

Environmental Impact Assessment of Hydroelectric Power Plant



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- EIA of Hydroelectric plants
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Background

- Hydroelectricity: An emerging source of energy
- Positive impacts:
 - Immune to the variation in the cost of fossil fuels like oil, coal, natural gas
 - Renewable source
 - It is clean source of power
 - Electricity in remote areas
 - Improvement in living standard
 - Employment opportunities
 - Creation of reservoir

India's hydro power potential

Region/State	Identified Capacity as per re-assessment)	Capacity Developed		Capacity Under construction		Capacity Developed + Under Construction		Capacity yet to be developed	
	(MW)	(MW)	%	(MW)	%	(MW)	%	(MW)	%
Northern	53395	13771.9	25.79	6734.0	12.61	20505.9	38.40	32889.1	61.60
Western	8928	5803.8	65.01	400.0	4.48	6203.8	69.49	2724.2	30.51
Southern	16458	9394.8	57.08	786.0	4.78	10180.8	61.86	6277.3	38.14
Eastern	10949	3049.4	27.85	2211.0	20.19	5260.4	48.04	5688.7	51.96
North eastern	58971	1202.7	2.04	2724.0	4.62	3926.7	6.66	55044.3	93.34
All India	148701	33222.5	22.34	12855.0	8.64	46077.5	30.99	102623.5	69.01

Regulations Regarding Clearances

Central Government in Ministry of Environment and Forests	<ul style="list-style-type: none">• for Category A projects ≥ 50 MW• for category B projects if located wholly or partially within 10 km from boundary of notified protected area/critically polluted area/ecosensitive area
State Environmental Assessment Authority (SEIAA)	for category B projects ≥ 25 MW and < 50 MW

Objective

- EIA for Hydroelectric power plant project
- Case Studies:
 - The small hydro power projects from Uttarakhand.
 - A large hydro power plant; Demwe Lower HEP in Arunachal Pradesh.
- compare the key environmental issues : small vs large plants

Background

- Difference between small and Large project
- Classification of Small Hydro Power (SHP):
 - Micro hydro: <100 KW;
 - Mini hydro: 101-2000 and
 - Small hydro; 2001-25000 KW.
- <25 MW does not need environmental clearance?

EIA Process

- Background of the project
- Methodology followed.
- Detailed baseline studies
 - Physiography
 - hydro-meteorology
 - Soil
 - geology and seismicity
 - land use and land cover
 - floristic and forest types
 - faunal elements
 - aquatic ecology & fisheries
- Impact assessment and evaluation.

EIA: Background

Item	Bhilangna (SHP)	Demwe
State	Uttarakhand	Arunachal Pradesh
District	Tehri	Lohit
Capacity	2 x 2250 kw	1750 MW
Type of project	Run of the river with trench-type weir	Run-of-the river scheme. Concrete Gravity type
Catchment Area	343 km ²	20,174 km ²
Hydrology	Bhilanga is perennial stream emanating from Gangotri group of glaciers	River Lohit is a major right bank tributary of the Brahmaputra River
Archaeological/Historical site	Not present	Not present
Protected Area	No	Danger of submergence of Kamlang wildlife Sanctuary

EIA: Key Environmental issues

- **Impact on Terrestrial Ecosystem**
- **Change in Land Use and Habitat Destruction**
 - *Location of various structures*
 - *Dumping sites*
 - *New Roads and bridges*
 - *Anthropogenic Pressure*
- **Impact on Wildlife**
- **Species population loss**

Cont..

EIA: Key Environmental issues

- **Impact on Aquatic Ecosystem**
 - *Habitat Degradation and Destruction*
 - *Habitat fragmentation*
- **Deterioration of water quality**
- **Fisheries**
- **Impact on Air Environment**
- **Noise Pollution**
- **Sediments**
- **Downstream Impacts**

EIA: Key Environmental issues

- **Impact on Terrestrial Ecosystem**

- Includes all the land within the project study area (within 10km radius from the project area)
- **Acquisition of land** for various project components like submergence, road construction, dam structure, labour camps, colonies

- **Change in Land Use and Habitat Destruction**

- Leads to the land use changes, habitat degradation and destruction from the said land
- We have to examine whether the area is covered by the dense or open forests.
- **Location of various structures**
- **Dumping sites:**
- Number, Location and Area of the dumping sites. **Efficient use? Proper cover and stabilisation?**
- **New Roads and bridges: Slope failure**
- **Anthropogenic Pressure:** Increase in fuel wood collection, killing and poaching of animals, rearing of the livestock, grazing activities by the livestock
- Settlement away from forests. Provision of facilities like fuel, kitchen, sanitary etc.

EIA: Key Environmental issues

- **Impact on Wildlife**

- Demwe dam - “Mishmi tribe”, practice to hunt the animals and use their organs or parts for making ornaments or for food.
- If the site of construction is used as migratory route by the animals, special measures need to be taken.
- Impact on the wildlife by the vibration of the machines, increase in noise

- **Species population loss**

- May be case where there will be expected loss or disappearance of some species
- Demwe dam: some threatened plant species like *Acer oblongum*, *Calanthe manii*, *Phoenix rupicola* which are expected to occur in the influence zone

EIA: Key Environmental issues

- **Impact on Aquatic Ecosystem**

- The construction of dam will lead to formation of lacustrine/semi lacustrine body on the upstream.
- It will also lead to formation of algae and it may lead to the eutrophication of the reservoir.
- The dam acts as an obstruction for the fish migration. (Habitat fragmentation)

- **Deterioration of water quality**

- Runoff of loose muck, effluents from crushers and sewage disposal from the labour colonies.
- The activities such as bathing, cocking and drinking will have the negative impact.
- Untreated sewage is disposed in the river it will lead to **increase in the organic content**

EIA: Key Environmental issues

- **Impact on Air Environment**

- Vehicular movement which are needed for drilling, tunnelling, digging purposes
- The use of diesel generator to supply electricity; emission of NO_x , SO_2
- The production of CO_2 and CH_4 due to the decomposition of the organic matter and from the primary processes. (Flushing important)

- **Noise Pollution**

- Construction activities
- Older people and the young children are the sensitive receivers
- Older people develop high blood pressure due to consistent exposure to noise level

EIA: Key Environmental issues

- **Sediments**

- Essential to have the information of the slope of the ground
- In case of steep slopes, the sediments would be washed away by the water to the reservoir

- **Downstream Impacts**

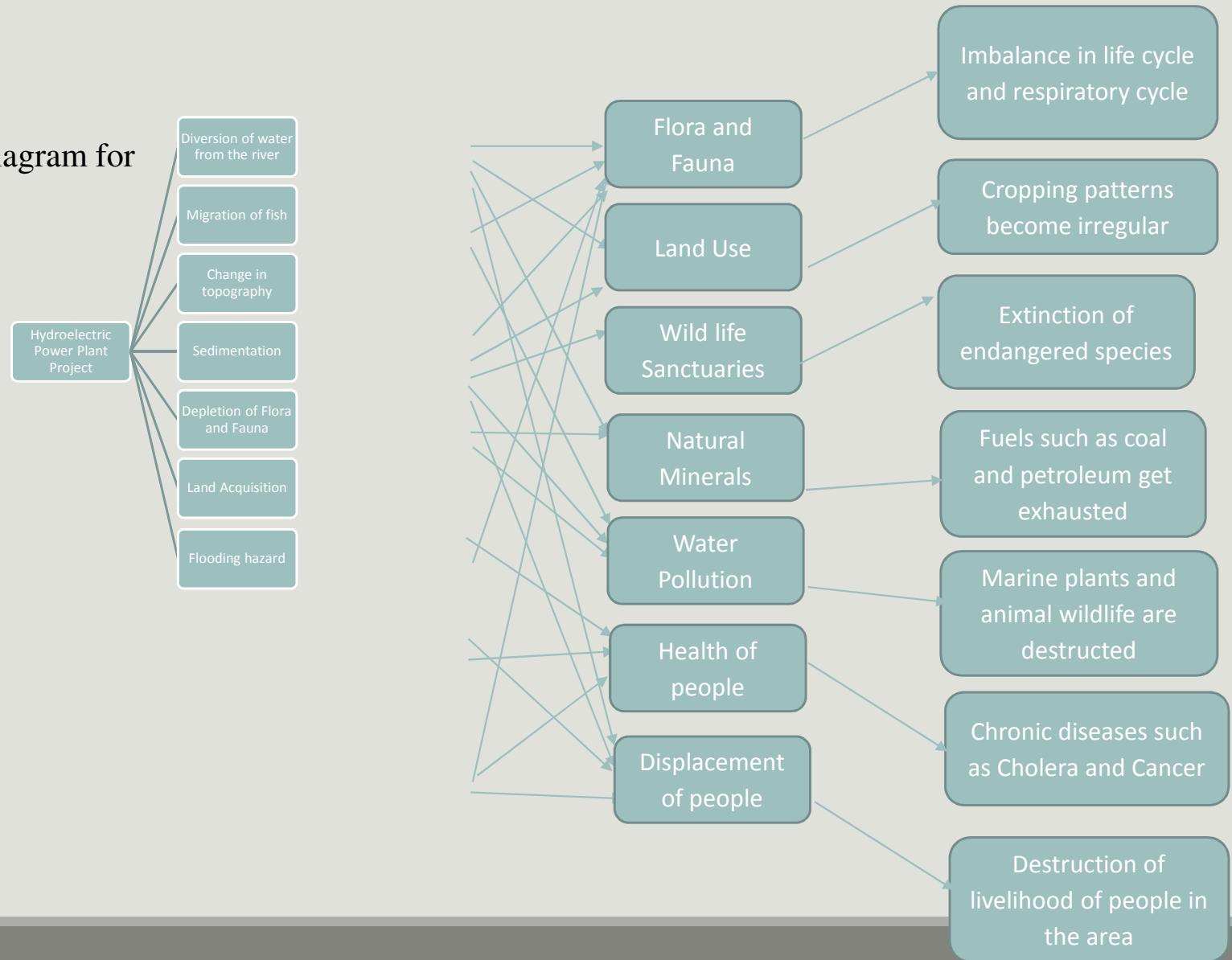
- Demwe dam: lowering of the turbidity water downstream leading to the high erosion capacity of the river.

Tools and Techniques used

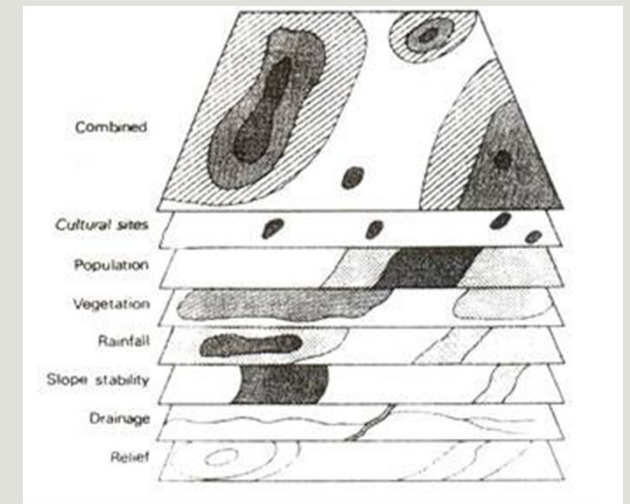
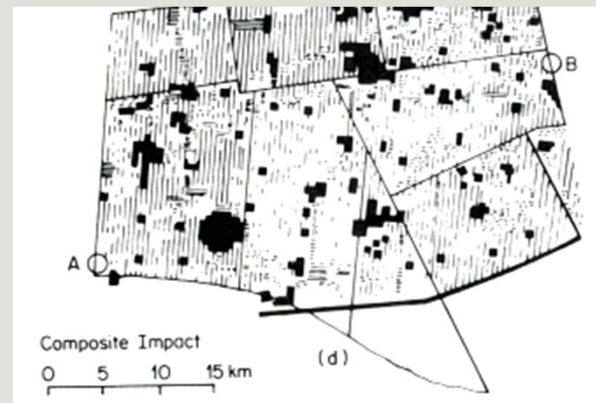
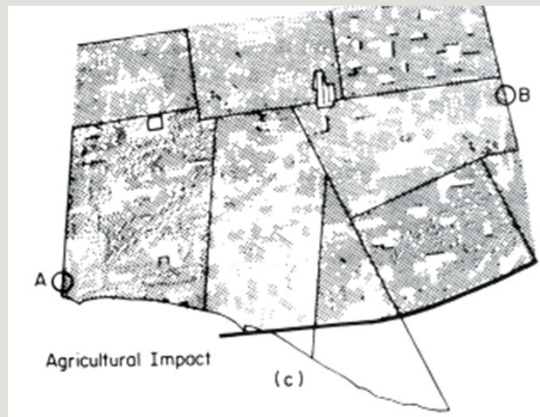
Environmental Component	Activity/ Action	Likely Impacts							
		Minor impact		Moderate		Significant		Major	
		CS	OS	CS	OS	CS	OS	CS	OS
Siltation and sedimentation	Effluent from crusher		Orange		Orange				
	Muck disposal			Orange					
	Quarrying and blasting operation								
Change in water quality	Construction activity		Orange	Orange					
	Damming and impounding of water	Blue							
	Effluent from crusher		Blue	Orange					
	Muck disposal								
	Quarrying operation								
	Sewage from labour camp	Orange	Orange						

Table:
Interaction matrix
for Demwe project.

Figure : Network Diagram for Hydro Electric Plant



Overlays



Comparison of two case studies

- Number of environmental issues: **Demwe (More)**
- Important to consider downstream impacts.
- Involve the people living in the downstream in public hearing
- Cumulative impacts.
- Type of river : **“run of river”** type for both. Length of submergence increases.
- SHP
 - Risk of eutrophication
 - Storage
 - impact due to construction of the roads etc is less

Quick points

- EIA as a process.
- Impact Assessment.(3 stage process).
- Tools and Techniques.
- Importance of cumulative impact of project.

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Thank You
