

**Mercy Corps
Nepal**

**Assessment Report
on**

**“Development of Landscape Approach
for Climate and Disaster Vulnerability
in Doda Watershed”**

Submitted by

DPNet Nepal.

Kathmandu, Nepal

Email: dpnet@dpnet.org.np

www.dpnet.org

Ph. 015672165

August, 2022

Contents

Acknowledgement	iii
Abbreviation	iv
List of Table	v
List of figures	v
1. Introduction	1
1.1 Background	1
1.2 Objective	2
1.3 Scope of the study	2
2. Study Area	3
3. Methodological approach and methods	4
3.1 Approach adopted	4
3.2 Consultation with the project team at MC	4
3.3 Methods	4
3.3.1 Preparatory phase.....	4
a. Desk work and stocktaking similar studies and practices.....	4
b. Preparation of thematic maps of Doda watershed	6
3.3.2: Field Visit and stakeholders' consultation	15
Consultation with relevant stakeholders in the watershed.....	15
3.3.3: Report Preparation and Submission	16
Preparation of draft assessment report	16
Preparation and submission of final report	16
4. Findings and Discussions	16
4.1 Land use land cover change in the watershed	16
4.2 Climate factors trend	20
4.3 Issues and barriers in the watershed	20
5. Formation of dialogue platform	23
5.1 Rational of the platform	23
5.2 Upstream, downstream and cross boarder stakeholders in the watershed	24
5.3 Functions of the platform in the Doda Watershed:	24
5.4 Structures of multi-stakeholder dialogue platform	25
6. Conclusion and Recommendations	28

6.1 Conclusions:	28
6.2 Recommendations:	28
Annexes	I
Annex 1: Checklist at field level interaction	I
Annex: 2. List of Consultation	II
Annex 3: Meeting Minutes	III
Glimpses of the field activities:	VIII

Acknowledgement

Disaster Preparedness Network Nepal (DPNet Nepal) would like to express its gratitude to Mercy Corps (MC) for providing the financial support and the guidance to carry out the study. We also thank all the stakeholders involved in the consultative meeting during the field visit for providing valuable information and data on the issue of the Doda watershed.

Abbreviation

CCFC	Community Forest Coordination Committee
CDMCs	Community Disaster Management Committees
CSOs	Civil Society Organizations
DEM	Digital Elevation Model
DHM	Department of Hydrology and Meteorology
DPNet Nepal	Disaster Preparedness Network Nepal
DPRP	Disaster Preparedness and Response Plan
DoS	Department of Survey
DRR	Disaster Risk Reduction
FGDs	Focus Group Discussions
GIS	Geographical Information System
GPS	Global Positioning System
KIIs	Key Informant Interviews
LAPA	Local Adaptation Plan for Action
LDMC	Local Disaster Management Committee
MSD	Multi-Stakeholder Dialogues
NEEDS	National Environment and Equity Development Society
NGO	Non-Governmental Organization
NNSWA	Nepal Network of Social Welfare Association
NRM	Natural Resource Management
PES	Payment for Ecosystem Services

List of Table

Table 1: Palika wise coverage of Doda watershed	10
Table 2: Slope classes in the watershed	13
Table 3: Landuse land cover change in Doda watershed in last 25 years	16

List of figures

Figure 1: Study area	3
Figure 2: Municipality map of Doda watershed	9
Figure 3: Road network within watershed	11
Figure 4: Major river network of Doda river and the climate stations nearest to the watershed	12
Figure 5: Slope map of the watershed	14
Figure 6: Landuse change over 25 years (figure a, b,c)	19
Figure 7: Multi-stakeholder platform	27

1. Introduction

1.1 Background

A combination of rugged topography, high reefs, active tectonic processes, and intense monsoon rain has made this fragile environment vulnerable to various types of disasters. Floods, landslides, droughts, and other weather and climate-induced hazards are almost regular phenomena in Nepal. Due to climate change, the frequency and intensity of natural hazards in Nepal is rising. The Observed Climate Trend Analysis Report (2017) prepared by the Department of Hydrology and Meteorology (DHM), Nepal based on temperature and precipitation data from the years 1971 to 2014 finds out that the average annual temperature increase rate of Nepal is 0.056°C. Churia is naturally in a more vulnerable situation, with fragile soils, high exposure to flash flooding and landslides in the monsoon season, and frequently changing water courses. Climate change, coupled with unsustainable natural resource management (NRM) in the region, is increasing the vulnerability of communities and ecosystems to landslides, flooding and erosion, extreme heat, water scarcity, and forest fires, among other climate-induced natural disasters.

The local government has a vital role and responsibility to strengthen the disaster risk reduction (DRR) and emergency response system and mechanism by assessing the risks and preparing accordingly for an anticipated disaster. The Local Government Operation Act (2017) granted more power and responsibility to the local governments comprising urban and rural municipalities. Local governments are responsible for much larger territories under the federal system and are mandated to manage local services, local level development plans, and projects, including identifying and effectively addressing transboundary governance issues for disaster risk reduction, preparedness, response, and flood resilience.

The Doda river mainly originates in the Churia region, and the Doda watershed is geologically very young and very fragile, making it vulnerable to water-induced erosion. The natural resources in the watershed are at risk from several factors, such as degraded forest land and human encroachment, haphazard rural road construction, overgrazing, forest fire, conventional agriculture practices on steep slopes; and soil erosion. Moreover, the impact of climate change is unprecedented in the area due to high vulnerability. Water flows from the upstream (Churia) to the downstream (Bhabar, Dun, and the Terai), resulting in the loss of soil and biodiversity, and land degradation in the upstream, and flooding, siltation, and sedimentation deposition in the downstream. River bank erosion and floods are a normal phenomenon during the rainy season in Doda. Major disastrous floods in 2007 and 2008 caused colossal damage that forced farmers to abandon the village. The river has changed its course and is eroding the lands near human settlement all year round. The agricultural lands in villages near the river in Dekhatbhuli, Shankarpur and Belauri municipalities have turned into river banks due to large amounts of sand deposits.

Mercy Corps Nepal, with Zurich Flood Resilience Alliance members (Practical Action and IFRC) has a plan to conduct research which will provide an opportunity to understand issues, barriers, and

opportunities at the watershed level of the Doda watershed in Kanchanpur district and engage with different local government units and enhance their resilience through improved policies and integrated plans. In this context, Disaster Preparedness Network Nepal (DPNet), Kathmandu is willing to express interest in the services to develop a Landscape Approach for Climate and Disaster Vulnerability in the Doda Watershed.

1.2 Objective

The general objective of the study is to identify barriers and opportunities on transboundary disaster governance and contribute to improving efficient coordination between upstream and downstream communities across the local municipalities and improving their resilience and adaptation practices.

The specific objectives are:

- ❖ Examine transboundary issues, barriers and opportunities between upstream and downstream communities across the local municipalities of the Doda watersheds level and identify recommendations to improve transboundary disaster risk management governance at the local government level.
- ❖ Develop multi-stakeholder dialogue platforms to increase ownership of local actors on the integrated local development planning process and for the institutionalization of communication mechanisms between different local administrative units.
- ❖ Provide data and information with recommendations for land use planning to the local municipalities and provincial concerned ministries (Ministry of Internal Affairs and Law, Infrastructure, Forest and Environment; Land Management, Agriculture and Cooperatives) for the integrated planning process and improve risk financing at policy frameworks and practices.
- ❖ Identify recommendations for local government and other stakeholders on suitable and nature-based solutions for building flood resilience and improving local adaptation practices.

1.3 Scope of the study

The scopes of the study are

- Review documents related to climate and disaster vulnerability and landscape assessment
- Stocktaking landscape assessment studies and practices in the Far-west region to address those gaps and improve transboundary disaster risk management governance
- Analysis of stakeholders (who is doing what with regard to Landscape assessment and how can we create synergy and work engaging multi-stakeholders)
- Create platforms for multi-stakeholder dialogues and platforms of upstream and downstream communities
- Understand the linkage and relation of one administrative unit to another (issues) cross-boundary issues (flood).
- Explore issues of administrative units (upstream and downstream community) related disasters focused on floods and how the administrative units solve those issues.
- Find out the legal barriers and opportunities to invest upstream by downstream

- Identify issues, problems, causes and analysis of solutions of the sub-watersheds
- Design methodology, tools and work plan for conducting landscape assessment together with local stakeholders in consultation with the Mercy Corps team
- Conduct Key Informant Interviews(KIIs) and Focus Group Discussions (FGDs) with the local government (local municipalities) from Doda Watershed and Local Disaster Management Committees and other local community-based organizations
- Develop landscape scenarios and support to formulate local disaster and climate-resilient plans, local disaster preparedness and response plans
- Influence policymakers to scale up and replicate the model to neighboring sub-watersheds and promote transboundary approach
- Feed learnings into government policies and governance structures to improve flood resilience

2. Study Area

The study area is the Doda river system, presented on the map (Figure 1). The Doda watershed is located between 80° 20' 0" E to 81° 05' 0" E and 28° 10' 0" E to 28° 05' 0" which covers the administrative region of Dadeldhura District, Kanchanpur District, Kailali District.

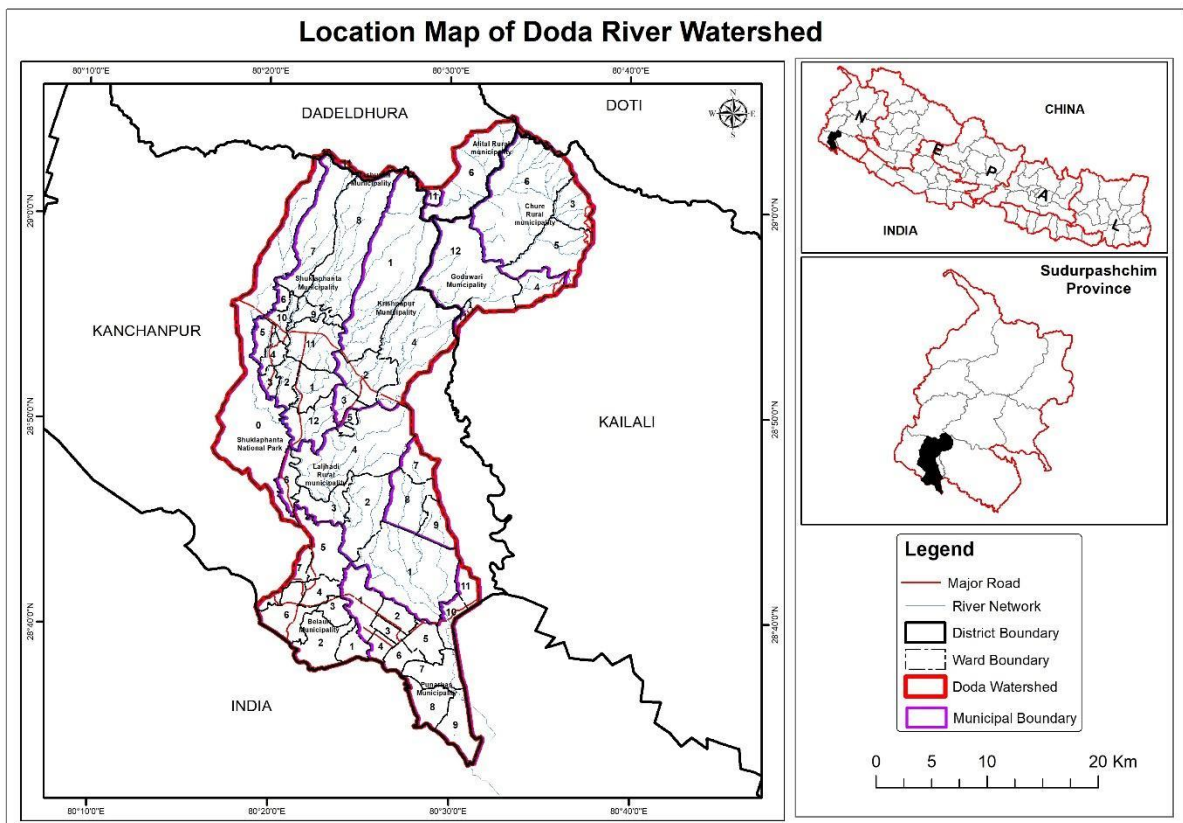


Figure 1: Study area

3. Methodological approach and methods

3.1 Approach adopted

The method in this study was carried out at the watershed level, particularly in the Doda Watershed of Sudurpaschim province. Watershed management integrates various aspects of eco-disaster risk reduction, adaptation, soils, agriculture, forest, hydrology, climate change, and resilience to provide guidelines for choosing appropriate planning and implementation alternatives for the vulnerable community. Geospatial tools such as Geographical Information System (GIS) and Google Earth were used to assess the Doda watershed's geospatiality. The GIS and Google Earth images were used to understand the bio-physical situation of the watershed, including drainage networks, flood inundation areas, landslide zones, and risk-prone areas. Using the Global Positioning System (GPS), was used to locate the vulnerable areas and major hazard impacted areas during the field visit. The bio-physical, geological, physiographical, and drainage network information of the watershed were determined by using the secondary data in the GIS environment.

3.2 Consultation with the project team at MC

A close consultation was done with the Zurich Alliance Policy and Advocacy Specialist and Mercy Corps MRED Project team to build on the methodology outlined here and develop a detailed methodology and field work plan. A consultation meeting was held with the Zurich Alliance Policy and Advocacy Specialist and Mercy Corps MRED Project team at central in Kathmandu and at field level in Dhangadi Kailali in July, 2022. This meeting provided the context and strategic background for the in-depth analysis and discussed the scope of the study in detail.

3.3 Methods

The study was carried out in three phases:

1. Preparatory Phase;
2. Field Visit and stakeholder consultation;
3. Report Preparation

3.3.1 Preparatory phase

a. Desk work and stocktaking similar studies and practices

Relevant literature such as plans, policies, and strategies, legal instruments like regulation and acts in distribution of climate change, disasters and natural resources were considered in the literature review.

Studies and practices related to the Doda watershed landscape were undertaken to find the status of the situation on what has been done, and what gaps are, and what strategies need to be taken to address the problems of flood risk in downstream and the causes of the risk in upstream. Also, what has been done by which stakeholders in the watershed was also reviewed in order to improve transboundary disaster risk management governance at local government.

Some initiatives have been reflected in the watershed, which are as follows:

Early Warning System in Nepal (The Mercy Corps experience 2008-2013)- he report stated that the flood event in Kanchanpur in October 2008 affected 5961 households and 14 death cases. Similarly, 2250 families and 3 deaths in Kanchanpur were affected by the 9 October and 12 October 2009 flood events. On September 18–19 2012, 2,075 families were affected by flooding; 96 families were displaced; 96 houses were completely destroyed; and 1,229 were partially damaged with no loss of human life. The floods in Kanchanpur in 2009 and 2012 in particular were reported as being similar in terms of magnitude and scale from a hydro-meteorological point of view, but due to early warning systems, impacts caused by floods were lowered.

Water Commons and Transboundary Rivers (2017), Institute for Social and Environmental Transition (ISET)-Nepal and ActionAid Nepal-

The flood event in the Doda river on September 20, 2008, caused 2 deaths and the displacement of 18 households in Sreepur VDC. Wards 9, 10,11, 12 and 13 are the most affected wards in Mahendranagar municipality in terms of river cutting and bank erosion.

Conceptualizing flood modelling (2022), Mercy Corps (MC)-

the flood flow has been estimated for the Doda river system by using empirical methods, and the mean monthly flow for September in the Doda river system is about 84.39 m³/s. The 50-year flood and 100-year return period flood hazard maps of the Doda river system showed high depths of flood in the flood plain region downstream. For example, the highest depth in a 50-year return period flood was estimated at 2.65m and for a 100-year return period was 2.705m.

Formation of Community Disaster Management Committees (CDMCs) Network: A network of CDMCs (+30 CDMCs) exists at the local community level in the watershed. The MC plays a key role in developing and strengthening the network in the watershed. The role of the network is to be involved in disaster and natural resource management at the community level and share information about flood risk in the watershed

Local Adaptation Plan of Action, Belauri Municipality, Kanchanpur (2075)-Flood risk is the most serious issue in the municipality, followed by inundation, pest and disease infestation, wild animal attacks, windstorms, forest fire, landslide, drought, and thunderstorm. Flood impacts threaten agricultural land. Likewise, the impact of droughts and cold waves on agriculture crops, viz vegetables, pulses, and oil seeds, is significant in the watershed. The very high vulnerable wards are 1,2, 5 and 9 while the low vulnerable ward is 4, in the municipality. Around 13% (1178) of households live in high-risk areas.

Disaster Preparedness and Response plan, Alital rural municipality (2078)- Flood and landslide are the most severe hazard events that have impacted Alital rural municipality's livelihoods, followed by pest and disease infestation, drought, windstorm, forest fire, epidemics, wild animal attacks, and thunderstorm.

Disaster Preparedness and Response plan, Parshuram municipality (2078)- The major hazards impacting the municipality are flood, landslide, forest fire, hailstorm, windstorm, drought and epidemics. The plan incorporated nine cluster-wise activities to be carried out during the preparedness and response period of the disaster events.

Local Adaptation Plan for Action, Laljhadhi rural municipality (2075)- the local impacts of climate change are flood, inundation, river bank cutting, sediment deposition, wild animal attacks, and cold waves. The multi-stakeholder identified during LAPA preparation are local representatives, local service centers, political leaders, users' groups, dalits, women's groups, etc.

Municipality of Sukulaphanta (2075)-Floods, pest and disease infestations, windstorms, wild animal attacks, drought, cold waves, epidemics, forest fires, and thunderstorms are the most prioritized hazards affecting the municipality.

b. Preparation of thematic maps of Doda watershed

Land use changes and land capability within the watershed were assessed on the basis of a land systems map of scale 1:50000 and also on the drainage patterns, slope classes etc. The map was prepared from aerial photography taken in 1978/79 by the Department of Survey. The slope map was made by using the DEM on the topographical map (DoS, 1996).

The types of land use and land cover with their corresponding areas and general features in existing condition will also be assessed. The land capability of the watershed will be determined by assessing land features, for example, slope. The slope classes are: Class I (0-3%), Class II (3-15%), Class III (15-30%), Class IV (30-60%), and Class V (>60%). The land capability class indicates the general degree of limitation to use and the versatility of land use.

Similarly, topographic maps at a scale of 1:25 000, published in 1996 by the Survey Department, Government of Nepal, were used to get topographical data and information about drainage, land use, land cover, trails, buildings, houses, build up areas, other infrastructure, forest lands, agriculture lands, etc.

Using a Geographical Information System (GIS), the Doda watershed boundary was delineated on topographical maps at a scale of 1:25 000 based on the principle of surface water division with an outlet ridge-line. The base map of Doda was prepared by incorporating major land features like boundaries, rivers, buildings, and ward and municipality/rural municipality boundaries.

Digital Elevation Model

The altitude of the Doda watershed ranges from 97 meters above sea level to 1914 meter above sea level (Figure 2). The map shows a flat area in the southern part of the watershed and the steepness in the northern part.

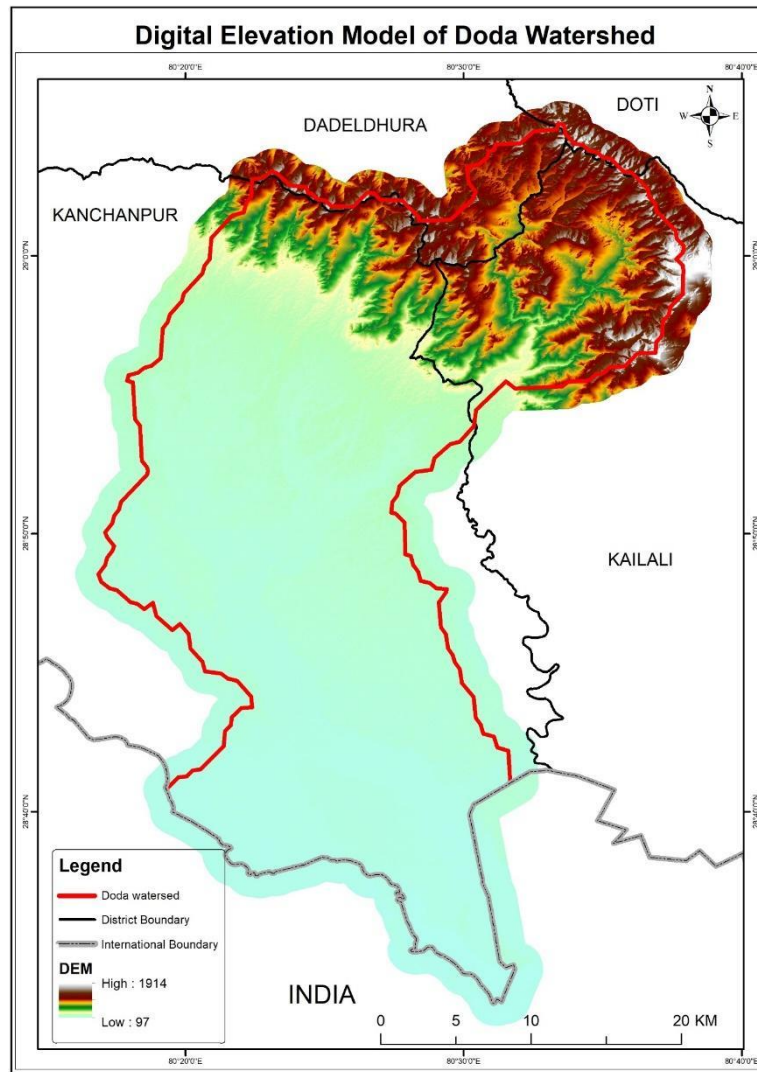


Figure 2: Digital elevation model of the watershed

Major local territory in the watershed

Physio-graphically, the Doda watershed is divided into three, i.e., the Siwalik and Terai areas (Figure 3). The area covered by Siwalik was 32% of the total watershed, followed by Terai by 68%.

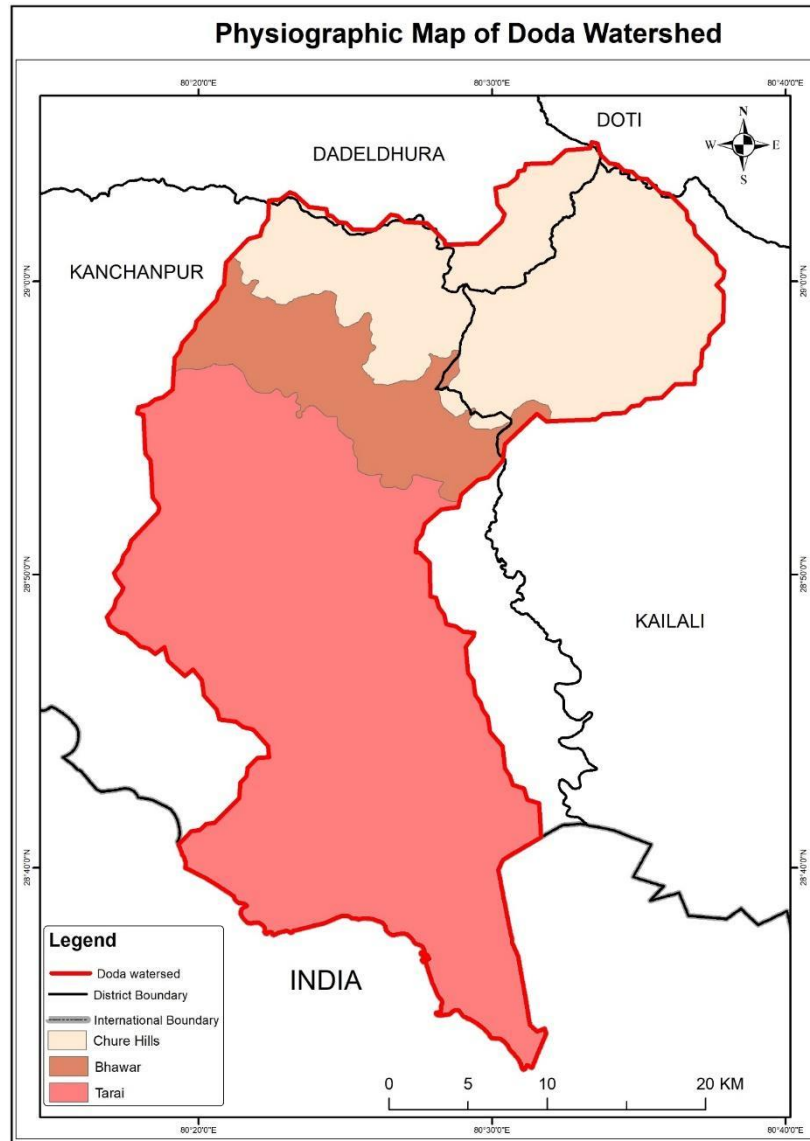


Figure 3: Physiographic map of the watershed

The Doda watershed covers around 946.2 sq. km. The watershed lies in the Doti, Kailali, Dadeldhura, and Kanchanpur districts of Sudurpashchim Province (Figure 4). The major coverage of the watershed is as follows (Table 1): around 18% of the watershed lies in the Krishnapur municipality of Kanchanpur, followed by Shuklaphanta Municipality of Kanchanpur (17%) and Laljhadi Rural Municipality of Kanchanpur (16%). The watershed covers three rural municipalities (Joraya of Doti, Laljhadi of Kanchanpur, Chure of Kailali, and Alital of Dadeldhura) and six municipalities (Godawari of Kailali, Belauri of Kanchanpur, Krishnapur of Kanchanpur, Punarbas of Kanchanpur, Shuklaphanta of Kanchanpur, and Parashuram of Dadeldhura).

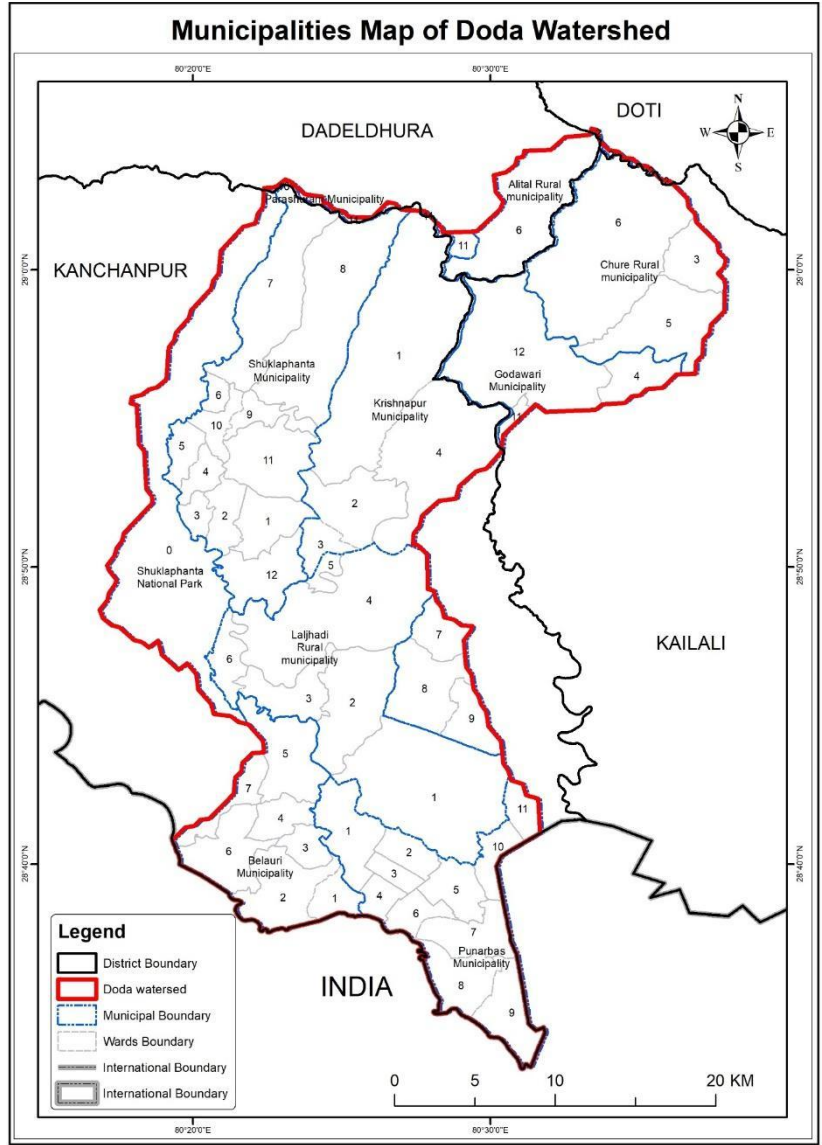


Figure 2: Municipality map of Doda watershed

Table 1: Palika wise coverage of Doda watershed

DISTRICT	GaPa_NaPa	Province	Cover by Doda watershed	
			Sq KM	%
DOTI	Joroyal RM	Sudur Pashchim	1.2	0.1
KAILALI	Chure RM	Sudur Pashchim	101.3	10.7
KAILALI	Godawari M	Sudur Pashchim	59.6	6.3
KANCHANPUR	Belauri M	Sudur Pashchim	74.8	7.9
KANCHANPUR	Krishnapur M	Sudur Pashchim	172.8	18.3
KANCHANPUR	Laljhadi RM	Sudur Pashchim	151.8	16.0
KANCHANPUR	Punarbans M	Sudur Pashchim	96	10.1
KANCHANPUR	Shuklaphanta M	Sudur Pashchim	162	17.1
KANCHANPUR	Shuklaphanta National Park	Sudur Pashchim	87.7	9.3
DADEL DHURA	Alital RM	Sudur Pashchim	34.1	3.6
DADEL DHURA	Parashuram M	Sudur Pashchim	4.9	0.5

Road network and drainage network

A road network is a network that connects several segments to form a transportation node that can provide choices or alternatives for its users. The total road network that connects the Doda watershed with other municipalities is 1147 km (Figure 3). Around 73% of the roads within the watershed are cart tracks, followed by 13% of main trails, 4% district roads, 3% of highways, 3% of crossing fords and 2% of other connecting roads. The drainage network of the watershed is shown (Figure 4).

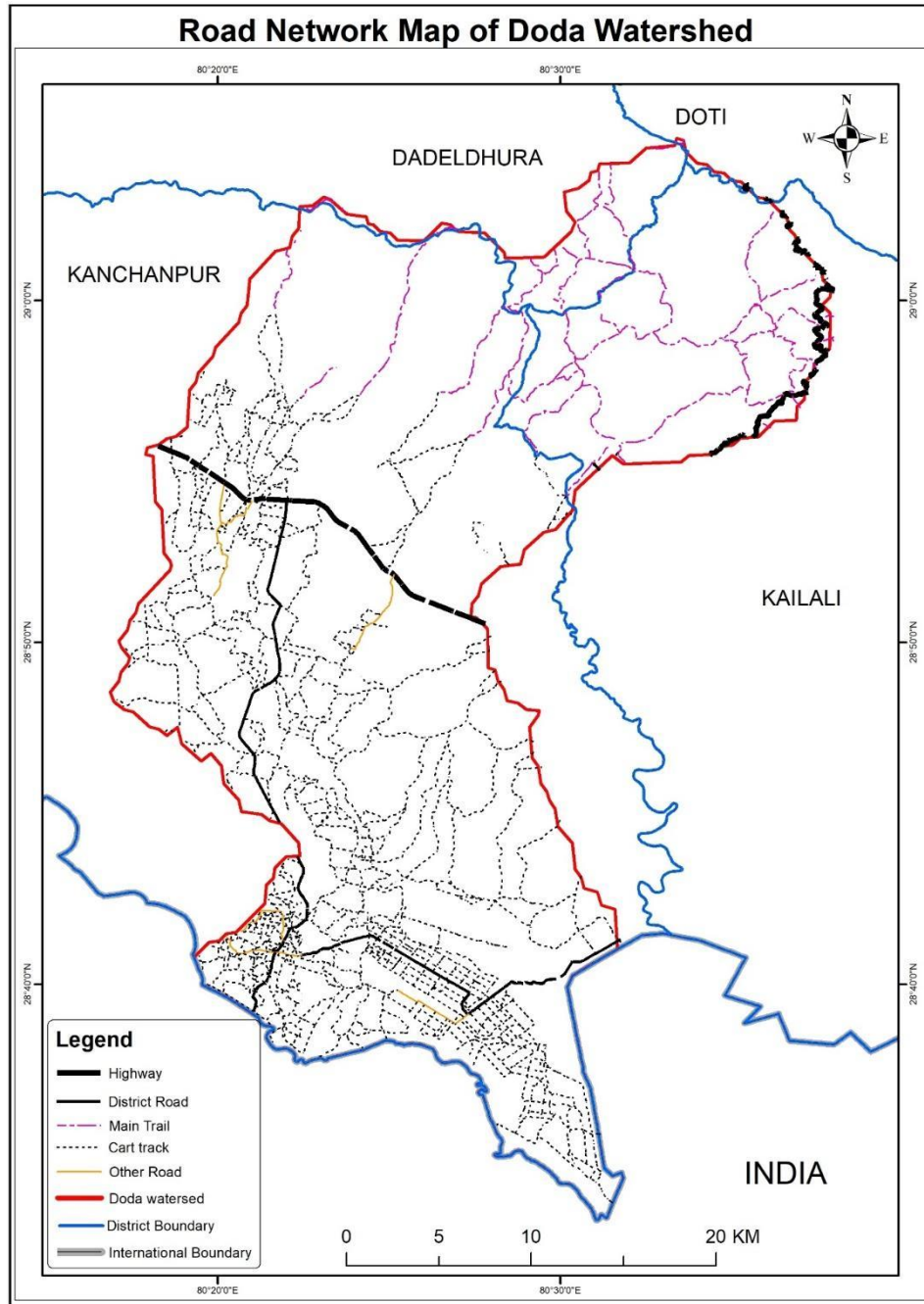


Figure 3: Road network within watershed

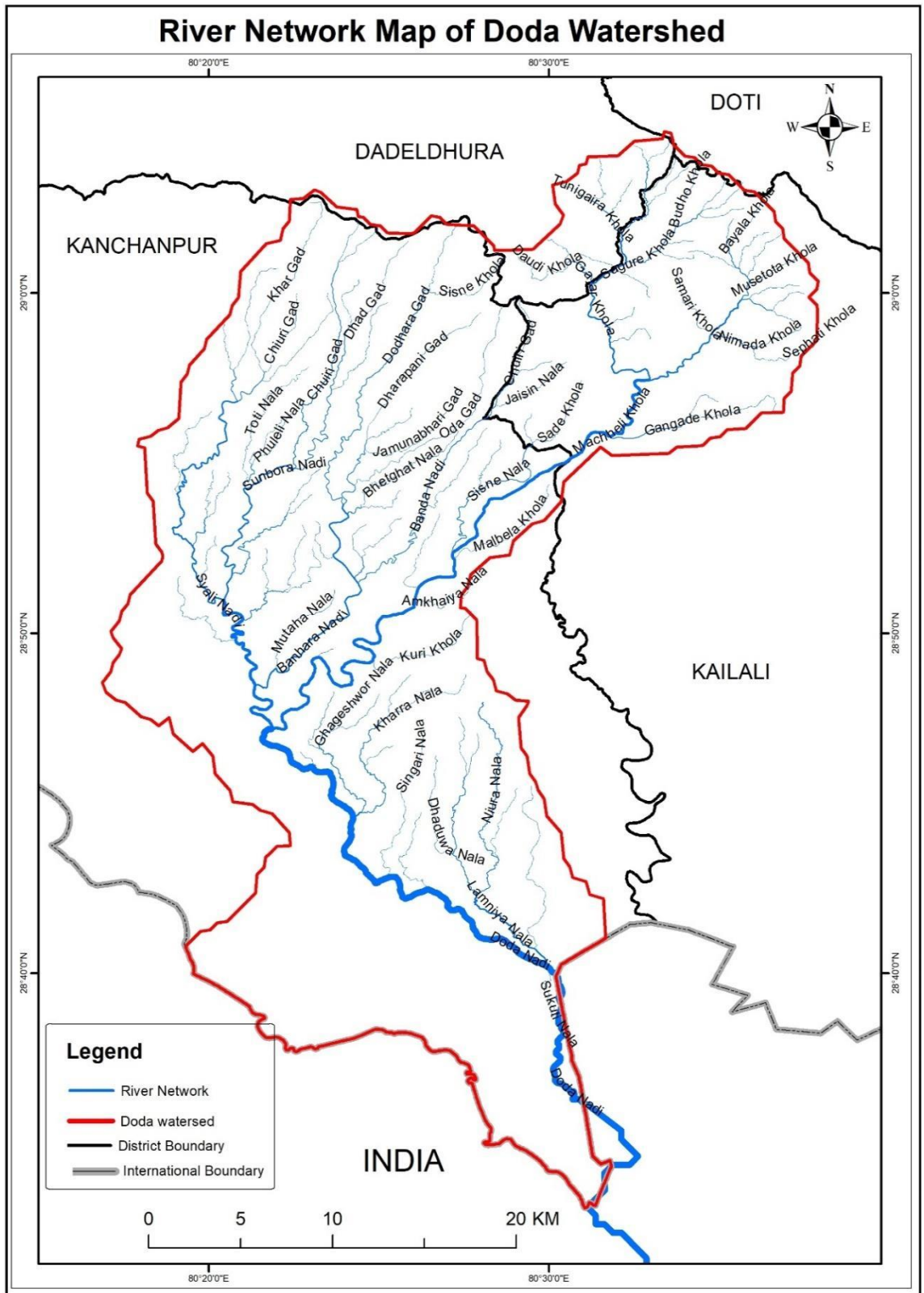


Figure 4: Major river network of Doda river and the climate stations nearest to the watershed

Slope

A slope is an important causative factor when considering landslides and floods. Usually, steep slope areas are more susceptible to landslides, and areas with a low slope gradient, usually flat areas, are more susceptible to flooding. The slope gradient was generated from the DEM image. The slope gradient ranged from 0 to 77.2 degrees and was then classified into five classes. After the classification, the results showed that most of the watershed area (47.9%) was found in the 0–3° slope class (Figure 5), followed by the 3–15 slope class (28.05%) and so on (Table 2).

Table 2: Slope classes in the watershed

S.No.	Slope (Degree)	Area (sq km)	Percentage
1	<3	453.0	47.90
2	3-15	265.3	28.05
3	15-30	160.3	16.95
4	30-60	66.7	7.05
5	>60	0.5	0.05
	Total	945.8	100

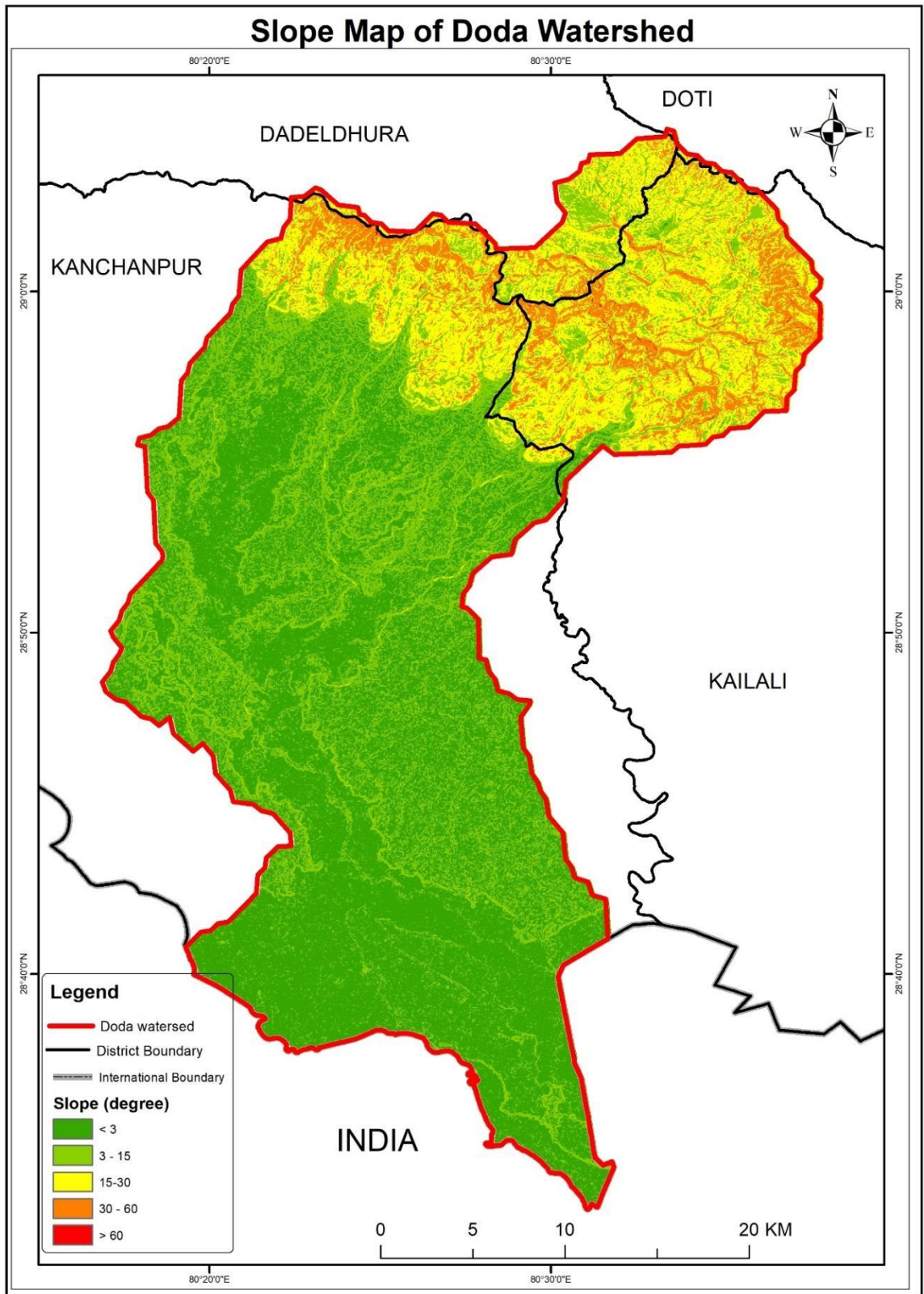


Figure 5: Slope map of the watershed

3.3.2: Field Visit and stakeholders' consultation

Consultation with relevant stakeholders in the watershed

Several consultation meetings with different relevant stakeholders involved in the watershed were held during the study period (from July 23 to July 30, 2022). The consultation agenda was primarily focused on:

- the study's objective;
- Cross-border issues within local government units;
- disaster-related issues in upstream and downstream communities; and
- barriers in watershed management.

The main objective of the consultation was to assess the possible opportunity to develop a platform in the watershed to discuss and explore possible solutions in an integrated approach to the climate, disaster and natural resources issues in the watershed landscape to enhance the capacity of the flood-suffering communities and make them resilient.

A. Consultation with the local government units:

In upstream:

- Chure rural municipality
- Godwari municipality,
- In midstream:
 - Krishnapur municipality,
 - Shuklaphanth municipality

In downstream:

- Laljhadi Rural Municipality,
- Belauri Municipality
- Punarwash Municipality

B. Consultative meetings with other government agencies supporting in the watershed management activities:

- Bani Sub-division Forest Office, Kanchanpur,
- Janatako Tabanda, Kanchanpur,
- Field Office of Hydrology and Meteorology, Kailali.

C. Consultation with other Community based Social Organizations:

- Nepal Red Cross Society, District Chapter, Kanchanpur,

- National Environment and Equity Development Society, NEEDS Nepal
- Community Forest Coordination Committee (CCFC)
- Nepal Network of Social Welfare Association (NNSWA)
- Chhada Pashu Byabasthapan Samitee

3.3.3: Report Preparation and Submission

Preparation of draft assessment report

A draft assessment report has been prepared after analysis of the field information and landscape assessment. The report is in the process of being shared with the Zurich team and Mercy Corps MRED Project team to get suggestions and feedback on the report.

Preparation and submission of final report

The comments and feedbacks on the draft assessment report is also in the process from Zurich team and Mercy Corps MRED Project team. The comments and suggestion are welcome.

4. Findings and Discussions

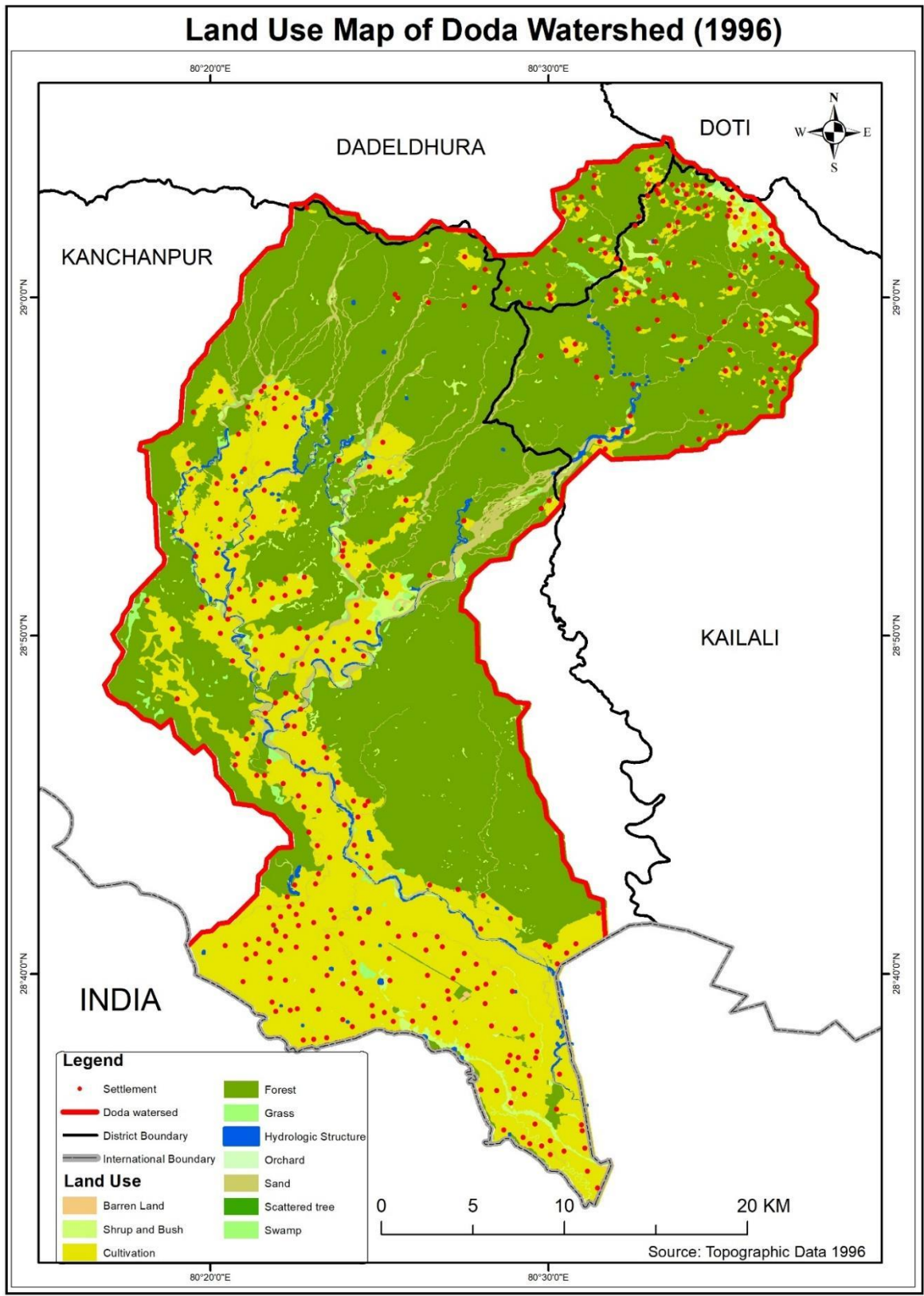
4.1 Land use land cover change in the watershed

The summary of the land use and land cover changes of 1996, 2010 and 2019 for the Doda watershed is presented below (Table 3). Over the last 23 years, the forest area (-4.70%), sand (-0.65%) and water bodies (-0.08%) have decreased in the watershed, whereas settlement and agricultural practices have increased in the watershed (Figure 6).

Table 3: Land use land cover change in Doda watershed in last 25 years

Land Use Type	1996		2010		2019		Change over 23 years
	Area (sq km)	%	Area (sq km)	%	Area (sq km)	%	
Barren Land	1.1	0.11	55.02	5.82	0	0	-0.11
Bush	18.6	1.97	1.46	0.15	0	0	-1.97
Cultivation	295.9	31.29	300.10	31.73	339.3	35.87	4.58
Forest	577.7	61.09	567.06	59.96	533.3	56.39	-4.70
Grass	8.9	0.94	9.70	1.03	31.9	3.38	2.44
Water bodies	4.6	0.49	11.39	1.20	3.9	0.41	-0.08
Orchard	0.5	0.05	0.00	0	0.0	0	-0.05
Sand	37.7	3.99	0.00	0	31.59	3.34	-0.65
Scattered tree	0.1	0.02	0.00	0	0	0	-0.02
Swamp	0.5	0.05	0.00	0	0	0	-0.05
Built-up area	0.0	0.00	1.04	0.11	5.71	0.60	0.60
Bare Rock	0.0	0.00	0.00	0	0.01	0	0

Bare Soil	0.0	0.00	0.00	0	0.00	0	0
Grand Total	945.71	100	945.78	100	945.71	100	



6 a) Landuse map of 1996

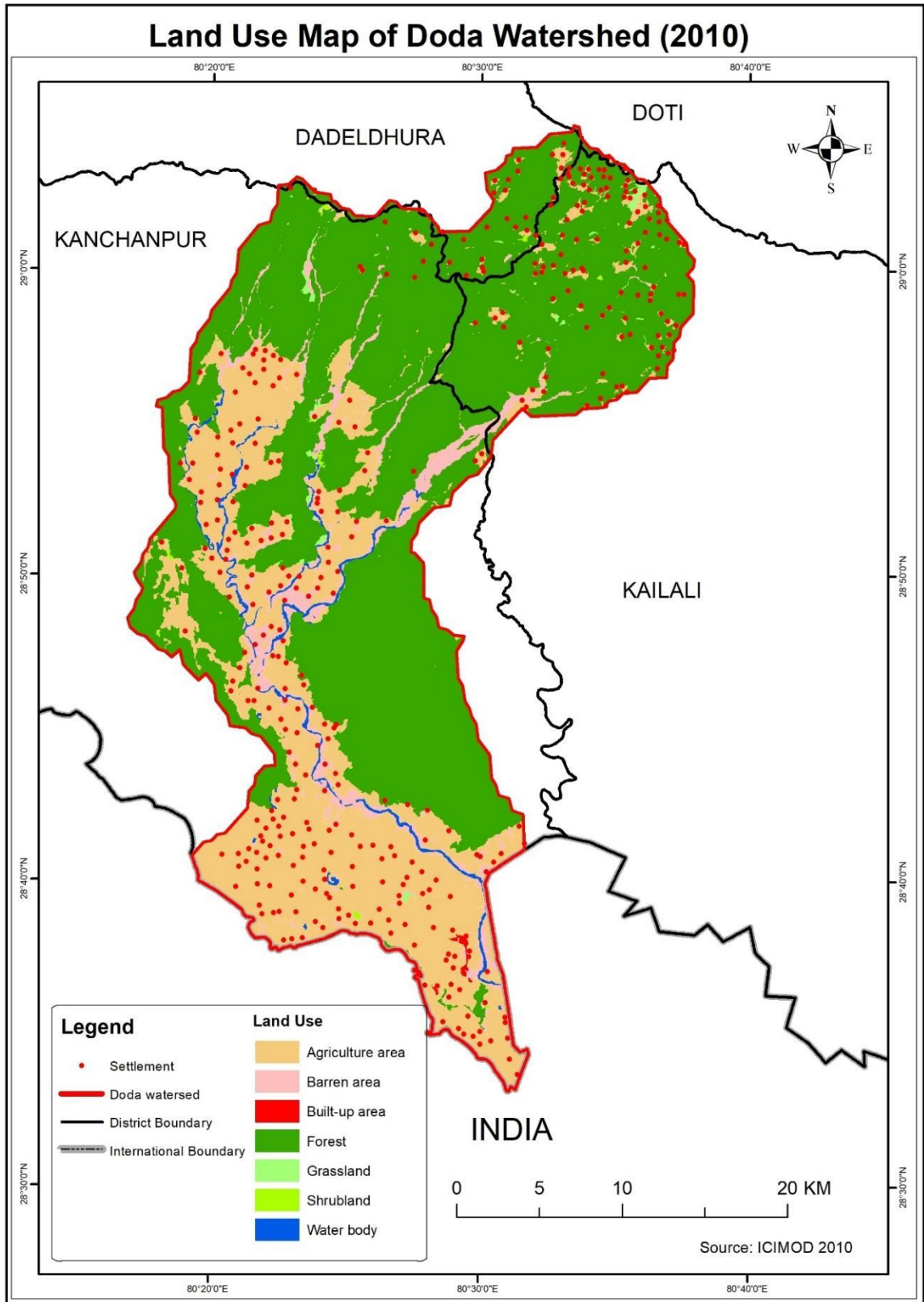


Figure 6b) Landuse map of 2010

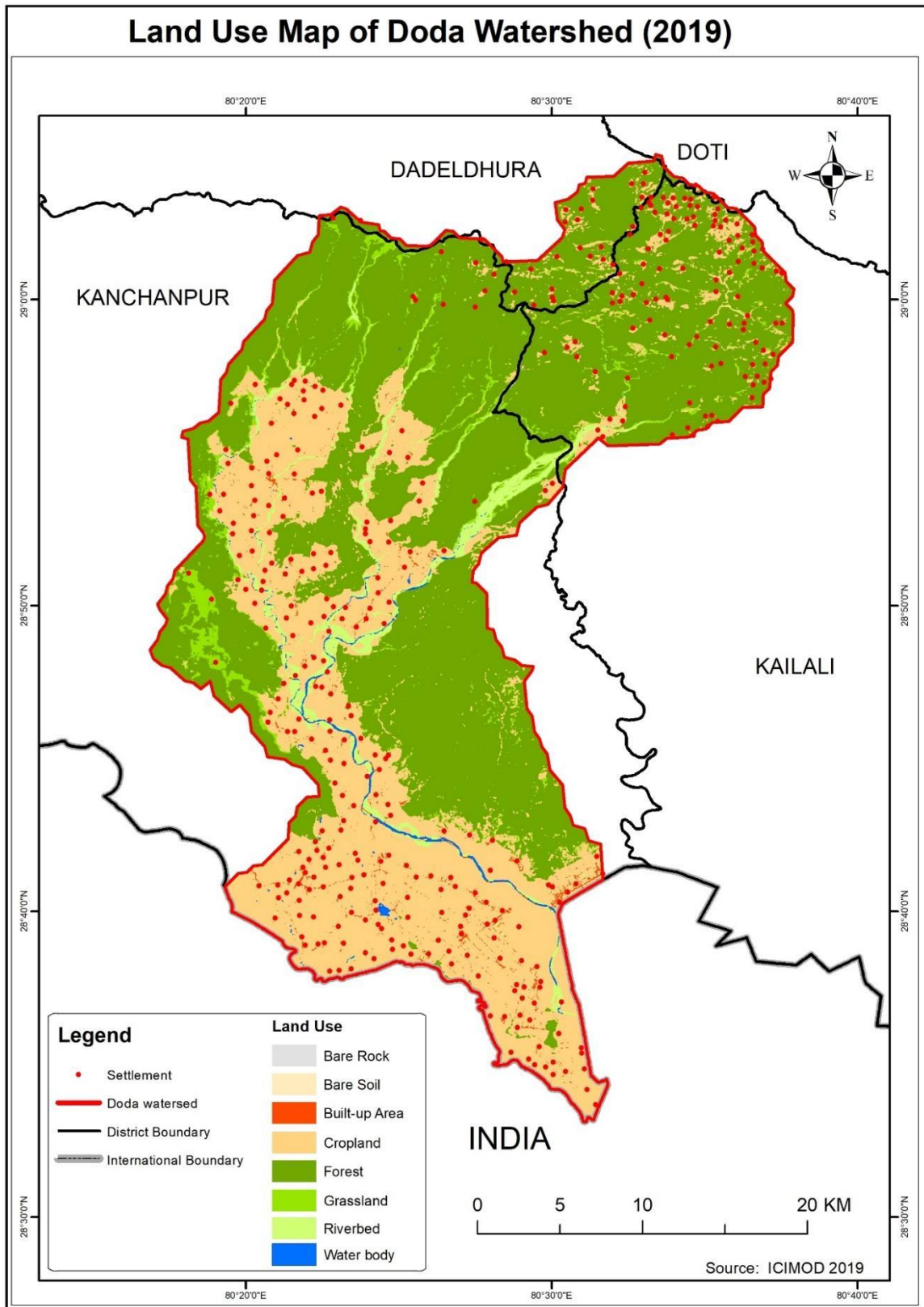


Figure 6: Landuse change over 23 years (figure a, b,c)

4.2 Climate factors trend

Precipitation trends differ in different districts across the physiological regions and provinces. Precipitation in Kanchanpur and Kanchanpur districts exceeded 4 mm/yr. Kanchanpur districts experienced more than 4 mm/yr of precipitation¹. All the districts of Sudurpaschim Province show an increasing precipitation trend. The Terai region of Sudurpaschim has the highest increased precipitation trend. The Chure of Sudurpaschim Province has observed an increasing trend.

4.3 Issues and barriers in the watershed

The issues highlighted below are based on the consultations with the concerned stakeholders and the secondary information.

a. severe landslides and erosion downstream

The upstream region of the watershed is highly sensitive to landslides and erosion. For example, there are five major landslides in the upstream, including three landslides in Machheli khola and two in Churi-gad khola. Upstream, landslides are a major source of pebbles, boulders, sands, clay, and soil erosion.

b. River bank erosion poses a threat to agricultural lands and the community.

- In 2019, the river bank cutting resulted in the loss of 40 hectares (ha) of agricultural land in Shankarapur. When the Shallow khola joins the Doda river, there is a high deposition in the lowlands of Laljhadi.
- About 2500 households are at risk of river bank cutting and floods in the Krishnapur municipality.
- The locals said haphazard sand and boulder mining from the Chure region is also illegal (that is, the mining is around the Chure region—having 300 meter altitude and 5 degree slopes are understood as illegal mining activities).
- Once the Shyali Nadi mixes with the Doda river, it loses a huge quantity of land in Shuklaphant municipality 1, 2, and 12, and the losses have been increased when Banara meets the Doda river.
- The most affected areas in Shuklaphant municipality are 3, 5, 6, and 7.
- Displaced people (20 HHs) came from Laljhadi rural municipality 3 and have reclaimed lands in Shuklaphant 10. As a result, forest losses have happened in the region.
- Every year, the Doda river bank loses 4 ha of land while expanding by 500-700 meters.

¹ https://reliefweb.int/sites/reliefweb.int/files/resources/Vulnerability_Report_1622809902_compressed.pdf

c. Instability of irrigation facilities:

With no stable irrigation system structure in Laljhadi , the community manages irrigation needs by pumping water from the Doda river. In addition, water pumping from the Doada river helps to irrigate more than 800 ha of land in winter crops and also in summer crops. In recent years, a certain flow (about 1.5 feet) has occurred in the main channel of the Doda river in downstream, but there has been almost no flow in the last 20–25 years downstream.

d. Flooding and inundation and deposition downstream

- After 4-5 hours of rain in the Shuklaphant and Krishnapur regions, flood and inundation occurred downstream in Laljhadi, and the flood impact area expanded to 2-3 kilometers from the main river channel to agricultural lands.
- The deposition of sand, silt soil causes a rapidly changing river course (started in 1985) in downstream and riverbank cutting losses in agricultural lands, particularly in Purnarbash Municipality-1, 2, 5, 7, 8, and 9. In addition, the most vulnerable communities (Dalit, Indegioius Peoples (IPs)) of more than 20,000 depend on cultivation lands (more than 400 ha), which are at high threat to flooding in the municipality.
- Previously, the river depth was much lower than the agriculture lands, but the agriculture lands have been deposited with silt-soil by 20 feet in the last 12 years. Every year, up to 1.5 feet of sand and silt soil are deposited on agricultural lands below the watershed.

e. Backwater from intervention activities in Indian territory is increasing flood risk.

- If any intervention happens towards Daduwa International Park-Indian’s National Park existed on the left bank of the river, there is a threat to Nepal’s land (Punarwash municipality-ward 9) on the right bank. The Nepal-India boarder demarcation structures (Junge Pillars-185 & 186) have been heavily damaged by the deposition of sands and flooding.
- Bushes, boulders, flooded and residual woodlots deposited in lowlands in Indian territory become huge obstacles in runoff flow in the monsoon season, resulting in backwater and threatening Punarbash municipality wards 2, 5& 9.

f. Loosing economic values of lands:

According to the locals, financial institutions give low priority to agricultural lands, which are at risk of inundation and flooding.

g. Deforestation and Forest Degradation (D&FD)

- Doda riverbank cutting losses forest land, especially in Krishnapur municipality-4 (Bhalubela, Belkumari), ward 2 and ward 5, and near the upstream and downstream of the E-W highway. Likewise, Banda khola threatens forest land in Kanchanpur municipalty 5 & 1.
- Every year, river bank cutting results in the loss of 40–50 trees in Punarbash municipality–2 and 200–300 forest trees in Laljhadi.
- Embankment structures have been adopted in community settlement sites, but not in forest lands. As a result, a huge quantity (yet to be studied) of forest soil is being lost.
- Illegal cutting and encroachment are also contributing to forest loss, which is not addressed by any government agencies or other stakeholders.
- Huge losses of forest due to landslides (Chure-6, Simti, Rampani, Saujiya Ghat, Maina; Chure-5 Khani Danda, Budaganu, and riverbank cutting in Chure rural municipality 5 & 6 (Bayala, Gjar, Fatkune, Simti) in upstream and also Godabari municipality-12 (about 20 ha of forest land) in Bandre Chauki forest lands.
- Shally nadi and Chaudhar khola are two tributaries of the Doda river that have damaged forests and lost forest lands in Shuklaphant National Park.

h. Inadequate resources for natural resource management, as well as risks from climate change and disasters,

- Lack of coordination to get resources to prepare for and respond to disasters in the watershed's downstream. However, coordination among Laljhadi, Bilauri and Punarwash local units has occasionally been initiated as per the requirements, especially for the early warning system, and also for mutual support for search and rescue and information sharing.
- Local governments have inadequate financial resources, especially for embankment structures that are one of the most needed river control measures.
- The locals are aware of the vegetative means, for example, bamboo plantations along the riverbank, but they have inadequate knowledge of the bamboo species for seedlings and plantations. In addition, massive bamboo plantations could also help to control elephant risks (here, the region of Punarbash is also a corridor for elephants).
- Water retention measures are inadequately in place in the Chure region. As a result, the water sources (surface and ground) are dry in the watershed.
- There are several good cases of horticulture species planting (self-reliance in banana farming) in the region, but due to a lack of resources, the replication of the good practices has yet to be explored in the river claimed land in Doda river and to promote Bel farming, Woodlot species, Amala plantation, other herbal plants, and fish farming, all of which need to be linked to the local community's income generation.
- Wildlife attacks on cultivation crops are the major problems in the watershed since the forest coverage has been increasing in the region, according to the locals.

i. Weak coordination among inter-palikas and other stakeholders in the watershed

- Coordination gaps exist between forest offices and the soil conservation office (Dadeldhura) and local governments for plantation in river-claimed lands in downstream and gully stabilization in upstream.
- Due to a lack of coordination among the Community Forest User Groups-CFUGs (22 CFUGs in the Doda watershed, including 8 CFUGs in upstream), attention for its management is inadequate, especially in the forest coverage areas of 100 ha in the National Forestry area and 3000 ha in the 8 CFUGs in upstream).
- A lack of coordination and collaboration between Shuklaphanta municipality and Shuklaphant National Park to manage degraded forest and river cutting issues in the national park area.
- Lack of budget with low priority for the protection measures of forest losses due to riverbank cutting and flooding in Shuklaphanth National Park;
- Practicable policies and practices do not exist in resource utilization for forest management. For example, the municipality cannot invest funds in the core area of the national park but can transfer budget into the national park budget headings and the budget can be spent by the national park rather than the municipality.
- The government has given high priority to building structural measures (emababkments) in Doda river control through the *Janatako Tatbanda* Programme for the last 10 years, and the government has a master plan for the river system. But, the structures have been made for 12 km since then. Every year, a budget of Rs.3.5 karod is spent on the structure in the river, which is insufficient to meet the people's demands in midstream and downstream.
- There is no water flow monitoring gauge station established by a government entity (OHM). If any intervention for monitoring the water level might be in the river, which is not a formally recognized.

5. Formation of dialogue platform

5.1 Rational of the platform

- In order to address the above listed issues and other relevant barriers to climate and disaster risk management, a multi-disciplinary dialogue platform is outlined on the basis of the consultative meetings and interaction with the concerned stakeholders working in the watershed. It is also expected that necessary policies and tools to solve climate and disaster vulnerabilities in the Doda watershed will be produced through continued dialogue and interactions. Similarly, the issues of administrative units (upstream and downstream communities) related to disasters focused on floods will be exposed once the platform is established. The platform will also discuss the legal barriers and opportunities for downstream communities to invest upstream.
- The linkage of upstream and downstream communities is very important for the reduction of flood and drought risk. Activities such as gully erosion control, pond construction, terrace

farming, etc. are needed in the upstream, while riverbed farming, agroforestry, and bioengineering activities are important in the downstream for risk reduction. Horizontal collaboration between administrative units is needed for disaster risk reduction and management. Payment for Ecosystem Services (PES), one of the tools linking upstream and downstream issues and opportunities for sustaining ecosystem services, helps to build linkages between upstream and downstream communities.

- Multi-stakeholder dialogues (MSD) aim to bring relevant stakeholders with a common goal to discuss barriers and interests to create mutual understanding and brainstorm a common course of action towards a productive goal. This platform will bring together interested groups from both the upstream and downstream and cross-border palikas/groups in order to increase participatory dialogue, take decision making, and improve communication about the Doda watershed's issues.
- The institutional framework will clearly define the mandates, roles, and responsibilities of each actor (Figure 10). Representatives of civil society organizations (CSOs), national and international non-governmental organizations (NGOs/INGOs), the private sector, and academia are also members of the platform.

5.2 Upstream, downstream and cross boarder stakeholders in the watershed

The stakeholders, including government agencies, non-government and private agencies listed below, are key organizations involved in the watershed and they directly contribute to risk reduction from climate and disasters and also to natural resource management

- Chure Rural Municipality
- Godawari Municipality
- Shuklaphanta Municipality
- Krishnapur Municipality
- Laljhadi Rural Municipality
- Punarbas Municipality
- Belauri Municipality
- Alital Rural Municipality
- Parashuram Municipality
- Joraya Rural Municipality
- Shuklaphanth National Park
- Kunda Sub-division Forest Office,
- Red cross Society
- Udhog Banijya Sangh
- Regional Office-Department of Hydrology and Meteorology

- International Non-governmental Organizations (INGOs): Mercy Corps
- Non-Governmental Organization (NGOs): NEEDS Nepal, Nepal National Social Welfare Association (NNSWA)
- Community Disaster Management Committees (CDMCs)

5.3 Functions of the platform in the Doda Watershed:

- to build a good linkage between upstream and downstream municipalities.
- To interact and find a way out to control and manage the over-exploitation of river-induced mines and materials in the watershed;
- To utilize resources of the watershed in a sustainable manner among the palikas
- To establish a sustainable approach for the collaboration, coordination, and investment in various programs by local government units and communities in upstream in order to control or reduce deposited materials that originated uphill, such as awareness programs, plantation and conservation, soil erosion, and landslide protection programs in upstream. Here, the downstream local governments wanted to ensure control of mining and landslides.

5.4 Structures of multi-stakeholder dialogue platform

The structure of the platform is outlined from community level to watershed level, which is discussed below.

a. Community level stakeholder dialogue forum

The ward level Local Disaster Management Committee (LDMC), led by the ward's chairperson, would be a formal government entity at ward level in each palik of the watershed. In addition, a network organization of Community-based Disaster Management Committees (CDMCs) at ward level can play a role in secretariat and coordination support for LDMC.

b. Palika level multi-stakeholder dialogue forum

The existing LDMC in each palika can coordinate with the concerned stakeholders, including CDMCs, Red-Cross, and I/NGOs working in the respective palikas, to dialogue on common and cross-cutting issues related to climate ,natural resources, and disaster management.

c. Inter-palikas level multi-stakeholder dialogue forum and coordination committee:

An inter-palika multistakeholder dialogue forum needs to be established to deal with common issues regarding the Doda watershed. The dialogue forum can be run by a loose network of Inter-palika Coordination Committees (ICC), which includes representatives

from each LDMC (disaster focal persons), CDMC representatives, Red Cross representatives, and I/NGOs representatives. The committee is to be formed upstream, midstream, and downstream separately.

d. Watershed level multi-stakeholder forum

- A forum for multi-stakeholder dialogue at the watershed level is required to be established by including representatives of the Inter-Palika coordination committee (newly to be formed), the focal desk of the Ministry of Internal Affairs and Law, government entities, the Office of Hydrology and Meteorology, Shuklaphant National Park, etc.
- A government agency is required for overall coordination with the palikas in upstream-downstream and cross-border palikas. Here, a province-level government entity will be one potential entity for overall leadership (for example, the Focal Desk at the Ministry of Internal Affairs and Law, Sudurpaschim Province).
- Sectoral government agencies: government agencies, especially those working in different sectors such as forestry, river training, natural resources management, wildlife conservation and management, river training and management, agriculture, and irrigation systems, should be the key entities of the platform at watershed level.
- A non-government unit/network can provide support to the leading entity by playing a secretariat role in supporting the lead entity.
- Other organizations are also potential stakeholders for the platform, including non-government agencies and the private sector—Udhyog Banijjya Sang, Mines Collector/Contractors

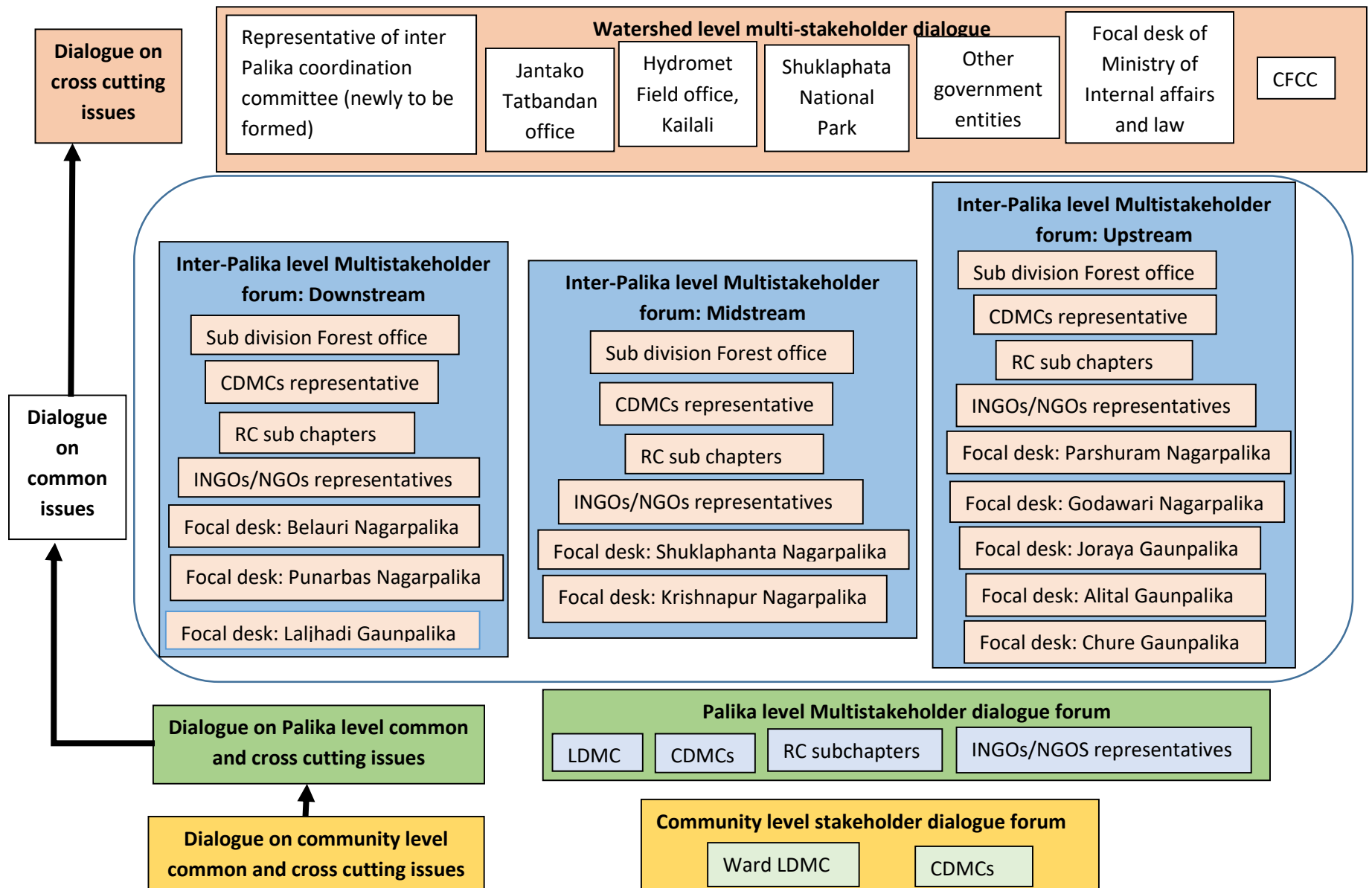


Figure 7: Multi-stakeholder platform

6. Conclusion and Recommendations

6.1 Conclusions:

The study concludes the following highlights:

- Forest land use and cover has decreased by 4.7% of total forest area coverage in the watershed over the last 23 years (1996–2019), while cultivation land has increased by 4.58%. The lost forest land might be converted (partly) into grassland, which increased by 2.44% in the period.
- Landslides, erosion, and forest degradation in the upstream region are some of the main sources of land degradation and water depletion in the downstream region of the watershed that contribute to decreasing agricultural production and productivity. The other causes include natural resource mining in mid-stream and upstream of the watershed.
- The local government units—cross-border and vertical units—have initiated their efforts in watershed management through integrating landuse changes, climate and disaster risks into their planning process. However, they are unable to coordinate within the palikas, having common and cross-cutting issues in natural resource management, climate change, and disaster risk reduction in the watershed.
- There is a coordination gap within the government entities working in the watershed and also with other international and national non-governmental organizations and civil society organizations (CSOs), especially in the restoration of forest ecosystems, agriculture land ecosystems, and water management in the watershed.
- There is a strong gap between province-level ministries and local government units in resource utilization and collaboration. As a result, overlapping and inadequacy of resources to address the common issues of two or more palikas.
- A number of Community Based Disaster Management Committees (CDMCs) are in place, which is a remarkable network that exists in the watershed to address climate and disaster risk management. However, their capacity in terms of skills, knowledge, technology transfer, and income-generating activities is inadequate. As a result, the network is becoming weaker and also raising its sustainability.

6.2 Recommendations:

The recommendations are as follows:

- Support for continuous and regular interaction with high-level public representatives of all palikas, upstream and downstream;
- Develop close coordination between Shuklaphanta municipality and the Shuklaphanth National Park;
- support for the establishment of the proposed multi-stakeholder dialogue forum platform, which is required to deal with common and cross-cutting issues and barriers to watershed

management. In order to make the forum strong, a working guide/guideline/Standard Operating Procedure (SOP) needs to be developed.

- Build a strong mechanism to conserve the Chure region and give high priority to controlling riverbank cutting.
- Build coordination relation with the central government for a strong collaboration for the resources in Doda watershed
- support for restoration of degraded forest and vulnerable agriculture lands, and climate and disaster risk reduction in an integrated approach by collaborating with interpalikas and other stakeholders.
- There is a need to strengthen the existing network of CDMCs and connect them to livelihood programs on river-claimed land in the watershed.
- Establish a formal hydrological monitoring gauging station in the Doda river to monitor water flow and link the data to an early warning system.

Annexes

Annex 1: Checklist at field level interaction

Upstream

- What are the major issues in upstream communities?
- What is the level of importance of forest in providing water ecosystem services (provisioning, cultural, supporting and regulating services)?
- What are the factors that hinders the linkage /relation between upstream and downstream community?
- What are the roles of major stakeholders to address the cross boundary issues (flood)?
- What are the agro-ecological interventions needed in upstream?

Downstream

- What are the major issues in downstream communities?
- What are the factors influencing willingness to pay in downstream communities?
- What are the factors that hinders the linkage /relation between upstream and downstream community?
- What are the opportunities to invest upstream by downstream?
- What are the legal barriers to invest upstream by downstream?

Annex: 2. List of Consultation

Mr. Nirmal Lama, Chairperson, Laljhadi Rural Municipality (Gaupalika)

Deputy Mayor, Belauri municipality

Mr. Bal Mukunda Bhatta, Assistant Chief, Bani Sub-division Forest Office, Kanchanpur

Mr. Ran Bahadur Mahara, Mayor, Shuklaphanth Municipality, Kanchanpur

Mr. Birendra Bhatta, Mayor, Godabar municipality, Kailali

Mr. Roshan Singh Thangunna, Assistant Warden, Shuklaphant Rastiya Nikunja, Kanachanpur

Mr. Karunakar Pant, Chief, Divisional Engineer, Janatako Tatbandh, Kanchanpur

Mr. Sher Bahadur Saund, Chairperson, Shuklaphant-1

Mr. Lok Raj Bhatta, Chair, Krishnapur municipality-2/CDMC Athaniphata,

Mr. Chet Narayan Acharya, hydrologist, Office of Hydrology and Meteorology (OHM), Kailali

Mr. Tirtha Raj Rana, Chari, CDMC, Punarbas municipality

Mr. Dhana Bahadur Bk, Journalist, Sudur Sandesh

Mr. Ramesh Rana, CDMC Chair Udari Punarbash

Mr. Krishna Bahadur Chaudhari, CDMC, Belkundi

District Chapter, Red Cross Society, Kanachanpur

LDMC, Punarbas Municipality

Annex 3: Meeting Minutes

PAGE NO.....
DATE 1/1

आज मिति २०६९/०४/०८ गतेका दिन यस पुनर्वास नगरपालिका
का नगर प्रमुख तथा विपद व्यवस्थापन समितिका संयोजककी तय
प्राप्त शर्मा ज्यूको अध्यक्षतामा वामे देहाको उपस्थितिमा निम्न
विषयहरू गरियो ।

उपस्थित

	की तय	प्राप्त शर्मा - नगर प्रमुख	
	"	शुलिया कुमारी राणा - " उप-प्रमुख	
	"	शिवरत्न शर्मा	वि. प्रमुख प्र. व्यवस्थापक
	"	मोहनलाल राणा	अध्यक्ष वडा नं. १
	"	डम्बर थापा	" २
	"	सुधा तामाङ	का. का. " ५
	"	मनोज लोखरे	" ४
	"	मुलचन्द्र राणा	" ६
	"	बाला शर्मा	" १
	"	नरवीर विक	" ९
	"	सुकदेव शर्मा	
	"	कुलाल प्रमोद	" ११
	"	पदम शर्मा	" ५
	"	हरिमान महजय (१९८५/१५/६१)	विपद व्यवस्थापन समिति नेपाल उप महासचिव
	"	दीपक पौडेल	डिपिनेट नेपाल (१९८५/१५/२२९)
	"	अमनाथ शर्मा	विपद समर्थक व्यक्ति
	"	हरिनाथ जाशी	पत्रकार (हेल्थी चान्द्र २०६९)

हस्तमाला विवरण

यसको अन्तर्गत यस बँडकमा पुनर्वास नगरपालिका लगायत
दोटा नपिटाट प्रमोदित ताली तहिय डोडा का पालिका
हलक माथिल्लो तहिय डोडा पत्र - युरे डोडाका पालिका
हलक बिच कापसि नगरप्रमुखको नाममा गरी दोटा लड
ले पार्ने डाले लड डोडाको ठाउँ का लागे डोडाका
तिलन, महजय लिवर दिईकाले व समझा समाधानका
उपायहरू समझा हलकाल ठाउँ यस पालिकाको
मार्गको तहिय डोडा पत्र पालिका हलक संग सम्बन्ध गरी

निर्णय सं २: - देवा नदिले यस पालिका मा गर्ने इतिहासिक नदी
 नदी निका (०) ठूलो बढेका कारण सार्वजनिक सडक समेत गर्नु
 उपयुक्त हुने हुनाले नदीको पानीको प्रयोग गर्न सकिने
 वा कुनैलाइ समेत मध्यवर्ती गर्ने योजना कथनमा कडा
 निर्णय गरियो ।

(Handwritten signatures and initials)

वाणिज्य-डिभिजन् वर कार्यालय - धनुषा

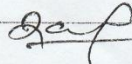
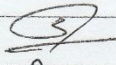
क-चनपुर् - Doodha पामोचर (सवधन)

सि.नं.	नाम/थर	पद	ठेगाना	फो. नं.	कैफियत
१	दिपक पोडेल	प्रथम श्रेणीकोषी	DPMet-Nepal	९८५११५७२२९	<i>[Signature]</i>
२	दरिमान प्रधान	अपवादालिकी	DPMet-Nepal	९८५११५१६१	<i>[Signature]</i>
३	बालमुकुन्द मड	स.क.अ.	गण्डकी ए.डि.वि.सि.	९८६२५५२९२५	<i>[Signature]</i>
४	माया चौबारी	फरेल्लर	"	९८५८५२९९०३	<i>[Signature]</i>
५	जनेश सिंह बस्नेत	अपवादालिकी	"	९८६८५०६५२६	<i>[Signature]</i>
६	प्रमोद पन्त	ब.स.स.स.	"	९८९२६९०३८५	<i>[Signature]</i>
७	अंगदराज ओझा	"	"	९८५८६६६५६६	<i>[Signature]</i>
८	पद्म राज उम्रेती	"	"	९८६८८८६०३०६	<i>[Signature]</i>
९	चन्द्र बहादुर खाडु	हवहपार	"	९८५८६३०६६८	<i>[Signature]</i>
१०	सुब्रह्मण्य सिंह पाप	स.क.अ.	"	९८५८६०९९९९	<i>[Signature]</i>
११	जोषनाथ सिंह कुमरे	"	"	९८५८६२५८६०	<i>[Signature]</i>
१२	राम राज मड	ह.सि.सि.	"	९८५८८२५९०३	<i>[Signature]</i>
१३	लक्ष्मण शर्मा	स.क.अ. लेव	मार्केट नेपाल	९८९०६८९२६०	<i>[Signature]</i>

नाम	ठेगाना	संख्या
१. नर बहादुर विन्ड	मुर्तवाय-९	१८६५५५२५९५
२. दान बहादुर सुनार	००	१८०६५९६३३२
३. दिल बहादुर कोहरा	११	१८०५६५९१६०
४. सुर्य विन्ड	११	१८०६५५५५९७
५. पद्म करिगार	००	१८९२६५९५५५
६. शंकर विन्ड	११	१८०५९९६५९६
७. श्याम सुनार	११	१८२५६२५५२६

आज मिति २०७३ साउन १० गतेका दिन नेपाल रेडक्रस सोसाइटी
 कुश्चनपुर जिल्ला शाखाका सभापति श्री देवराज ड्रेती ज्यूको
 सभापतित्वमा डिपिनेर नेपाल लगायत अन्य संघसंस्थाको कु
 पहलमा तपसिल बमोजिमका सहभागीहरू मार्फत विपद तथा
 बाढीको समयमा दोहा नदिले कोरा पार्क अरु र यसको
 जोडियेन मुनिबुटाका विषयमा हलफल गरियो।

सभा उपस्थिति :

- १- श्री देवराज ड्रेती सभापति नेरेसो कुश्चनपुर
 २- श्री नर वंशना उपसभापति " " " "
 ३- श्री प्रजु दाहाल " " " "
 ४- श्री अम प्रदाश जोशी सदस्य " " " "
 ५- श्री दिपकु पौडेल डिपिनेर नेपाल 
 ६- श्री हर्षमान महर्जन " " " "
 ७- श्री देवराज गुरु 
 ८- श्री धन वं. जोशी नेपाल रेडक्रस सोसाइटी
 ९- श्री शेर व. साउदर वडा अध्यक्ष शुम्भाफोरा-११-
 १०- श्री महेश गुरु ने रेसो जिल्ला शाखा

Glimpses of the field activities:



Consultation with Mayor, Purnawash and Local Disaster Management Committee Meeting, Purnawash, Kanchanpur



Consultation with Deputy Mayor, Belauri Municipality



Consultation with Mayor, Krishnapur, Municipality



Consultation with Mayor, Shuklaphanth Municipality



Consultation with Mayor, Godawari Municipality



Consultation with Sub-division forest office, Bani, Kanchanpur



Consultation with CDMC, Punarwash, Kanchanpur



Consultation with Suklaphant National Conservation , Kanchanpur



Consultation with Red Cross Chapter, Kanchanpur



Consultation with local NGOs working in the Doda Watershed



Doda river threatening forest lands in Krishnapur Municipality







Site verification of flood impact areas in downstream, Punarbas