Comparison of Environmental Impact of Barrages and Large Dam by Checklist Method

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Research Article

Abstract: This article focuses on the environmental & social impacts of the River Valley Projects, while pinpointing the vital need of large storage water resources projects in India. The water is becoming scarcer in India due to increase in population; on the other hand due to creation of large dams it is resulting environmental impacts. The paper aims at clarifying implementation of the minor & medium projects on the river with minimizing the environmental impacts & leading towards a sustainable growth.

Introduction

History

There was no proper mechanism for assessing the environmental impacts of the river valley projects in India till 1978. The Central Water Commission and the Planning Commission had indicated the broad lines for the preparation of the detailed project report and clearance of the project. The Department of Environment and Forests, Government of India in 1978 prepared the guidelines for environmental impact assessment of river valley projects. Thereafter in 1980, Ministry of Environment & Forests passed the Forest (Conservation) Act, under this act all the river valley projects consisting forestland needed to be cleared before commencement of the Project. In January 1985 MoEF prepared a list of the type of data and basic information on the Environmental impact studies and sent to project authorities along with guideline further it came in to force as Environment (Protection) Act, 1986. Moreover before 1994 this was only an administrative requirement & list of the documents to be collected for the clearance. However the EIA notification issued by the Ministry in January 1994 (and amended thereafter till date) As a part if process in Sept 1999, 2003. 2006 MoEF published guidelines which further elaborate the procedure to the followed for EIA. The Science of EIA in India is still evolving in India.

Case History

Tapi system is one of the three major river systems crossing the State of Maharashtra and nearly 80% of the basin lies in Maharashtra. Tapi originates from the Multai hills of Satpura ranges in the Baitul district of Madhya Pradesh and flows from East to West. Sulwade Project & Lower Tapi similarly of both these projects is under construction on Tapi River in Dhule & Jalgaon district. Basically these projects are for irrigation need of the scarcity zone in the proposed command area. Lift irrigation is proposed for both the projects. Following are the comparative Salient Features of the Project.

Salient Features

	Lower Tapi	**Sulwade Barrage**
I) Location:-		
a) Topo sheet No.	46(0/4,K/11,K/12,K/15,K/16)	
b) Name of River	Tapi	Tapi
c) Village	Padalse	Sulwade
d) Latitude	20^0 11' 0"	21 - 18' -12"N
e) Longitude	75^0 0' 30"	74 – 48' – 14"E
II) Catchment area		
a) Total Catchment area	49190 sq.Kms	52149 Sq.Km.
b) Free Catchment area (Below Lower Tapi Project)		3649.52 Sq.Km
III) Storage		
Storage provided (Gross)	420.56 mm^3	65.06 mm^3
Live Storage	407.59 mm^3	64.942 mm^3
Dead Storage	12.97 mm^3	0.118 mm^3
IV) Affected villages		
a) Fully	8 Nos	Nil
b) Partial	9 Nos	Nil
V) Command area		
a) Gross command area	48920 Hect	9333 ha
b) Cultivate command area	39136 Hect	8400 ha
c) Irrigable command area	31309 Hect	8582 ha

VI) Costs:-		
a) Total cost of the scheme	Rs. 39946.04 Lakhs	Rs. 29088.00 Lakhs
b) B.C. Ratio	1.97	1.278
c) Cost / Mcum	Rs 95.10 Lakhs	Rs. 447.10 lakh
f) Cost / Ha.	22.00	Rs. 340893/-
VII) Land to be acquired		
Without Nalla & River	4595.26 Hect	1272 ha
Forestland	3.12 Ha	Nil

Comparison of Large & Medium Project

Salient features of the above both the projects show detailed technical comparison. Major area of concern are Lower Tapi projects involves rehabilitation & resettlement of 17 villages under which 8 villages will be fully submerged & 9 are partially, despite of the river portion 4595.26 hectare of land required for the project. However for Sulwade barrage medium project does not involve any rehabilitation & resettlement & the area required for the project including the Dam seat area is 1190 hectare most of the area required for the project is from the banks of the river. In addition to this Forest Land required for Lower Tapi Project is 3.12 Ha and for Sulwade Barrage no Forest land required for the project. Study in respect of the Irrigation benefits of Lower Tapi project will provide irrigation facility to 31309 Ha of area & Sulwade Barrage project will provide irrigation facility for 9333 Ha. When we compare it in respect of the area under submergence it shows that one hectare of area required for the submergence to irrigated 7.84 ha of the land. And on the other hand cost of Sulwade barrage project is Rs. 29088 Lakhs, one hectare of area required to irrigate at the cost of 3.11 Lac per ha. under this ratio environmental loss of area under submergence can be clearly measured. In addition to this cost of Lower Tapi project is 39946.04 Lakhs & irrigation facility for one ha will come at cost of 1.27 Lakhs & for Sulwade it comes to 3.11 though the cost of the Sulwade is more than Lower but it can be certainly recovered, in comparison of early completion of the project due to less hurdles in rehabilitation & resettlement, land acquisition, funds provisions etc. When we compare these projects, medium project benefit start early due to early completion through indirect benefits by natural percolation. Because construction of the medium project has limited hurdles up to the crust level, submergence of the crust level of most barrage project is under river it self. Due to delay in implementation of the project cost of the project increases due to escalation, land acquisition, rehabilitation & resettlement etc. In respect of the above facts avoiding major projects & implementation of the barrage project whose submergence is limited to river portions can be thought.

Environmental Impacts

The lack of environmental consideration in the planning of water resource project can sometime create severe impacts of an irreversible nature on the environment, resulting in ecological destruction. Along with the degradation of natural resources, there can be impacts on the social, economic and cultural structures of the communities and inhabitants of the region. The idea to build barrages & Dams on rivers was for as much equitable distribution of water resources as possible. Flood control and freedom from drought will bring about greater stability of food production, better prediction of agricultural income and value addition to the quality of life in both water rich as well as water depressed areas due to efficient disaster management and socioeconomic development. While these benefits are indeed desirable, the construction of Barrage & Dams will result in some positive and some negative impacts on the environmental, socioeconomic and health parameters, including those related to minimum environmental flows for ecologically sound management of the downstream ecology. The environmental effects of these projects are quantified in terms of measurement of the possible impacts which could happen. The comparative study of these impacts may provide a yardstick for future water resources projects under planning to minimise adverse environmental impacts. This comparison is categorised under three major heads namely a. Natural & Physical parameters b. Socio economic conditions c. Biodiversity.

Checklist Method

The commonest method of EIA is a checklist and presence / absence data. However due to natural biases in data interpretation and analyses this method is not advisable. The checklist method however has some advantages when used for biodiversity assessment. This method helps to identify with ease, the rare and endangered plant or animal species and their abundance in the area studied. As earlier stated checklist is categorised under three major heads namely a. Natural & Physical parameters b. Socio economic conditions c. Biodiversity Firstly the major areas of concern were identified. Impact description is made under subheads are No Impact, Very low, Low, Medium, High & Very high impact, because intensity of the impact can be easily recognized. Blue color denotes No Impact, Green color denotes Positive impact & Red color denotes Negative Impact.

Impacts Checklist														
S. No		**Factors affected/ Potential Impact Area**	**Sulwade Medium Project**						**Lower Tapi Major Project**					
A		**Physical and Natural Parameters**	No Impact	Very Low	Low	Medium	High	Very High	No Impact	Very Low	Low	Medium	High	Very High
	1	**Alterations to Topography**												
	a.	Quarrying & Mining												
	b.	Debris Generation												
	c.	Land pollution												
	2	**Land Use**												
	a.	Waste land												
	b.	Grazing												
	c.	Agricultural												
	d.	Forest												
	e.	Residential												
	f.	Industrial												
	3	**Water Resources**												
	a.	River hydrology												
	b.	Quality (sewage disposal, solid waste dumping)												
	c.	Siltation												
	d.	Alterations to Natural drainage												
	e.	Ground Water												
	f.	Water logging and Salinity												
	g.	Irrigation												

Impacts Checklist															
S.No		**Factors affected/ Potential Impact Area**		**Sulwade Medium Project**						**Lower Tapi Major Project**					
B		**Biotic factors**		No Impact	Very Low	Low	Medium	High	Very High	No Impact	Very Low	Low	Medium	High	Very High
	1	**Biodiversity**													
	2	**Forest**													
	a.	Fragmentation													
	3	**Fauna**													
	a.	Wildlife													
	b.	Rare & endangered species	Terrestrial fauna												
	c.	Mammals													
	d.	Reptiles & Amphibians													
	e.	Fish & fisheries													
	f.	Avifauna													
	g.	Migratory paths													
	4	**Flora**													
	a.	Rare & endemic species													
	b.	Ethnobiological & Medicinal plants													
	c.	Trees													
	d.	Shrubs													
	e.	Grasses													

Impacts Checklist														
S.No		**Factors affected/ Potential Impact Area**	**Sulwade Medium Project**						**Lower Tapi Major Project**					
C		**Socio-Economic**	No Impact	Very Low	Low	Medium	High	Very High	No Impact	Very Low	Low	Medium	High	Very High
	1	**Population**												
	a.	Employment												
	b.	Displacement of Villagers/Tribals/Fishermen												
	c.	Resettlement												
	d.	Livestock												
	e.	Migration of labour												
	2	**Loss of Social tie**												
	3	**Health**												
	4	**Public Service System**												
	a.	Schools												
	b.	Health Centres												
	5	**Infrastructural Facilities**												
	a.	Roadways												
	b.	Bridges												
	c.	Transmission lines												
	6	**Archaeological sites**												
	7	**Places of Religious importance**												
	a.	Temples & fairs												
	b.	Sacred groves												
	8	**Aesthetics**												

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Case Study: *Sulwade Tal. & Dist. Jalgaon (Medium Barrage Project) with Lower Tapi Tal. Amalner Dist. Jalgaon (Large Project) Maharashtra*