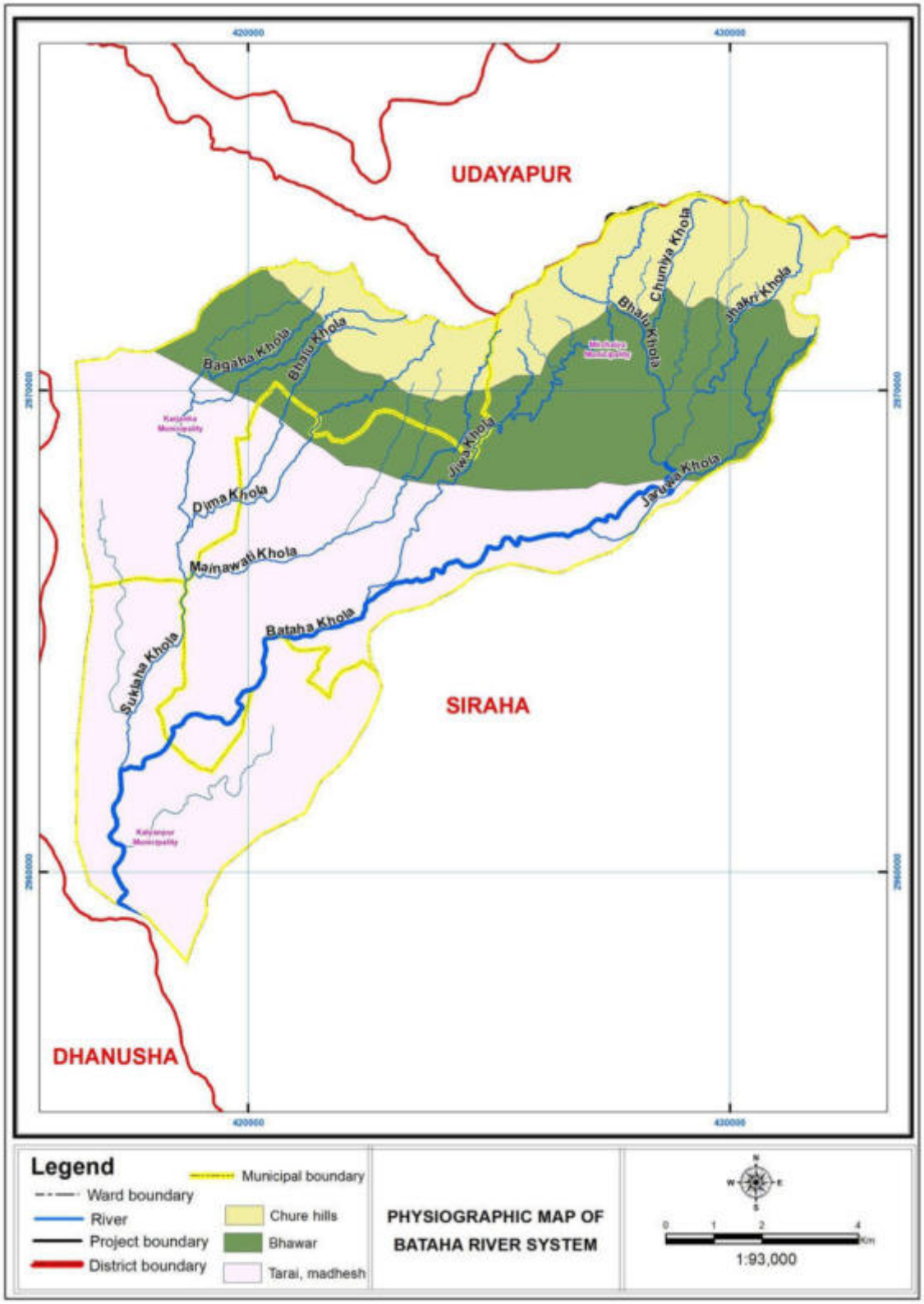
Digital Elevation Map of the Bataha river system



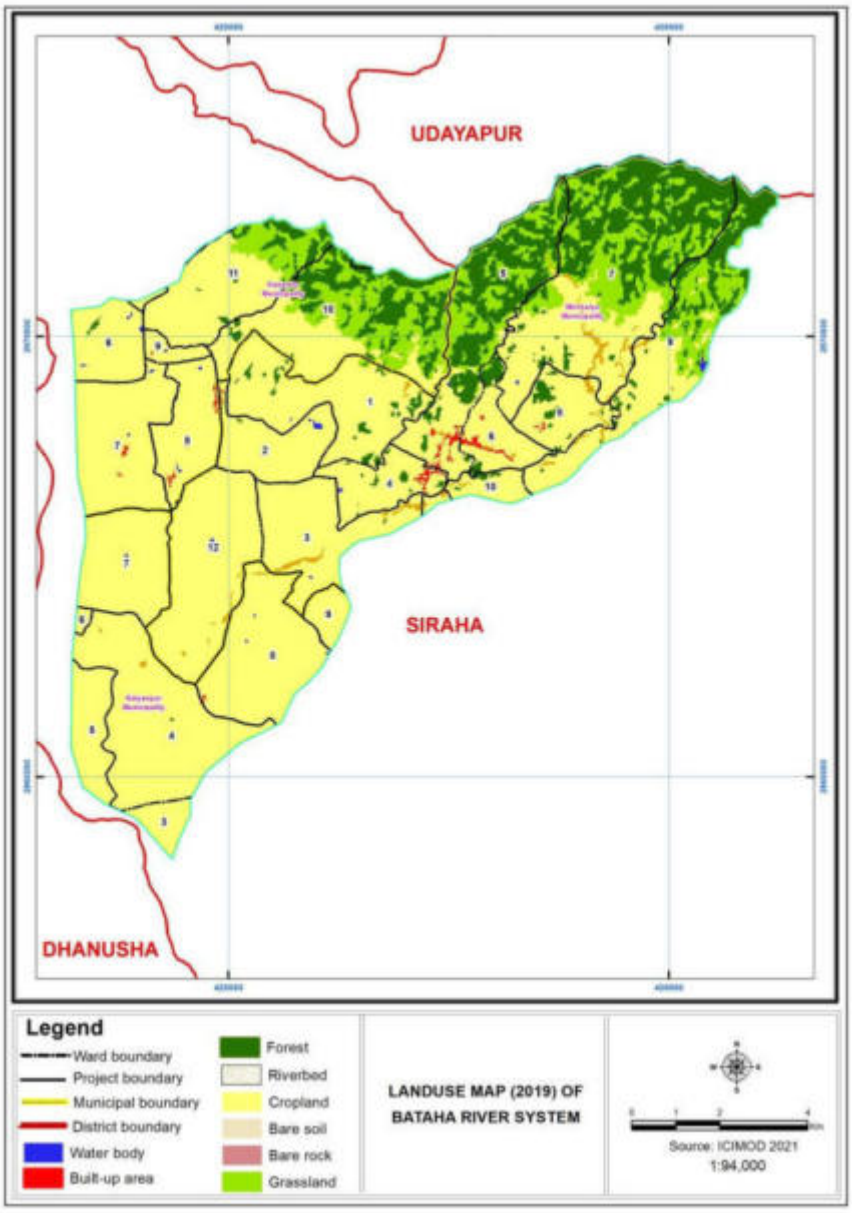
Soil map of the Bataha river system



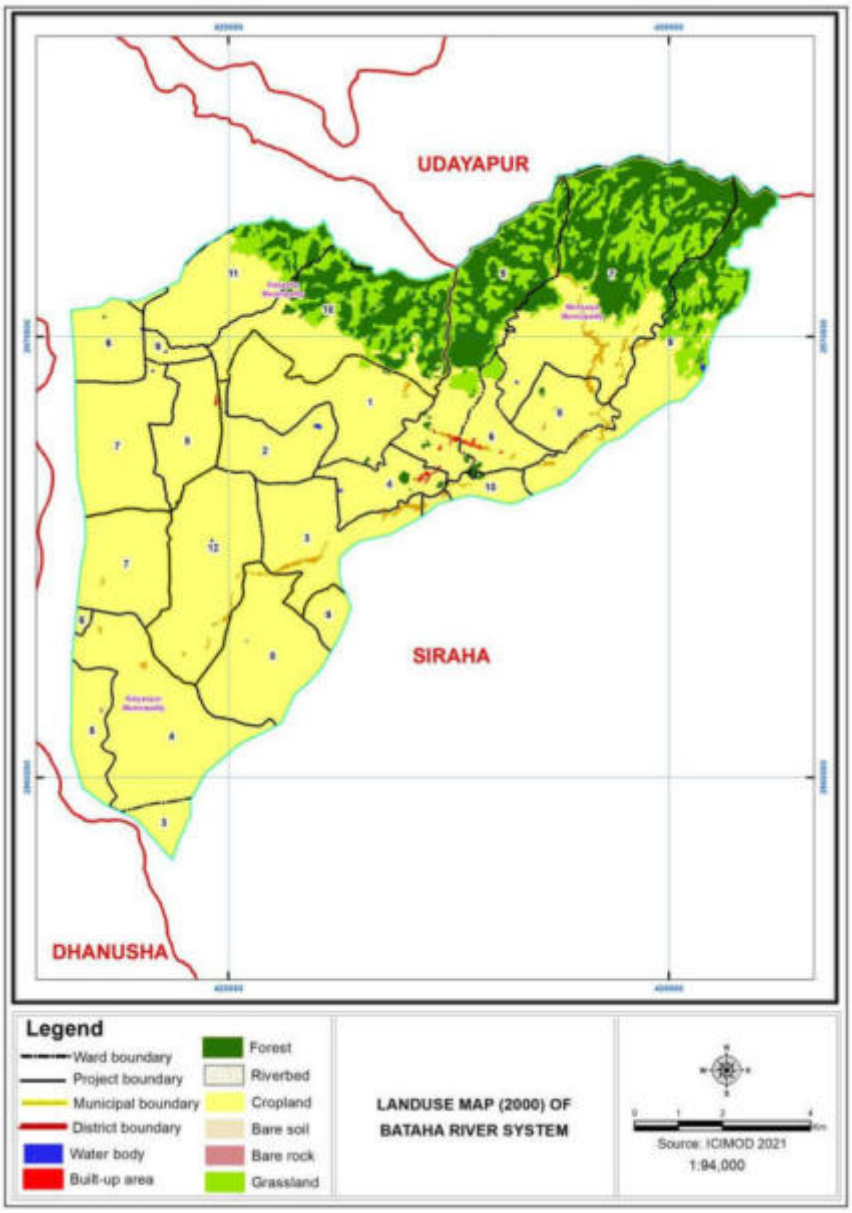
Slope map of the Bataha river system



Physiographic map of the Bataha river system



Landuse map of Bataha river system (ICIMOD, 2019)



Landuse map of Bataha river system (ICIMOD, 2000)

Glimpses of the events and site visits in Bataha river system

Local stakeholders and facilitators actively engaged in problem tree and solution tree workshops held in Mirchaiya, Mirchaiya municipality in Bataha river system

Potential for demonstration plantation and site inspection and interaction with the locals

Potential for afforestation sites in Bataha river system in downstream

Flood controls in Bataha River upstream (1km) of confluence with Kamal river , potential riverbed farming and afforestation in upstream river site areas

Potential sites of soil erosion and bank cutting protection areas, mass sliding and soil erosion (Bagaha Khola), Bagaha Beldada Community Forest, Karjanhya Gaunpalika ward no. 11

Potential for afforestation Area Kalyanpur NaPa, Ward No. 5, Near Nirdana Settlement

Potential land for agriculture Practices and riverine plantation in Kalyanpur NaPa, Ward No. 5, Near Chikana Settlement

Expert planning workshop and interaction on Bataha river system in Lahan, Siraha