

Nepal

Ministry of Energy, Water Resources and Irrigation

**Detailed Planning Survey for
Project for Capacity Development on Flood Control
for Disaster Risk Reduction in Sunsari and
Morang Districts in Nepal**

Environmental and Social Considerations
in the Detailed Planning Survey

April, 2023

Japan International Cooperation Agency (JICA)

Yachiyo Engineering Co., Ltd.

Pacific Consultants Co., Ltd.

Environmental and Social Considerations in Detailed Planning Survey (Technical Cooperation)

1. Full title of the Project

Project for Capacity Development on Flood Control for Disaster Risk Reduction
in Sunsari and Morang Districts

2. Type of the study (e.g. Master Plan, Feasibility Study, Detailed Design, etc.)

Preliminary information gathering survey

3. Categorization and its reason

(1) Category: B

(2) Reason:

The Project is not likely to have significant adverse impact on the environment under the JICA Guidelines for Environmental and Social Consideration (April, 2010) in terms of its sectors, characteristics and areas.

4. Agency or institution responsible for the implementation of the Project

Ministry of Energy, Water Resources, and Irrigation (MoEWRI), Department of Water Resources and Irrigation (DWRI)

5. Outline of the Project (objectives, justification, location, proposed activities, and scope of the study)

5.1. Objectives

The Project aims to enhance to formulate and implement flood control plans and projects to reduce flood disaster risks while considering the contribution to regional development in the target river basins through:

- Preparation of flood hazard and risk maps for the target river basin
- Development of flood control plans for flood risk reduction through structural and non-structural measures in the target river basin
- Formulation of an implementation mechanism to promote proactive disaster management investments for the implementation of flood control plans that contribute to flood disaster risk reduction.

5.2. Location

Keshaliya, Singhiya and Lohandra Rivers, in Province No.1 Nepal

5.3. Scope of the Project

5.3.1. Outputs

- (1) Flood hazard and risk maps are prepared for the target river basins.
- (2) Flood control plans are developed for flood disaster risk reduction through structural and non-structural measures in the target river basins.
- (3) An implementation mechanism is established to promote pre-Disaster Risk Reduction (DRR) investments in the implementations of flood control plans for flood disaster risk reduction.

5.3.2. Activities

(Activities for Achieving Output 1:

Flood hazard and risk maps are prepared for the target river basins.)

- 1-1. Collect and organize data and information on past flood events, damages, and relevant documents.
- 1-2. Review data and information collected in 1.1.
 - 1-3. Conduct flood inundation analysis and risk assessment.
- 1-4. Establish an implementation mechanism consulting with agencies concerned on how to prepare and update flood hazard and risk maps.
- 1-5. Prepare flood hazard and risk maps for the target river basins using the data collected and the results of the inundation analysis.
- 1-6. Inform agencies concerned of the hazard and risk maps to build a common understanding about flood risks.

(Activities for Achieving Output 2:

Flood control plans are developed for flood risk reduction through structural and non-structural measures in the target river basin.)

- 2-1. Collect and organize data and information necessary for flood control plan (current and plans on hydro-meteorology, flood control, sediment, river use, urban development and land use, social environment, climate change etc.)
- 2-2. Analyze current issues over the target river basins
- 2-3. Set a design discharge to be adopted by the flood control plan
- 2-4. Set an outline for flood control plans
- 2-5. Examine appropriate combinations of structural and non-structural measures for flood disaster risk reduction.
- 2-6. Formulate a flood control plan based on 2.5, in consultation with agencies concerned.

(Activities for Achieving Output 3:

An implementation mechanism is established to promote proactive disaster management investments in the implementation of flood control plans towards flood disaster risk reduction.)

- 3-1. Identify and organize issues about existing flood control projects and cooperation mechanisms with agencies concerned.
- 3-2. Establish a structure and mechanism for project implementations necessary for the continuous and effective implementations of flood control plans.
 - 3-2-1. Clarify roles and responsibilities of relevant organizations (e.g., consultation, formulation and approval of the flood control plans, and coordination for its

- implementations).
- 3-2-2. Develop a procedure and mechanism for prioritizing flood control projects, minimizing overlaps, and allocating required budget.
 - 3-2-3. Develop tools and materials to justify the relevance of pre-Disaster Risk Reduction (DRR) investment and flood control project implementation.
 - 3-3. Establish a river management system to operationalize the project implementation mechanisms established in 3.2.
 - 3-4. Examine the project implementation mechanisms to replicate the flood control plan, flood control project implementation in other regions (such as through selection of prioritized river basins for replication, examination of the contents).
 - 3-5. Conduct workshops/seminars to disseminate flood hazard/risk assessment, flood control plans and flood control project implementation methods.

6. Description of the project site (maps, environmental and social condition, current issues, etc.)

6.1. Location Map

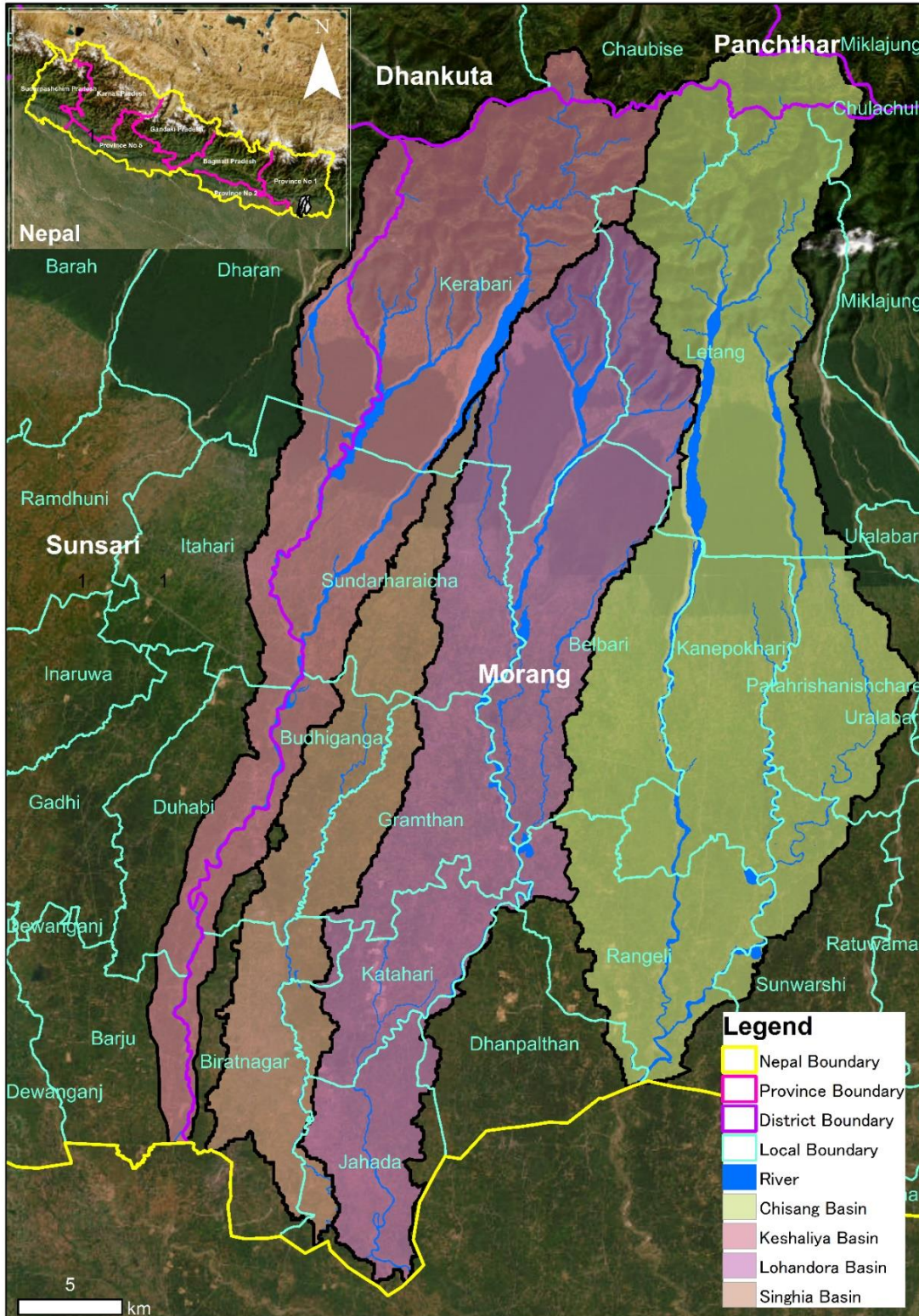


Figure 6-1 River Basin and Boundaries

6.2. Environmental and Social Condition

(1) Geography and topography

The three target rivers are located in Sunsari and Morang Districts of the Province No. 1 in southeastern Nepal. A summary of the three target rivers is shown in Table 6-1.

Table 6-1 Basic Data of the Target Rivers

Name of the river	River basin area (km ²)	Total river length (km)	Current river width (m)	River bed slope	Topography	Land use
Keshaliya River	309	63.2	90-150	1/800	Chure to plain	Urban area, agricultural land
Singhia River	98	20.7	50-100	1/1,050	Plain to plain	Urban area, agricultural land
Lohandra River	357	62	150-200	1/960	Chure to plain	Agricultural land, forest

Source: JICA Expert Team based on the DWRI data

The Figures 6-1 and 6-2 show the elevation distribution and the land use map of the target river basins. The breakdown percentages of each land use category are presented in Table 6-2. The elevation of each river is as follows:

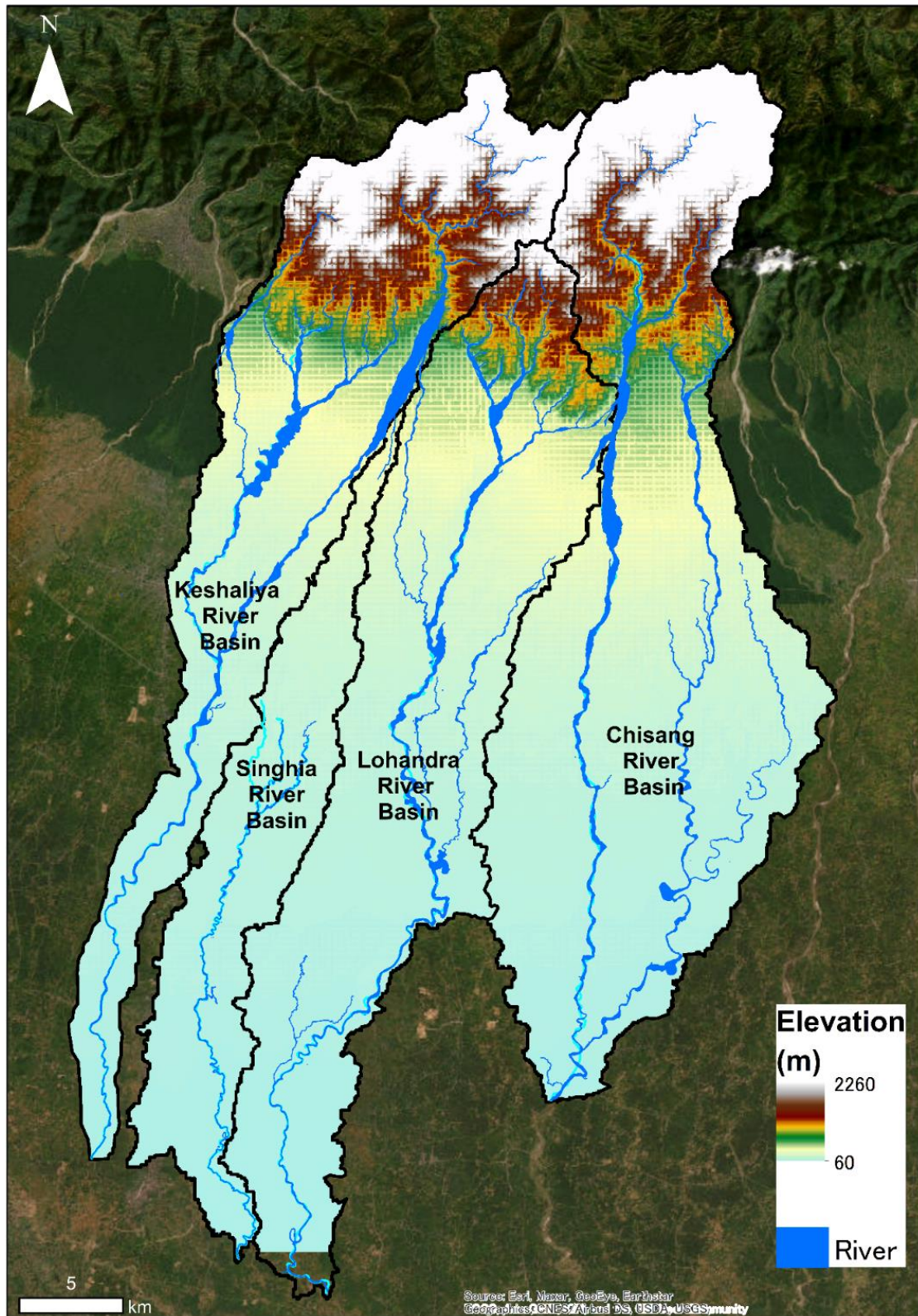
- Keshaliya River: 63 meters at the Indian border and 2,038 meters at its headwaters in the Siwalik Range.
- Shinghia River: 60 meters at the Indian border and 223 meters at its source.
- Lohandra River: 58 meters at the Indian border and 1,460 meters at its source in the Siwalik Range.

Table 6-2 Proportion of Land Use in River Basins

Land Use	Landuse (%)			
	Keshaliya	Singhia	Lohandra	Chisang
Built up	0.03	0.87	0.01	0.03
Big Building	0.00	0.00	0.00	0.00
Land Slide	0.40	0.00	0.10	0.24
Cultivation	51.90	90.23	67.58	62.65
Forest	40.48	4.98	26.43	27.94
Grass	1.15	0.00	0.77	3.20
Bush	0.31	0.00	0.30	1.64
Sand	4.30	0.66	2.61	2.91
Barrenland	0.30	0.23	0.09	0.12
River Water	0.52	0.76	0.91	0.57
Lake	0.19	0.62	0.41	0.21

Source: Ministry of Land Management, Cooperatives and Poverty Alleviation

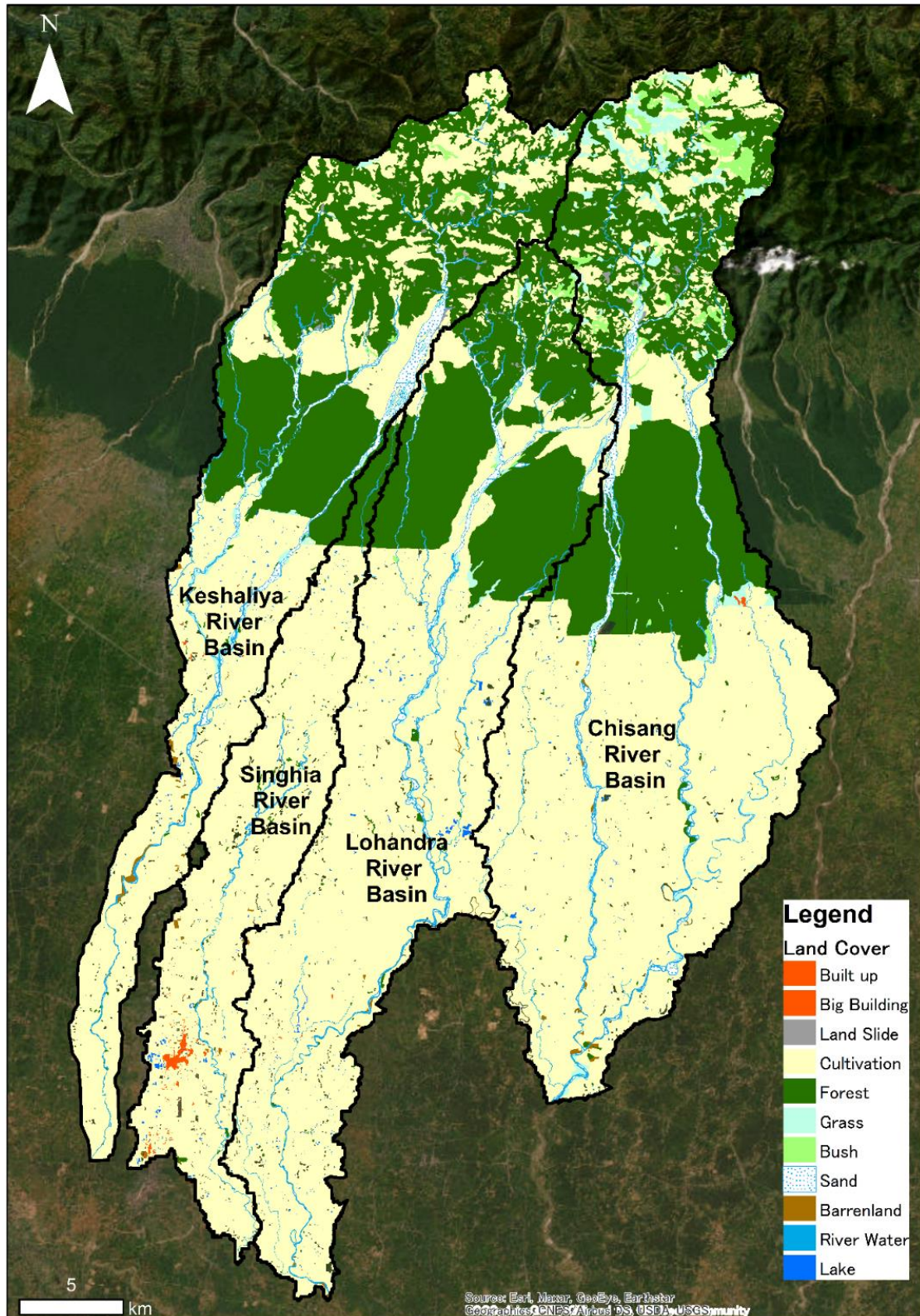
JICA Expert Team based on the data of the Survey Department



Source: Ministry of Land Management, Cooperatives and Poverty Alleviation

JICA Expert Team based on the data of the Survey Department

Figure 6-2 Elevation Distribution Map of the Target River Basins



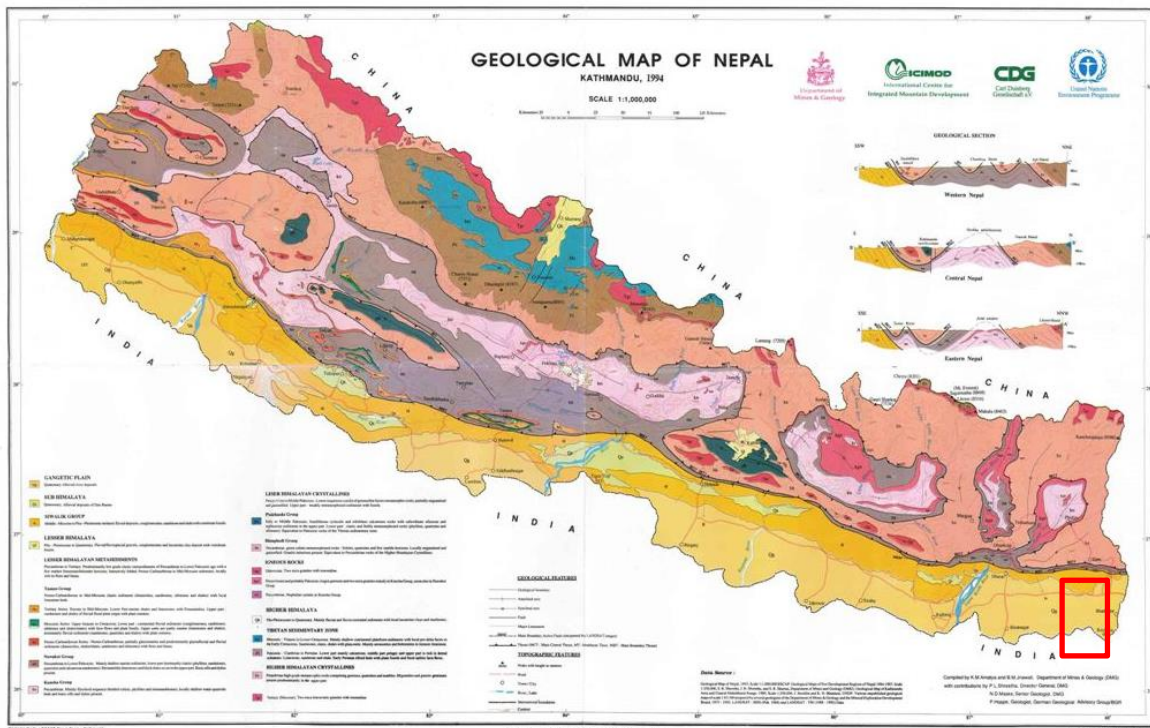
Source: Ministry of Land Management, Cooperatives and Poverty Alleviation
JICA Expert Team based on the data of the Survey Department

Figure 6-3 Land Use Map of the Target River Basins

(2) Geological features

The land of Nepal is divided into five morpho-geological structural areas from south to north, namely; (1) Terai Lowlands, (2) Sub-Himalayas (Siwalik Range), (3) Lesser Himalayas (Mahabharat Range and Middle Valley), (4) Higher Himalayas, and (5) Inner Himalaya (Tibet Tethys) (see Figure 6-4).

The target river basins consist mainly of (1) the Terai Lowlands and (2) parts of the Sub-Himalayas (Siwalik Range).



Source: Department of Mines and Geology with some additional description by JICA Expert Team

Figure 6-4 Geological Map of Nepal

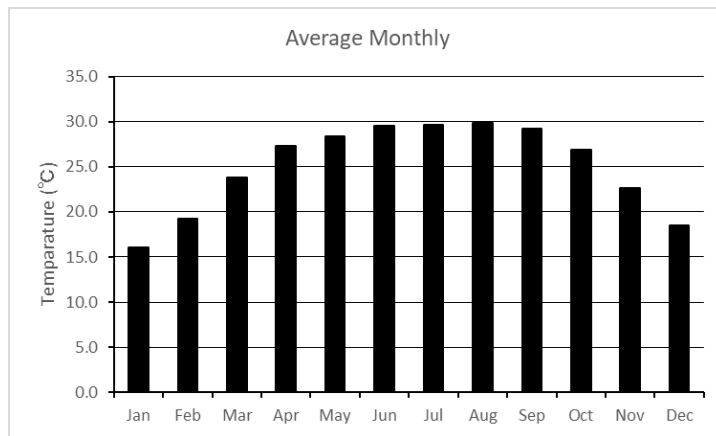
(3) Meteorology

Nepal varies in altitude from about 60 meters to 8,850 meters (Mount Everest, the world's highest peak) over a distance of 200 kilometers from south to north. The Köppen climate classification classifies most of the areas of the country as a 'temperate with low rainfall in winter' climate (Cwa), while the Himalayan region is classified as a tundra climate (ET).

The climate classification of the target basin is a Cwa climate, with a dry season from October to May and a rainy season from June to September.

The average monthly temperature and average monthly rainfall for Biratnagar Metropolitan City (at Biratnagar Airport), located in the target river basin, are shown in Figure 6-5. The

average monthly temperature in Biratnagar Metropolitan City is 25°C. Rainfall is generally heaviest in July, with the rainy season from June to September and the dry season from October to May.



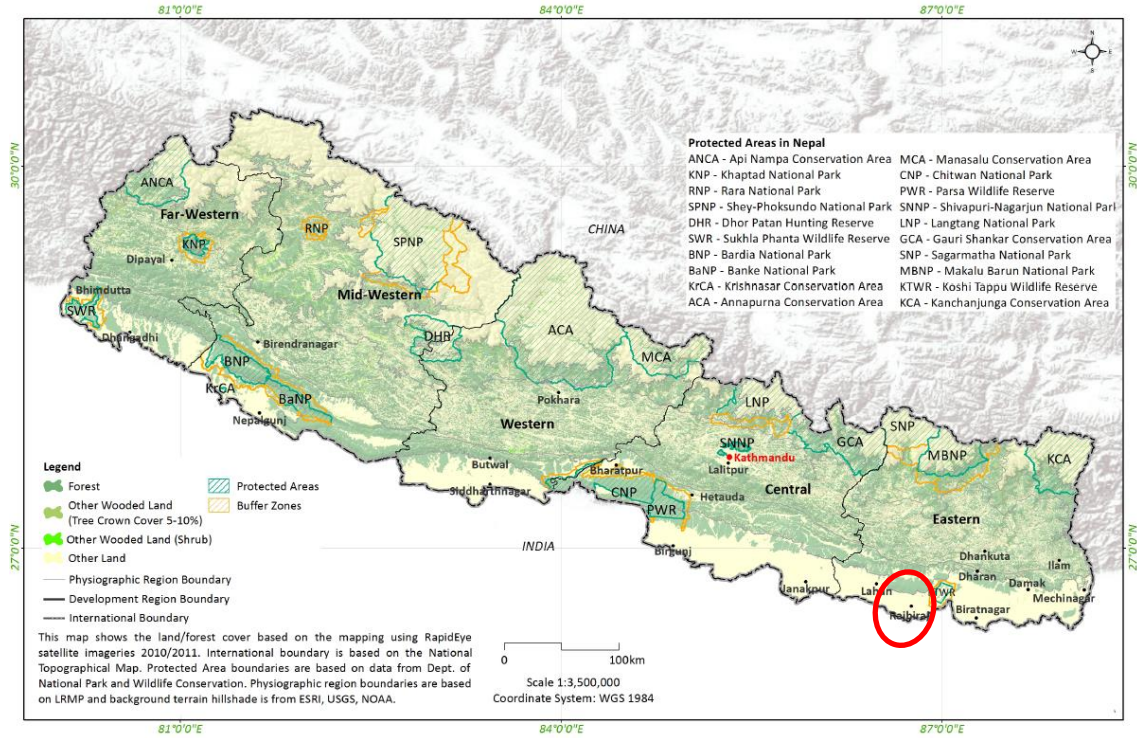
Source: Master Plan Report Lohandra Rive Training Project, Morang, 2021

Figure 6-5 Average Monthly Temperature in Biratnagar Metropolitan City

(4) Forest

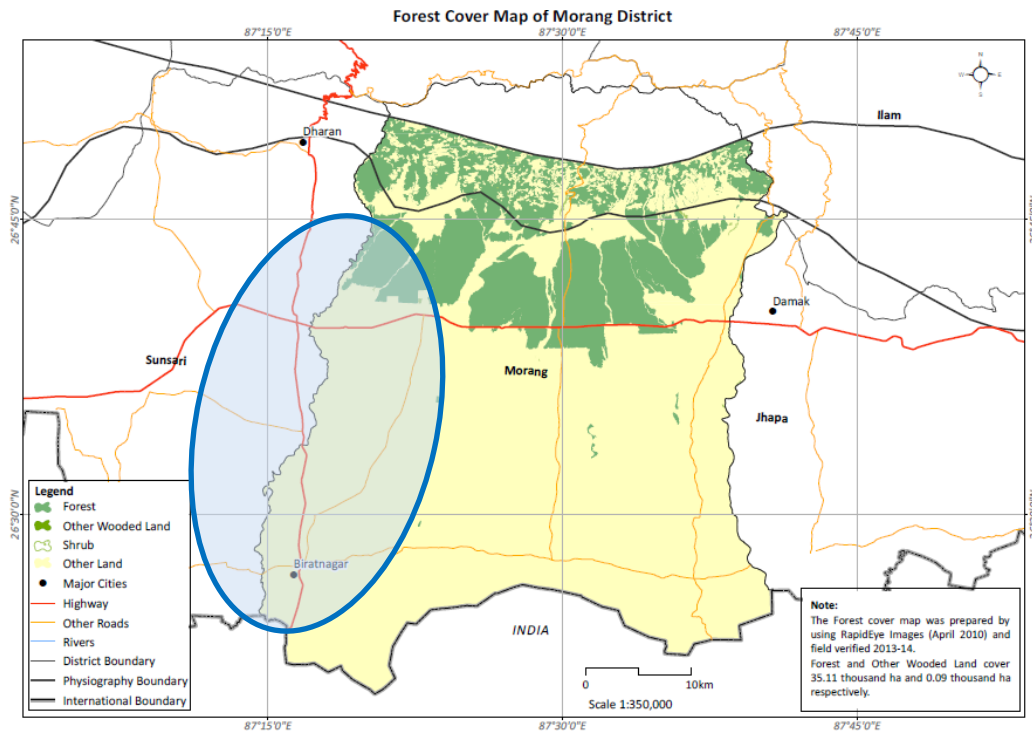
Nepal has several types of forests, including government-managed forests, community forests (CFs), and leasehold forests. There are no forests in Biratnagar Metropolitan City, but there are forests in Belbari and Letang, which are located upstream of the river.

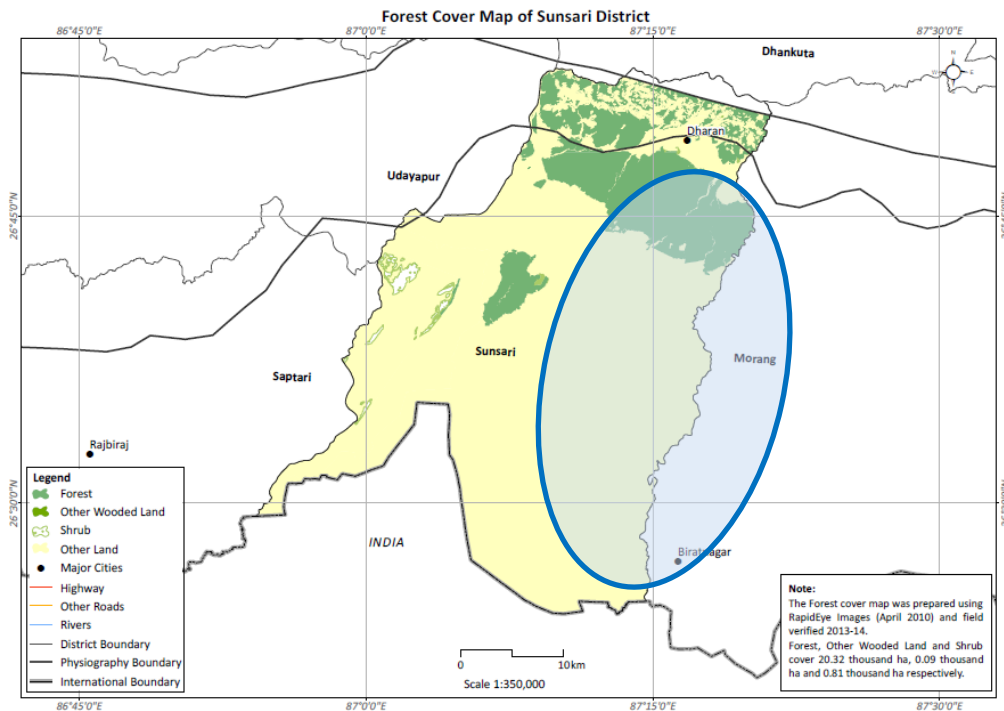
Figure 6-6 shows a map of protected areas and forest distribution in Nepal. The Chure Conservation Areas in Morang and Sunsari Districts are shown in Figure 6-7. The blue line indicates the approximate location of the target river basins.



Source: State of Nepal's Forests, Department of Forest Research and Survey

Figure 6-6 Distribution of Protected Areas and Forests in Nepal





Source: Churia Forests of Nepal, Department of Forest Research and Survey Ministry of Forests and Soil Conservation, 2014

Figure 6-7 Forest Distribution in Morang (top) and Sunsari (bottom) Districts

(5) Flora, fauna and ecosystem

The National Parks and Wildlife Conservation Act, 2029 (1973) lists the species to be protected in Nepal, including 26 species of mammals, 9 species of birds and 3 species of reptiles.

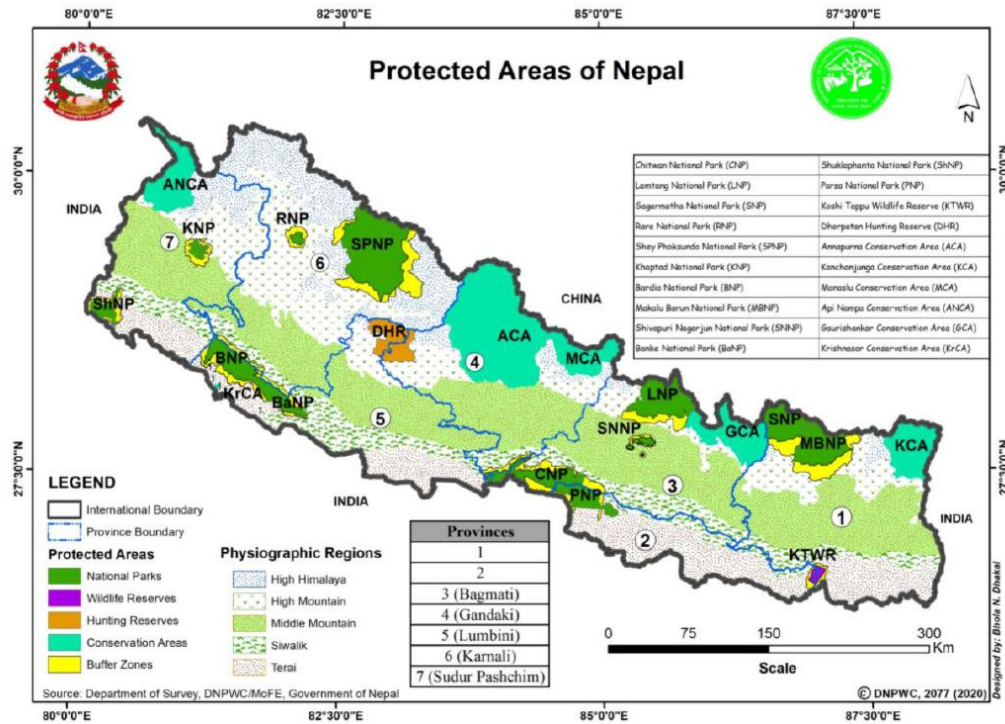
The Red List of the International Union for Conservation of Nature and Natural Resources (IUCN, 2022) for Nepal includes 854 species of flora, 6 species of fungi, 193 species of mammals, 870 species of birds, 60 species of amphibians, 134 species of reptiles and 168 species of fish. According to the Department of Plant Resources (DPR), there are 14 species endemic to Nepal growing in wetlands and 70 alien species, of which 23 are specified alien species. Forestry surveys are conducted by DFRTC.

According to the field interviews in December, 2022, the mammals identified in the target river basins, mainly in the vicinity of the Dharan Forest, included the large mammals such as elephant, wild boar and deer, and the medium-sized mammals such as monkey and hare. Witnesses of Bengal Florican (endangered species) and habitat of common leopard have also been confirmed. However, these are not based on formal survey results and therefore there are no written records. The main elephant habitat in the vicinity of the target river basin is the Siwalik Range (700-1,500m), which have a large forest cover and abundant food sources for animals. In the north of the target river basin, elephants have been observed migrating from India into eastern Nepal from September to November after the monsoon season, and it has been reported that human-elephant conflict has become

a problem in eastern Nepal. Elephants tend to be very aggressive during the mating season, especially from October to November, so caution is advised.

(6) Protected areas

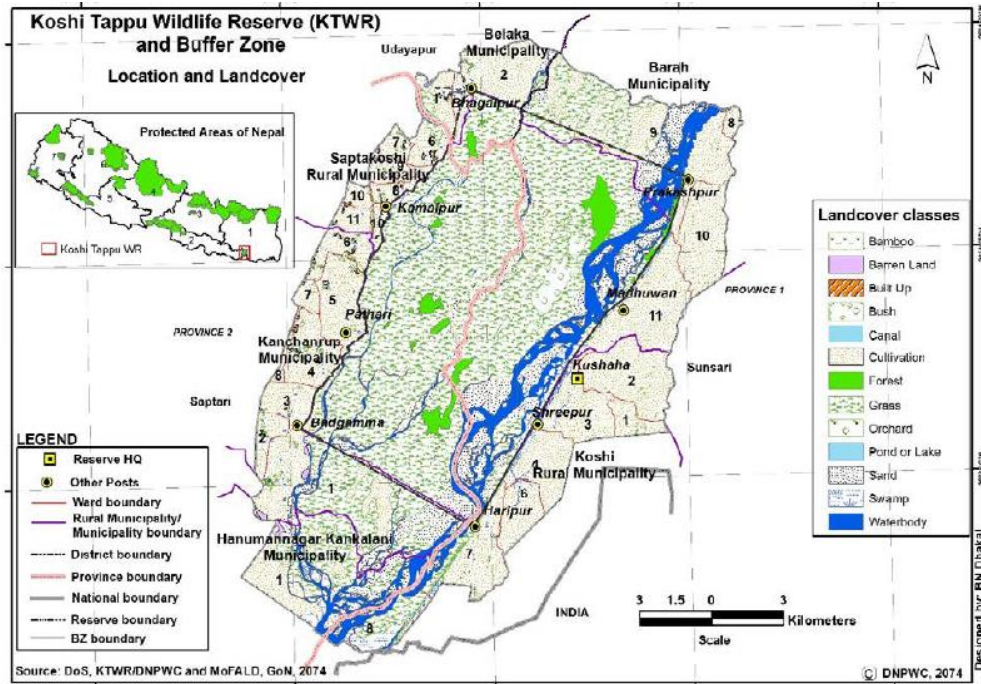
Figure 6-8 shows the protected areas in Nepal; there is no information on nature conservation and cultural heritage sites within the target river basin. This information will be confirmed once the detailed flood control plan becomes available.



Source: Department of National Parks and Wildlife Conservation
Figure 6-8 Protected Areas in Nepal

Koshi Tappu Wildlife Reserve, located about 20 kilometers west of Biratnagar Metropolitan City, is a wildlife protected area established in 1976. The reserve encompasses the floodplain of the Sapta Koshi River and covers an area of 176 square kilometers. It is the only protected area for wild buffaloes (*Bibalus arjee*) and was declared a Ramsar wetland in 1987.

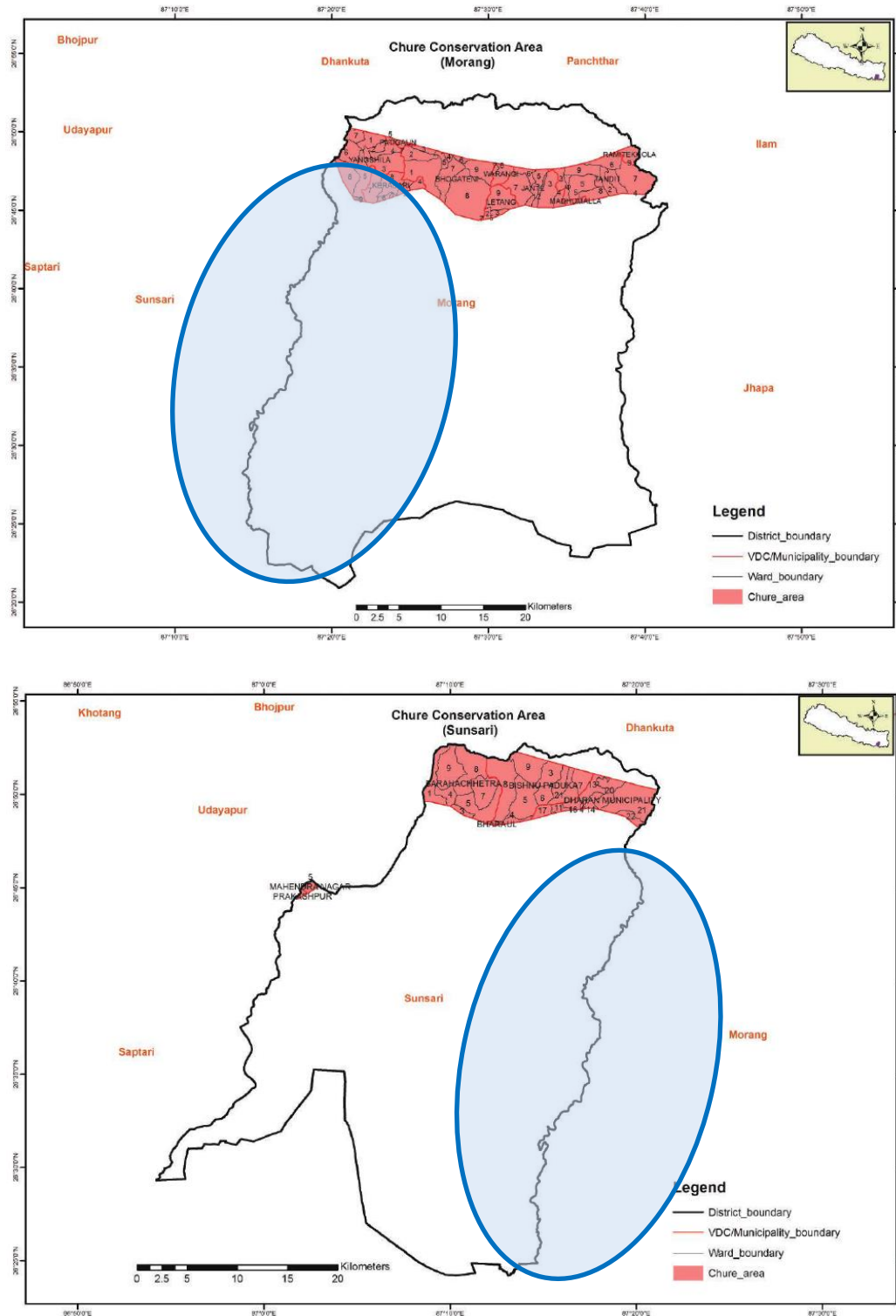
There will be no impacts from the project site, including in the buffer zone (173.50 square kilometers) surrounding the protected area.



Source: Ministry of Forests and Environment Department of National Parks and Wildlife Conservation

Figure 6-9 Koshi Tappu Wildlife Reserve

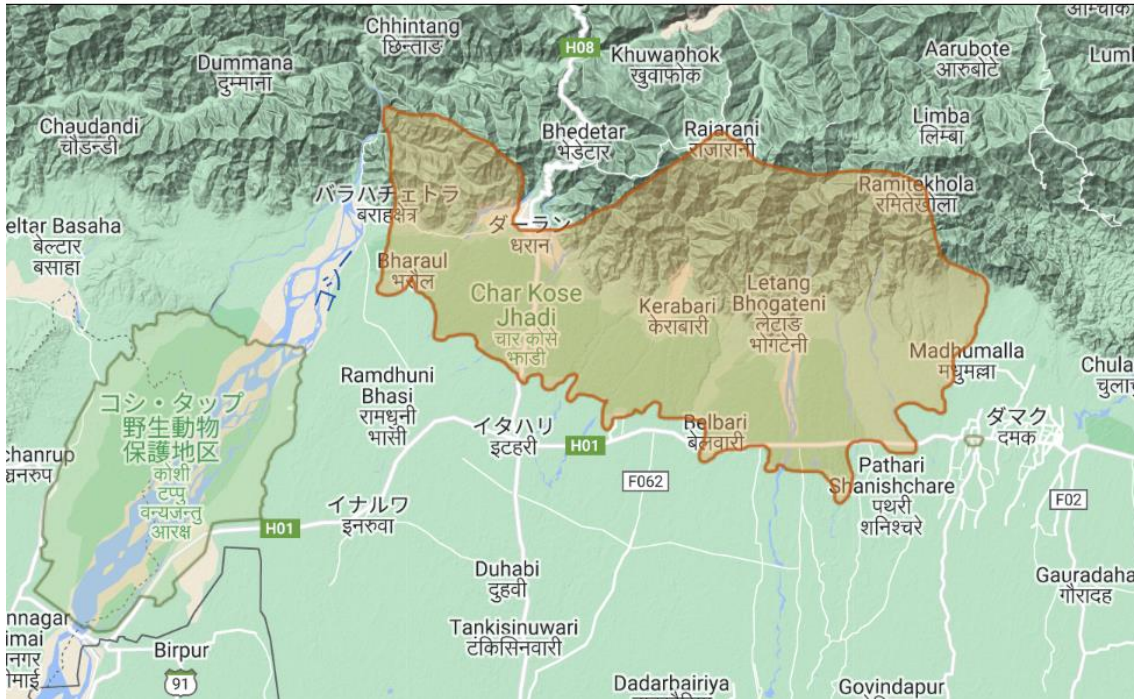
The Chure Conservation Area in Morang and Sunsari Districts is shown in Figure 6-10. The blue line indicates the approximate location of the target river basin.



Source: JICA Expert Team based on the data of Chure Conservation Area, President Chure-Terai Madhesh Conservation Development Board
Figure 6-10 Chure Conservation Area in Morang (top) and Sunsari (bottom)

Districts (The area shaded in blue is the target river basin)

Dharan Forest is located in Sunsari District and part of Morang District on the north side of Keshaliya River. It is a mixed forest of tropical evergreen forest and Sal *Shorea robusta*, and is the only undeveloped forest area in Nepal with this combination of tree species. It is estimated to be home to about 300 species of birds, including endangered species, as well as foxes and primates such as the Cercopithecidae.



Source: BirdLife International

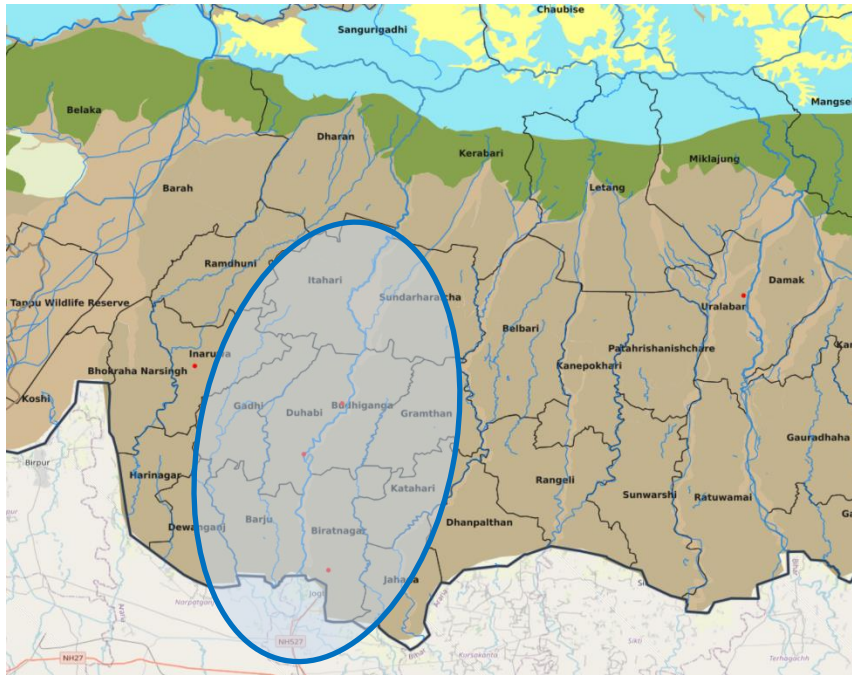
<http://datazone.birdlife.org/site/factsheet/dharan-forests-iba-nepal>

Figure 6-11 Biodiversity Area of International Importance (Dharan Forest)

According to the target protection categories under the National Parks and Wildlife Conservation Act, 2029 (1973), Nepal has 12 national parks, 6 conservation areas, 1 wildlife protected area and 1 hunting protected area, covering a total of 23.39% of the country's land area.

(7) Soil

Figure 6-12 shows the soil distribution in Morang and Sunsari Districts, which include the target river basin. Most of the areas are non-calcareous soils formed by fluvial processes, and the calcareous soils formed by fluvial processes are distributed along the rivers. The blue line indicates the approximate location of the target river basin.



Source: National Soil Science Research Center NARC
(<https://soil.narc.gov.np/soil/soilmap/>)

Figure 6-12 Soil Distribution Map

(8) Public hygiene

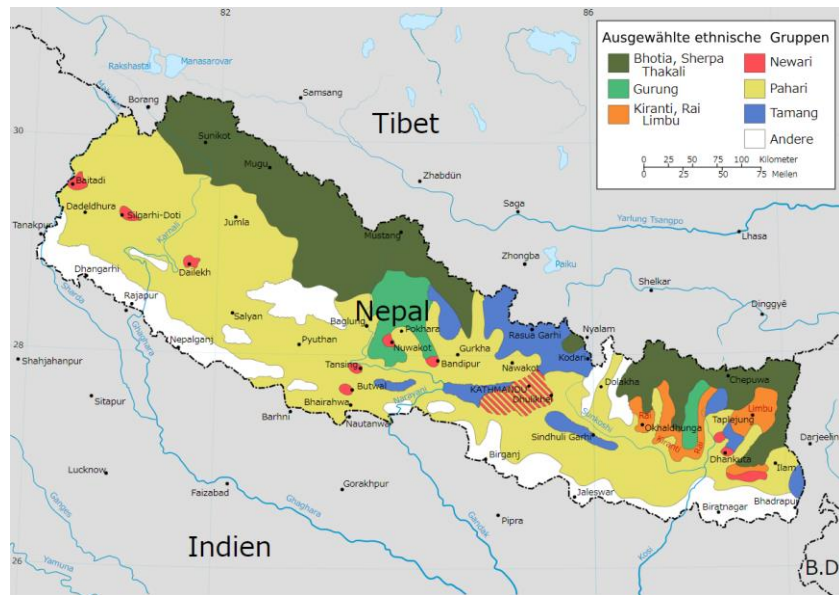
Public or private hand-pumped wells are well maintained, so households rely on groundwater as their main source of drinking water. In some villages along rivers, water pumped from the target river is used for household irrigation and drinking water for livestock. However, according to the "Preparatory Survey Report for the Water Supply Improvement Project in Biratnagar, Nepal (Preliminary Published Version, November 2021, JICA)," water quality samples collected from 17 taps in 2019 showed the presence of coliform bacteria at 13 locations and iron/manganese at concentrations above drinking water quality standards at 13 locations, failing to meet drinking water quality standards.

The Department of Labor is responsible for occupational health and environmental standards, and the Ministry of Health is in charge of Covid-19 control. Covid19 infections in Nepal have been contained as of December 2022, and there are no restrictions on field surveys due to Covid19.

(9) Ethnic minorities and indigenous people

Nepal is a country with a diverse indigenous population (Jati), with 126 defined Jatis and other undefined Jatis reported in the 2011 census.

Chhetri (16.6% of the total population) and Brahman (12.2% of the total population) are the major Jatis.



Source:

https://commons.wikimedia.org/wiki/File:Nepal_ethnolinguistische_Groupen.svg

Figure 6-13 Ethnic Distribution Map

(10) Socially vulnerable groups

The new Constitution promulgated in 2015 adopted a number of provisions pertaining to human rights, including national sovereignty, social security, the rights of women, children, and the elderly, and respect for diversity, which had not been explicitly stated before. Articles 84 and 176 of the Constitution stipulate that at least one-third of the members of the House of Representatives and state legislatures shall be women, thereby promoting the social participation of women. In addition, under the National Gender Equality Policy, 2021, the Ministry of Women, Children and Senior Citizen has taken the lead in addressing issues of gender equality, women empowerment and social inclusion.

On the other hand, there are some operational challenges in achieving the above goal, such as the still low percentage of women in chair positions, the lack of division of roles and responsibilities, and the lack of coordination between federal, state and local government administrations.

Statistical data on low-income households in the vicinity of the project site, households with persons with disabilities and households headed by women with dependent children (widowed households) are managed at the local government level.

7. Legal Framework of Environmental and Social Considerations

7.1. Laws, Regulations and Relative agencies and institutions

(1) Environment Protection Act (EPA), 2019

The Environmental Protection Act (EPA) regulates environmental impact assessment in Nepal and is complemented by the Environmental Protection Rules (EPR). The EPR governs information disclosure and the process of Environmental Impact Assessment (EIA) and Initial Environmental Examination (IEE) through Scoping Documents (SD), Terms of

Reference (ToR), and other relevant documentation.

The Ministry of Forests and Environment (MoFE) is in charge of the environmental impact assessment procedure, and the MoFE's Environmental Impact Assessment Division determines the level of impact statement required based on an overview of each project applied.

The EPA, promulgated in 1997, was revised in 2019. The revised version stipulates that Strategic Environmental Analysis (SEA) should be conducted in the pre-implementation phase of projects. However, specific procedures for conducting SEA have not been established.

Under the current EPA, project owners, depending on the nature of their business, are required to submit a brief environmental study report through a Summary Environmental Study, analyze environmental impacts and mitigation measures through an Initial Environment Examination (IEE), or conduct Environmental Impact Assessment (EIA).

The project owner should consider environmental and social matters in the EIA and other necessary studies, review them, and compile them in the EIA report or other relevant documents.

(2) Environment Protection Rules, 2020

The Environmental Protection Rules (EPR, 2020) provide, among other things, requirements for the description of EIA reports. It stipulates that the budget of the project, social and economic impacts, cultural and physical impacts resulting from the implementation of the project, as well as chemical and biological impacts must be described. It also describes the Brief Environmental Study (BES), which was introduced in the 2020 (2077) revision. The BES is a document required for the approval of new project categories with less impact than the EIA and IEE.

The EPR provides definitions for implementing and regulating the provisions and measures set forth in the EPA, including detailed rules and regulations regarding the procedures for conducting environmental impact assessments (e.g., commencement of procedures, report preparation, review, comments, and approval). It includes the format of the TOR to be prepared by project owners.

The implementation guidelines are prepared by the relevant ministries and agencies, depending on the type of project (e.g., hydropower projects, mining, etc.). In the case of this project, the Environment Section of DWRI is in charge.

(3) Forest Act, 2019 (2076)

The Act stipulates that the central government is responsible for classifying forests and establishing management policies. In the revised Forest Act, issues related to deforestation associated with government projects are presented in Chapter 12. According to Chapter 12, the owners of the projects to be implemented are required to submit an EIA, detailed project reports and design documents. It also states that if the forests are used in connection with the national development projects, the project owner shall prepare an equivalent forest (reforestation) or, if this is difficult, compensate for the use of the forest

with a monetary amount equivalent to the value of the forest.

(4) Land Acquisition Act, 2034 (1977)

The Land Acquisition Act (1977) serves as the basis for land acquisition and development projects by the government and provides for a compensation system relevant to such projects. The implementing rules of the Land Acquisition Act are detailed in the Land Acquisition Guidelines (1989). These guidelines provide the framework for the government to implement compensation as determined by the Compensation Fixation committee.

(5) National EIA Guidelines, 1993

The guidelines provide the guidance on the content of EIA studies and reviews, and define the public involvement in the process of preparing the EIA report and the position of the EIA. The guidelines also provide the scope of the required impact studies (physical, environmental, social and cultural factors) and explain the evaluation criteria for the degree of impact. The policies for avoiding, mitigating and compensating for impacts, and the need for monitoring and auditing to ensure maximum benefits from the project are also described in the guidelines.

(6) The Fifteenth Plan, 2019/20-2023/24

The Fifteenth Plan (2019/20-2023/24) by the National Planning Commission is a national development plan that describes the government's development goals and expectations for priority areas. It also outlines environmental protection strategies and target areas, and states that all development plans should be environmentally sensitive.

(7) Environmental standards

Air pollution

Based on Article 15 of EPR, National Ambient Air Quality Standard of Nepal was established in 2003 and nine parameters were revised in 2012.

Water pollution

This project involves drainage from the project site to rivers, which are public waters.

Drainage standards in Nepal were set based on Article 15 of EPR and categorized into 1) inland waterway, 2) public sewage, and 3) sewage plant to inland waterway.

Waste

Solid Waste Management Act 2068 provides how to collect and dispose waste in Nepal. The Act stipulates that local government is responsible for collection and disposal of waste.

Soil contamination

There are no environmental standards for soil contamination in Nepal.

Noise and vibration

National Standard for Noise 2069 B.S. sets noise level standards for each region and noise level standards caused by machinery/equipment. There are no environmental standards

for vibration in Nepal.

(8) Related agencies and institutions

The Ministry of Forests and Environment (MoFE)

President Chure Terai Madesh Conservation Development Board

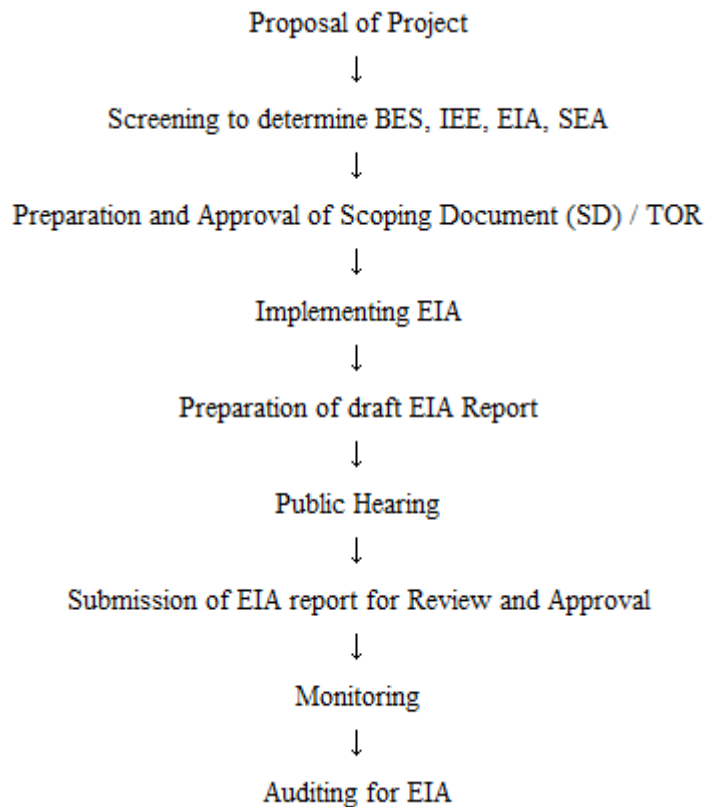
Department of Environment (DoE)

Department of Forests and Soil Conservation (DOFSC)

Department of National Parks and Wildlife Conservation (DNPWC)

7.2. Environmental impact assessment system

The main procedural flow of the environmental impact assessment system based on the guidelines for environmental impact assessment in Nepal is as follows.



Source: JICA Expert Team

Figure 7-1 Main procedures for environmental impact assessment

8. Provisional Scoping

Table 8-1 shows the impact of the project implementation in the three target river basins.

Table 8-1 Provisional Scoping Matrix for the project implementation in the three target river basins

Category	No	Assessment item	Assessment		Reason for the assessment
			Before / during construction	In service	
Countermeasures against pollution	1	Air pollution	✓		<p>[During the construction]</p> <ul style="list-style-type: none"> • There is a possibility that dust and exhaust fumes will be generated from the operation of construction machinery. • There is a possibility that dust will be generated by embankment construction, river excavation, etc. <p>[In service]</p> <ul style="list-style-type: none"> • There is no possibility of air pollution generated by the facility, etc.
	2	Water pollution	✓		<p>[During the construction]</p> <ul style="list-style-type: none"> • There is a possibility that embankment construction, river excavation, etc. will cause turbid water. <p>[In service]</p> <ul style="list-style-type: none"> • There is no possibility of water pollution generated by the facility, etc.
	3	Waste	✓	✓	<p>[During the construction]</p> <ul style="list-style-type: none"> • There is a possibility that dredged material will be generated. • There is a possibility that the removal of the existing embankment will generate sediment waste. <p>[In service]</p> <ul style="list-style-type: none"> • There is a possibility that sediment removal is required in the practice of river management and drainage channel management.
	4	Soil pollution	✓	✓	<p>[During the construction]</p> <ul style="list-style-type: none"> • Soil contaminated areas are not currently known. <p>[In service]</p> <ul style="list-style-type: none"> • There is a possibility of the establishment of embankment using sediment containing toxic substances.
	5	Noise and	✓		<p>[During the construction]</p>

Category	No	Assessment item	Assessment		Reason for the assessment
			Before / during construction	In service	
		vibration			<ul style="list-style-type: none"> • There is a possibility of noise and vibration associated with the operation of construction machinery and the use of equipment. • There is a possibility of noise/vibration associated with the travel of construction vehicles. [In service] <ul style="list-style-type: none"> • There is no possibility that facilities that generate noise and vibration exist.
	6	Land subsidence		✓	[During the construction] <ul style="list-style-type: none"> • There is no possibility of special impact. [In service] <ul style="list-style-type: none"> • There is a possibility of subsidence due to soft ground and earthquake.
	7	Odor	✓	✓	[During the construction] <ul style="list-style-type: none"> • There is a possibility of bad odor from construction machinery and workers' waste. • There is a possibility that the method of disposal of dredged material may affect the odor. [In service] <ul style="list-style-type: none"> • There is a possibility that water stagnation. If it occurs, it will cause a bad odor in the surrounding area.
	8	Sediment	✓	✓ -	[During the construction] <ul style="list-style-type: none"> • There is a possibility that river improvement and embankment construction will change the bottom sediment. [In service] <ul style="list-style-type: none"> • There is a possibility that river improvement and the establishment of embankment will change the bottom sediment.
Natural environme	9	Sanctuary	✓	✓	[During the construction]

Category	No	Assessment item	Assessment		Reason for the assessment
			Before / during construction	In service	
nt					<ul style="list-style-type: none"> Although there is no protected area in the subject river basin, there is the Dharan Forest, which is an important area for biodiversity and birds. Possible impact on fauna if forests are used as animal migration routes. A construction should not be conducted in the above area if possible. [In service] <ul style="list-style-type: none"> Although there is no protected area in the subject river basin, there is the Dharan Forest, which is an important area for biodiversity and birds. Possible impact on fauna if forests are used as animal migration routes.
	10	Ecosystem	✓	✓	[During the construction] <ul style="list-style-type: none"> There is a possibility that construction will affect the growth and habitat of plants and animals on the project site. There is a possibility that the construction work will affect fauna due to dust and exhaust gases. There is a possibility that the noise generated by the construction will affect the avoidance behavior of animals living in the vicinity. There is a possibility that the water pollution generated by the construction will affect the stream biota. There is a possibility that the ecological base of the wetlands will be lost by reclamation. [In service] <ul style="list-style-type: none"> There is a possibility that river improvement and the establishment of embankment will affect the ecosystem.
	11	Water regime	✓	✓	[During the construction]

Category	No	Assessment item	Assessment		Reason for the assessment
			Before / during construction	In service	
					<ul style="list-style-type: none"> There is a possibility that river improvement and embankment construction will cause changes in water regime. [In service] <ul style="list-style-type: none"> There is a possibility that river improvement and the establishment of embankment will result in changes in the water regime.
	12	Topography and geology	✓	✓	[During the construction] <ul style="list-style-type: none"> There is a possibility that river improvement and embankment construction will cause topographical and geological changes. [In service] <ul style="list-style-type: none"> There is a possibility that river improvement and the establishment of embankment will cause topographical and geological changes.
Social environment	13	Resettlement/site acquisition	✓		[Before/during construction] <ul style="list-style-type: none"> There is a possibility of resettlement/land acquisition. [In service] <ul style="list-style-type: none"> There is no possibility of resettlement/land acquisition once the facilities are operational.
	14	The poor segment	✓	✓	[During the construction] <ul style="list-style-type: none"> There is a possibility that the project site will have an impact on farmers and river use (water harvesting, fishing, etc.) in the vicinity of the project site. [In service] <ul style="list-style-type: none"> There is a possibility that river improvement and the establishment of embankment will result in the loss of residential areas, farmland, etc.
	15	Ethnic minorities	✓	✓	[During the construction and in service] <ul style="list-style-type: none"> Minority and indigenous people are

Category	No	Assessment item	Assessment		Reason for the assessment
			Before / during construction	In service	
		s and indigenous people			confirmed to reside in the project site.
	16	Local economy, including employment and means of livelihood	✓	✓	[During the construction] <ul style="list-style-type: none"> There is a possibility that the project site will have an impact on farmers and fishing by local residents in the vicinity of the project site. [In service] <ul style="list-style-type: none"> There is a possibility that river improvement and the establishment of embankment will result in the loss of residential areas, farmland, etc.
	17	Land use and local resource use	✓	✓	[During the construction] <ul style="list-style-type: none"> Impacts on farmers and fishermen in the vicinity of the project site are anticipated. [In service] <ul style="list-style-type: none"> There is a possibility that river improvement and the establishment of embankment will result in the loss of residential and agricultural land. There is a possibility that the project will reduce the occurrence of flooding and inundation.
	18	Water use	✓	✓	[During the construction] <ul style="list-style-type: none"> There is a possibility that river improvement and embankment construction will cause changes in water use. [In service] <ul style="list-style-type: none"> There is a possibility that river improvement and the establishment of embankment will result in changes in water use.
	19	Existing social infrastruc	✓	✓	[During the construction]

Category	No	Assessment item	Assessment		Reason for the assessment
			Before / during construction	In service	
		ture and social services			<ul style="list-style-type: none"> There is a possibility that the project will affect farmers and fishermen in the vicinity of the project site. [In service] <ul style="list-style-type: none"> The project will reduce the occurrence of flooding and inundation.
	20	Social organizations such as social institutional capital and local decision-making bodies	✓	✓	[During the construction and in service] <ul style="list-style-type: none"> There is a possibility that some areas are affected by the project.
	21	Unfair distribution of damage and benefits	✓	✓	[During the construction] <ul style="list-style-type: none"> There is a possibility that if involuntary resettlement and/or compensation for site acquisition are not fair, disparities will occur among the affected population. [In service] <ul style="list-style-type: none"> There is a possibility that the project will reduce flooding and inundation in some areas but not in other areas.
	22	Conflicts of interest within the community	✓	✓	[During the construction] <ul style="list-style-type: none"> There is a possibility that some areas will be affected by river improvement and embankment construction while others will not. [In service] <ul style="list-style-type: none"> There is a possibility that the project will reduce flooding and inundation in some areas but not in other areas.
	23	Cultural and religious	✓		[During the construction]

Category	No	Assessment item	Assessment		Reason for the assessment
			Before / during construction	In service	
		heritage			<ul style="list-style-type: none"> • There is a possibility that cultural heritage and religious facilities in the project site will be affected. [In service] <ul style="list-style-type: none"> • There is no possibility that the project will affect cultural heritage and religious facilities once it is put into operation.
	24	Scenery	✓	✓	[During the construction] <ul style="list-style-type: none"> • There is a possibility that river improvement and embankment construction will affect the landscape. [In service] <ul style="list-style-type: none"> • There is a possibility that river improvement and the establishment of embankment will change the landscape.
	25	Gender	✓	✓	[Under construction / In service] <ul style="list-style-type: none"> • Gender considerations are required for the projects in the river and erosion control sector.
	26	Children's Rights			[During the construction] <ul style="list-style-type: none"> • There is no possibility that special consideration is required for the rights of the children, as child labor will not be performed in accordance with Nepalese laws and regulations. [In service] <ul style="list-style-type: none"> • There is no possible impact on children's rights.
	27	HIV/AIDS and other infectious diseases	✓	✓	[During the construction] <ul style="list-style-type: none"> • There is a possibility that the risk of HIV/AIDS infection increases among construction workers and the people serving food and beverages to the construction workers, etc. [In service]

Category	No	Assessment item	Assessment		Reason for the assessment
			Before / during construction	In service	
					<ul style="list-style-type: none"> There is no possibility that special consideration is required for the effects of HIV/AIDS or other infectious diseases.
	28	Working environment (including occupational safety)	✓	✓	[During the construction] <ul style="list-style-type: none"> Safety management of the working environment in river maintenance and the establishment of embankments is necessary. [In service] <ul style="list-style-type: none"> Safety management of the work environment in soft measures for flood management is necessary.
Other	29	Accident	✓	✓	[During the construction] <ul style="list-style-type: none"> Safety management of the working environment in river maintenance and the establishment of embankments is necessary. [In service] <ul style="list-style-type: none"> Safety management of the work environment in soft measures for flood management is necessary.
	30	Transboundary Impacts and Climate Change	✓	✓	[During the construction] <ul style="list-style-type: none"> There is a possibility that construction work will generate greenhouse gases (CO₂). [In service] <ul style="list-style-type: none"> Increased flood risk due to climate change and mitigation measures should be considered.

Source: JICA Expert Team

9. Alternatives to the project activities

When selecting the project plan, multiple plans should be considered as alternatives, and the possibility of not implementing the project should be considered as one of the

alternatives. If the Project were not implemented, there would be no natural and social environmental or economic impacts associated with the construction work. However, as this project is requested by the local government based on the increasing risk of flooding, failure to implement the project would not meet the government's requirements. In the next phase of the project, multiple alternatives will be considered, including the case where the project is not implemented.

Table 9-1 Examples of Alternative Comparisons

Description of alternatives	Environmental impact	Social impact	Economic impact
[Current proposal] Proposal 1 - Flood control projects through structural measures such as erosion control facilities, flood control basins and embankments, as well as the non-structural measures through land use regulations	<ul style="list-style-type: none"> • Stabilizing peak channel flows maintains the channel environment. 	<ul style="list-style-type: none"> • The project is expected to reduce the risk of flood disasters and provide safe livelihoods and stable social activities for the population. 	<ul style="list-style-type: none"> • The project will stabilize the economy and contribute to urban development.
No implementation of projects	<ul style="list-style-type: none"> • Habitat loss and habitat degradation due to sediment runoff and deposition. • Deterioration of sanitation environment due to internal flooding, etc. 	<ul style="list-style-type: none"> • Human suffering due to flooding • Impact on social infrastructure such as damage to houses and public facilities, etc. 	<ul style="list-style-type: none"> • Impacts on agricultural land, industrial areas, airports, etc., which impede economic development

Source: JICA Expert Team

9.1. Scale and scope of land acquisition and resettlement

The extent and scale of land acquisition and resettlement by the project will be estimated based on the flood control plan that examines the scale and location of the structural measures and the extent to which land use restrictions will be established. As a general rule, land along rivers is publicly owned by the Right of Way (30 meters from the river bank for large rivers and 6 meters for small rivers), so acquisition of the land owned by ROW and surrounding areas is required. However, the ROW is inhabited by Sukumbasi (in slum areas), and compensation and support for their relocation is necessary. According to local interviews, there are no plans to relocate the Sukumbasi living along the riverbanks, although Biratnagar Metropolitan City has conducted small-scale relocation projects of Sukumbasi in the past. The current view is that they are already rooted in the area and in many cases people do not want to move away from where they are working. Although not all of the river was confirmed during the field survey, land use by farmlands, markets, temples, crematoriums, and ancillary facilities are observed along the river and are used as part of daily life, so it is necessary to consider these social impacts when selecting the target sites.



Source: JICA Expert Team

Figure 9-1 Condition of Riverside Dwellings

9.2. Specific measures for compensation support

According to the "Current Civil Law in Nepal and Future Legislative Trends, 2013" (ICD, Ministry of Justice, Research Commission Report), Article 13 of the Land Acquisition Act stipulates that compensation shall be paid in cash. The amount of compensation is determined by the Compensation Fixation committee. The amount of compensation is then notified to the government by the Chief District Officer. The decision on the amount of compensation is publicly announced in newspapers and by notification to the municipalities. The members of the Compensation Fixation committee are the Chief District Officer

(chairperson), the head of the land management office or the district tax director, the person in charge of the project or his/her designee, and a representative from the district development commissioner. In addition, Article 14 of the Land Acquisition Act states that compensation in-kind (through replacement land) may be applied if requested by the person whose entire land is being expropriated and if the government can procure the replacement land. In cases of involving large-scale resettlement, the government usually prepares land for relocation.

In addition, the "Priority River Basins Flood Risk Management Project, 2020" project implemented by ADB incorporated the method of voluntary land donation. This method deserves to be considered as an alternative or complementary method to involuntary resettlement in this project as well.

9.3. Complaint handling system

In Nepal, Article 11 of the Land Acquisition Act provides that any person dissatisfied with the land acquisition process may file an objection.

The acquisition of a site is publicly announced in the newspaper by the Chief District Officer. At that time, the owner or lessee of the subject site may file an objection with the Ministry of Home Affairs (MoHA) through the Chief District Officer within 7 days (plus the time required for the transfer) of the public notice of the expropriation of the site, stating the grounds for the objection. The MoHA recommends that the site owner consult with the Chief District Officer before filing a formal objection.

After receiving a complaint, the MoHA grants the local court the authority to investigate the site, summon witnesses, record statements, and collect data, and the local court conducts deliberations. As a general rule, the decision on the complaint is made public within 15 days from the date of receipt of the complaint by the MoHA.

10. Result of the consultation with recipient government on environmental and social consideration including roles and responsibilities.

MoEWRI agreed to follow "JICA guidelines for Environmental and Social Considerations (April 2010)" in order to ensure that appropriate consideration shall be made for the possible environmental and social impacts of the Project. At the same time, MoEWRI understood that the project category may be changed, after the on-site confirmation in the Project.

11. Terms of Reference for Environmental and Social Considerations

During the Project for Capacity Development on Flood Control for Disaster Risk Reduction in Sunsari and Morang Districts, Province 1, a Strategic Environmental Assessment (hereinafter referred to as "SEA") should be carried out in accordance with JICA Guidelines for Environmental and Social Considerations (hereinafter referred to as "JICA Guidelines") as well as the legislations of the country. Presently there is no detailed procedure on SEA, though concept of SEA is described in Environmental Protection Act (EPA) and Environmental Protection Rule (EPR) Nepal. Therefore, SEA should be conducted for this project based on the EPA, and it is advisable to communicate closely with concerned authorities for their guidance on SEA procedure. Guidelines and procedures of SEA in

other countries and international organizations should be also referred.

Terms of Reference for SEA on the flood control plan is shown below. Tasks include the followings, but not limited to

- ♦ Establishing SEA team with DWRI, relevant organizations, and JICA Expert in charge of environmental and social considerations.
- ♦ Providing SEA team members with guidance on SEA so that this activity is properly embedded in the process of formulation of the flood control plan.
- ♦ Preparing a TOR of SEA by reviewing SEA guidelines and procedures of other countries and international organizations and by consulting with Ministry of Forest and Environment.
- ♦ Confirming the legal framework and institution of Nepal on environmental and social considerations, including
 - a) Laws, regulations, and standards related to environmental and social considerations (ex. environmental impact assessment, resettlement, public participation, information disclosure, and others);
 - b) Gaps between the JICA Guidelines and the legal framework of Nepal on environmental and social considerations;
 - c) Relevant organizations responsible for implementation of projects and their roles on environmental and social considerations including Environmental Impact Assessment (EIA) and SEA.
- ♦ Analysis of the goals and objectives of the flood control plan.
- ♦ Analysis of possible alternative considering development constrains.
- ♦ Analysis of the contents of the flood control plan.
- ♦ Confirming the relevance and consistency of the flood control plan with other relevant policies, Development plans, legislations (both national and international) and public and private investment.
- ♦ Confirming that the flood control plan does not contain any plans subject to the Category A under the JICA Guidelines for Environmental and Social Consideration.
- ♦ Conducting stakeholder analysis. Based on the result, stakeholder meetings are planned and held. Meetings should be held at least two occasions, 1) at the time of alternative analysis and 2) at the time of preparation of a draft SEA report. When planning stakeholder meetings, consider the effectiveness and validity of methodology and timing of meetings in order to collect information from and build consensus with various stakeholders.
- ♦ Comparing and examining alternative scenarios in terms of environmental, social, technical, economic, and financial aspects.
- ♦ Conducting scoping including choosing alternatives for analysis, a range of significant and potentially significant impacts, and study methods.
- ♦ Conducting baseline surveys for Environmental and Social Considerations, including land use, natural environment, indigenous people and social and economic situation.
- ♦ Prediction of likely impacts of the proposed projects under the flood control plan based on the scoping.
- ♦ Evaluation of likely impacts of the plans and comparative analysis of alternative proposed plans, including the zero option and the 'without project' option.
- ♦ Examination of the mitigation measures (to be avoided, minimized, and compensated).

- ♦ Examination of the monitoring methods (monitoring items, frequencies, and methods).
- ♦ In SEA report, indicating how the results of SEA are reflected to the flood control plan.
- ♦ Circulating draft SEA report to relevant institutions/authorities for their comments.
- ♦ Finalizing SEA report by incorporating the comments.