

**COST BENEFIT ANALYSIS FOR CONSTRUCTION OF RESERVOIR IN TETAR PANCHAYAT OF MOHRA BLOCK AND WATER TREATMENT PLANT WITH SMALL RESERVOIR IN ABGILA OF MANPUR BLOCK UNDER GAYA DISTRICT FOR GANGA WATER LIFT PROJECT**

**A. Cases under which a cost-benefit analysis for forest diversion required**

S. No.	Nature of proposal	Applicable / Not applicable	Remarks
1	All categories of proposals involving forest land up to 20 hectares in plains (5 hectare in hills).	Not applicable	-
2	Proposal for defense installation purposes and oil prospecting (prospection only).	Not applicable	-
3	Habitation, establishment of industrial units, tourist lodges complex and other building construction.	Not applicable	-
4	All other proposals involving forest land more than 20 hectares in plains and more than 5 hectares in hills including roads, transmission lines, minor, medium and major irrigation projects, hydro projects, mining activity, railway lines, location specific installations like micro-wave stations, auto repeater centers, TV towers etc.	Applicable	<p>These are cases where a cost-benefit analysis is necessary to determine when diverting the forest land to non-forest use in the overall public interest.</p> <p>In the Present case, the cost benefit analysis for construction of reservoir in Tetar panchayat of Mohra block and water treatment plant with small reservoir in Abgila of Manpur block under Gaya district for Ganga water lift project has been calculated.</p>

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## B. Estimation of cost of forest diversion

### (i) Direct Benefits :-

S. No.	Parameters	Remarks
1	Ecosystem services losses due to proposed forest diversion	NPV Value as per FCA, 1980 is 6.26 Lakhs per Hectare Hence total NPV Value for diversion of land is $= 6.26 \times 88.14$ (for reservoir at Tetar) $= 551.75$ lakh. $= 6.26 \times 9.91$ (for WTP with small reservoir at Abgila) $= 62.04$ lakh.
2	Loss of animal husbandry productivity including loss of fodder	Nil
3	Cost of human resettlement	It is being decided by the District Administration Gaya.
4	Loss of public facilities and administrative infrastructure (Roads, building, schools, dispensaries, railways, etc.) on forest land, which would require forest land if these facilities were diverted due to the project.	Nil
5	Possession value of forest land diverted	The total area of protected forest land along the project required is 88.14 ha at Tetar, Gaya. The possession value is taken as 30 % NPV=165.53 lakh. The total area of protected forest land along the project required is 9.91 ha at Abgila, Gaya. The possession value is taken as 30 % NPV=18.61 lakh.
6	Cost of suffering to oustees	Nil
7	Habitat Fragmentation Cost	50 % of NPV Habitat Fragmentations cost is 275.88 lakh at Tetar, Gaya. 50 % of NPV Habitat Fragmentations cost is 31.02 lakh at Abgila, Gaya.
8	Compensatory a forestation and soil & moisture conservation cost	

### (ii) Indirect Benefits :-

The scheme is proposed to provide drinking water to the water scarce town areas of Gaya & Bodhgaya. Moreover, storage of water will lead to ground water recharge also. As per records of Central Ground Water Board, the ground water level in Gaya has shrunk to 0.52 m in the last one year. The situation became so grave during summer that the residents of Gaya town were supplied

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drinking water through tanks. It is also noteworthy that ground water depletion is often thought to impact people who use ground water. In fact depletion can also affect rivers, species, ecosystems and surface water users. Many rivers receive some or even most of their flow from groundwater, particularly during the driest months. In addition, forest is home to diverse and widespread number of groundwater-dependent species and ecosystems, some of which are endangered.

Because many rivers, lakes and wetlands are supported by groundwater, their associated ecosystems, plants and animal species depend on groundwater discharge to survive. By storage of water in the forest region of Tetar Panchayat in Gaya district, the project authorities are in fact helping groundwater recharge which will ultimately benefit the flora and fauna including ecosystem.

It is proposed to store 18.53 MCM (at Tetar, Gaya) and 1.29 MCM (at Abgila, Gaya) of water in the proposed reservoir which is to be constructed on the forest land. This will have a beneficial effect on the forest area. So this project is useful from the point of view of Forest Department also.

Total Costs at Tetar, Gaya (A) =  $551.75 + 165.53 + 275.88$   
= 993.16 Lakh.

Total Costs at Abgila, Gaya (A') =  $62.04 + 18.61 + 31.02$   
= 111.67 Lakh.

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### C. Benefits of forest-diversion

S. No.	Parameters	Remarks
1	Increase in productively attribute to the specific project	In lieu of total trees to be affected in protected forest land it is proposed to be undertaken at least twice of affected trees as compensatory afforestation.
2	Benefits to economy due to the specific project	Socio-economic benefit with enormous convenience in drinking water to urban and rural people and animals.
3	No. of population benefited due to specific Project	Population of nearby villages/ towns will be benefited. As per 2011 census, 512535 and after 30 years it may be nearly 994312
4	Economic benefits due to of direct and indirect employment due to the project	<p>At <i>Tetar, Gaya</i> - Approximately 250 employees will be working directly/indirectly in the project during entire construction period, about 25 employees will be required during operation phase. Assuming 180 working days, 1.58 years, 500 Rs per day.  Total cost = <math>250 \times 180 \times 1.58 \times 500</math>  = 355.50 lakh</p> <p>At <i>Abgila, Gaya</i> - Approximately 100 employees will be working directly/indirectly in the project during entire construction period, about 25 employees will be required during operation phase. Assuming 180 working days, 1.58 years, 500 Rs per day.  Total cost = <math>100 \times 180 \times 1.58 \times 500</math>  = 142.20 lakh</p>
5	Economic benefits due to Compensatory afforestation	<p>In lieu of total trees to be affected in protected forest land it is proposed to be undertaken at least twice to affected trees as compensatory afforestation</p> <p>The CA at <i>Tetar, Gaya</i> will be about 176.28 Ha. (Twice of 88.14 ha) for density 1.0 is Rs 126.74 lakh per hectare (As per Forest conservations) Act.  Considering density of the present forest as 0.2, cost per hectare is <math>176.28 \times 126.74 \times 0.2</math>  = 4468.345 lakh</p> <p>The CA at <i>Abgila, Gaya</i> will be about 19.82 Ha. (Twice of 9.91 ha) for density 1.0 is Rs 126.74 lakh per hectare (As per Forest conservations) Act.  Considering density of the present forest as 0.2, cost per hectare is <math>19.82 \times 126.74 \times 0.2</math>  = 502.397 lakh</p>

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Total Benefits at *Tetar, Gaya* (B) = 4468.345+355.50  
= 4823.845 lakh

Total Benefits at *Abgila, Gaya* (B') = 502.397+142.20  
= 644.597 lakh

- (i) Benefit to Cost Ratio for structures at *Tetar, Gaya*,  
= (B) / (A)  
= 4823.845 / 993.16  
= 4.86 (>1)

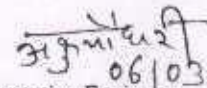
The benefit to cost ratio being greater than 1 (i.e., 4.86) the project is found viable as per analysis.

- (ii) Benefit to Cost Ratio for structures at *Abgila, Gaya*,  
= (B') / (A')  
= 644.597 / 111.67  
= 5.77 (>1)

The benefit to cost ratio being greater than 1 (i.e., 5.77) the project is found viable as per analysis.

- (iii) Benefit to Cost Ratio for structures at *both places*,  
= (B+B') / (A+A')  
= (4823.845+644.597) / (993.16+111.67)  
= 5468.442 / 1104.83  
= 4.95 (>1)

The benefit to cost ratio being greater than 1 (i.e., 4.95), the project is found viable as per analysis.

  
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Executive Engineer  
Tilaiya Canal Division, Wazirganj