

Annex 4.5

Inclusion of Biodiversity aspects in the approved EIA reports of Hydroelectric and Road Projects

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Introduction

Biodiversity : Variation and variability in the life form.

- Three levels viz.

Ecosystem diversity, Species diversity, and
Genetic diversity

- In EIA process biodiversity major concern - linked with physical, biological and socio-economic environments.
- In Nepalese context,
- National Environmental Impact Assessment Guideline – 1993
- EIA mandatory after the EPA - 2053, EP Rules, 2054 came into effect
- Physical, biological and socio-economic environments looked after in the IA process

Introduction ...

- Since, the country is in rural setting and 18% of the land mass is covered by protected area, biodiversity aspect is attracted by direct or indirect means in any development activities
- A number of EIA studies for different development projects completed till to date.
- Sample study on inclusion of biodiversity aspects in the approved EIA reports of Hydroelectric and Road Projects is attempted.
- Specific features of biodiversity aspects in the baseline environment, identification of impacts in the construction and operation phase, mitigation of impacts, and monitoring phase of the EIA process

Road Project

Features	Road Network Development Project (RNDP)	Basantapur-Chainpur-Khandbari Road Project
District	Terhathurm	Sankhuasabha
Distance	96 km	
Category	Feeder road	
Formation width	5.5 m	
Right of the Way (ROW)	15 m	
Start Year	2051/52	
Target year of completion	2061/2062	
Elevation	Lowest: 560m Piluwa Khola	Highest: 2500m Deurali

Baseline Condition

Flora

Vegetation of Tropical (400 m) to subalpine zone (2400m)

5 major forest types - *Rhododendron arboreum*, *Quercus lanugonis*, *Quercus lamillosa* – Laurel forest, *Q. semicarpifolia* and *Lithocarpus pachyphylla*

Forest: Total, tree, shrubs and herbs in natural forest

Sampling for status and ranking of forest in the project area

Sampling for status and ranking of forests in the project area

Section	Forest Type	Length	Area	Dominant Species
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Basal Area	Relative Dominance			
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Basal Area for 10 forest plots

Baseline information ..

- Forest category – excellent, good, fair, poor and bad
- Human disturbance – fuelwood, godder, grazing etc.
- Information on community forests within the Project area
 - ✓ VDCs
 - ✓ Forest User's Group
 - ✓ Ward No.
 - ✓ Area (ha)
 - ✓ Number of User households
 - ✓ Handover date
- Wood fuel consumption
 - ✓ Daily requirement in middle hills - 20 kg
 - ✓ Household size – 5.3
 - ✓ Yearly requirement - 2.3 m³ per person

Baseline information ..

- Ethno-botanical Analysis – total species found and used
 - o Fuelwood – 17 species
 - o Fodder – 20 species
 - o Timber – 11 species
 - o Edible – 12 species
 - o Medicinal – 21 species
 - o Total – 145 species

Rare and Endangered Flora as included in IUCN & CITES

Fauna

- Literature-based mid-hill distribution of fauna
- Mammals 110 (17% of entire known range),
- Breeding birds 147 (35%) restricted in mid-hills
- Butterfly 557 (88%) out of 635 with 244 (38%) restricted in this zone

Baseline information ..

Fauna

- a) Mammals – Lepus, Rhesus monkey, Langur monkey with its status, food, ecology, and behaviour with CITES and IUCN category
 - Description of the above mammals dealt in each transects
 - Description of *Muntiacus muntjak*, *Nemorhaedus goral* dealt in general
 - Predator species and description of crop depredation
- b) Birds – species information with IUCN/CITES status
- c) Reptiles and Amphibians (11 species reported)
- d) Fish – Fish type: 8 species with water body specific distribution pattern, Sabha khola, Piluwa khola
- e) Endangered Fauna - Golden Monitor lizard (*Varanus flavescens*)

Baseline information ..

Protected Area

a) Makalu Barun National Park and Conservation Area

- 50 km northwest of Khandbari
- Features of MBNPCA
- 300 species of flowering plants (47 sps. Of orchids, 25 Rhododendron species, 48 primroses, 19 bamboos, 15 oaks, 86 fodder trees and 67 economically valuable medicinal and aromatic plants)
- Mammals
- Birds
- Fish

b) Proposed Tinjure Milke Jaljale Conservation Area (Laliguras Conservation Area)

Potential Environmental Impacts and Mitigation Measures

Construction Phase

2.1 Loss of forests

- Length of the road bypassing the forest area 14.85 km
- Forest loss estimation 16.36 ha
- Tree densities along the road corridor 80 – 750/ ha.
- Wood volume per sample plot (1.3 m³/ha – 34 m³/ha)
- Tree types: with protection category of IUCN and CITES, both within ROW or periphery

2.2 Use of forest product by construction workers

- Fuelwood, Poles for huts
- Kerosene supplement by contract
- Contract clause

Potential Environmental Impacts and Mitigation Measures ...

2.3 Loss of habitat

- Total encroachment by the construction
- Loss or fragmentation of habitat

2.4 Effect on aquatic life

- Restriction on fish catch
- Use of explosives and electric shocks

2.5 Effect on protect species – *Acacia catechu*, *Butea monosperma*, *Podocarpus nepalensis*, and *Cythea spinulosa*

Operational Stage

- Effect on Tinjure-Milke-Jaljale conservation area]
- Effect on community forests
- Effect on endangered plant species
- Effect on wildlife and their inclusion in Red Data Book
- Effect on aquatic life especially fish and its export

Impact on Biological environment	Proposed Mitigation measures	Expected effect	Responsibility
Tinjure Conservation Area	Spoil minimization a. Bioengineering of cut slopes and gullies b. Plantation of rare/endangere d species	Reduction in dumping soil a. Conservation of biodiversity	Design team
Community forests	Mobilization of local CBOs	Protection of forests & its products	
Flora and fauna	Replantation at ROW, Strict vigilance by the Project against poaching of the WL	Maintenance of Biodiversity conservation of Wildlife species	

Operational Stage

Activities	Impact				Mitigation
	Nature	Magnitude	Extent	Duration	measures
TMJ, Cutting of Rhododendron trees and selling	Direct	High	Site specifi c	Long ter m	Create awareness for Biodiversity conservation
Community forests, cutting of trees and selling in the local market	”	”	”	”	Promote eco- tourism for off- farm employment. Create awareness about conservation and need based use of BD resources.

Operational Stage Impacts

- Disposal of felling produce
- Controlling of illegal felling
- Loss of protected flora
- Compensatory plantations
- Protected species
- Bioengineering measures
- Alternative energy techniques
- Seedling distribution
- Establishment of conservation area
- Controlling of poaching
- Translocation of Golden Monitor Lizard

Environmental Monitoring

- Department of Forests for forestry related issues

Construction phase

Firewood collection from adjacent forest area

- Forest use for fuelwood
- Kerosene supplement monitoring
- Wildlife hunting monitoring
(Resident Engineer and District Forest Officer)

Removal of vegetation

- Earthworks, excavation, Quarries and Pits need to be rehabilitated to their original conditions as mentioned in the Environmental Management Guidelines of DOR (Div Road Engineer)

Thankot-Chapagaun-Bhaktapur 132 kV Transmission Line Project

Source of Power	National Grid
Line of voltage	132 kV
Circuit	Double with single circuit strung
Length of Line	27 km
Tower Type	Lattice
Ruling Span	350 m
Line route	Parts of VDC, and Municipalities of Kathmandu, Lalitpur and Bhaktapur districts
Right of way (ROW)	18m, Forest - 1.08 ha, Agricultural land - 45.72 ha, Major crossing - 1.0 ha
Project commenced	2001
Project completion	2004

Baseline information

- Mostly cultivated land
- Dominant Vegetation broadleaf and chirpine species.
 - *Alnus nepalensis* (Alder), *Dendrocalamus* sp. (Bamboo), and *Pyrus pashia* (Mayal)
- Wildlife - barren land, grassland and agricultural land provide habitat to various wildlife species
 - a) Mammals - *Macaca mulatta* (Rhesus Monkey), *Presbytis entellus* (Langur), *Panthera pardus* (Leopard), *Felis chaus* (Jungle cat), and recorded mammalian fauna categorized under IUCN and CITES category
 - b) Birds - altogether 24 bird species reported with *Lophura leucomelana* (Kalij pheasant) and *Gallus gallus* (jungle fowl) with susceptible status in National Red Data Book. No other protected areas nearby
 - c) Reptiles and Amphibians - common frog and reptiles reported from the surrounding area

Impacts Identification

Construction Phase

Loss of Forest Resources

- Loss of about 300 small and medium sized alder trees
- Clear felling of transmission line
- 2 tons of firewood and 0.5 tons of twigs and foliage (mostly bedding materials of animals)

Operation Phase

- Low or no impact during operation as located in gullies and streams
- **Disturbance to wildlife and wildlife habitat**

Construction Phase

- Impact mainly on reptiles and amphibians, no protected species, and disturbance in habitat and loss of lives

Operation Phase

- Impact on reptiles and amphibians life and habitat, site only serves as corridor to certain wildlife, Jackal and Jungle cat with CITES status, no significant impact to other birds, reptiles and amphibian species, and may cause impact to domestic cattle due to electric shock

Mitigation Measure

Loss of vegetation

Clear felling for Transmission line	5 m strip for layout of wires during construction of TL Topographic consideration
Reptiles and amphibians and habitat impacted	No measure suggested for mitigation of impacts
Construction phase	No direct mitigation measures
Operation phase	Clearing of forest should be done only if necessary Trees to be felled need to be marked. Logs and branches should be piled up Control of illegal cutting through deputation of security persons

Monitoring

Baseline Monitoring

- Mapping of sensitive areas protected forests, community forests and settlements in combination with wildlife
- Survey and documentation of the operation of the existing Community Management Forests

Pre-construction

- Environmental Protection Plan
- Restoration and revegetation Plan

Construction

- Water bodies at critical areas, wildlife
- Reconnaissance forest monitoring
- Community Forest Monitoring
- Revegetation and slope stabilization monitoring
- Status of flora and fauna monitoring

Monitoring ...

Operation Phase Monitoring

- Effects of access and control measure on wildlands, wildlife habitats and wildlife populations
- Illegal hunting, trapping and tree felling monitoring

Institutional Set up

- Forestry, Wildlife, Soil Conservation Expert

In a nutshell

- Biodiversity aspects have been covered in road project than the Langtang Hydroelectric Project, and Thankot Transmission Line (TL) Project
- TL project passes through the prime agricultural area and agro-biodiversity has not been addressed

Thank you