


Cost Benefit Analysis

Name of the Project:- Jakhol Sankri Hydro Electric Project (44MW)

Sr. No	Particulars	Amount in Lakhs	Remarks
1.	Total cost		
a)	Estimation of cost of Forest Diversion as per Table- B of MOEF guidelines format	4396.29	As per table-B
	Total amount (Cost)	4396.29	
2.	Benefits		
a)	Benefits calculated as per Table-C of MOEF guidelines format	20096.41	As per table-C
	Total amount (Benefits)	20096.41	
Cost Benefit Ratio			
Total Benefits		20096.41 Lakhs	
Total Cost		4396.29 Lakhs	
Benefits Cost ratio		= Benefits/Cost =20096.41/4396.29 =4.57	
Note:-Cost benefit analysis has been done as per MOEF Guidelines			


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HEAD OF PROJECT/ परियोजना प्रमुख
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Cost Benefit Analysis Guidelines for forest land diversion -2017

Table-A: Cases under which a cost-benefit analysis for forest diversion is required

Sr. No.	Nature of proposal	Applicable/ not applicable	Remarks
1	All categories of proposals involving forest land upto 20 hectares in plains and upto 5 hectare in hills	Not applicable	These proposals may be considered on a case to case basis and value judgment
2	Proposal for defense installation purposes and oil prospecting (prospecting only)	Not applicable	In view of national Priority accorded to these sectors, the proposals would be critically assessed to help ascertain that the utmost minimum forest land is diverted for non-forest use
3	Habitation, establishment of industrial units, tourist lodges complex and other building construction.	Not applicable	These activities being detrimental to protection and conservation of forest, as a matter of policy, such proposals would be rarely entertained.
4	All other proposals involving forestland 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	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.



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Cost Benefit Analysis for diversion of forest land for JSHEP (44MW)

Table -B: Estimation of cost of forest diversion.

Sr. No.	Parameters	MoEF guidelines	Hydel Project	Total Loss (Rs. in lakhs)																		
1	Ecosystem services losses due to proposed forest diversion.	Economic value of loss of eco-system services due to diversion of forests shall be the net present value (NPV) of the forest land being diverted.	<p>Calculation of NPV: Total forest land = 24.317 hact.</p> <table><tr><td>Civil/forest land in GWLS &NP</td><td>22.067 ha.</td></tr><tr><td>Eco-Class of Forest</td><td>Class-V</td></tr><tr><td>NPV rate of Class V Forest</td><td>6,57,000/- per hectare</td></tr><tr><td>NPV of Civil/forest land in GWLS&NP</td><td>22.067 x 6,57,000x5 =7,24,90095/-</td></tr><tr><td>Forest land in Tons Forest Div.</td><td>2.25 ha.</td></tr><tr><td>Eco-Class</td><td>Class V</td></tr><tr><td>NPV rate of Class V Forest</td><td>6,57,000/- per hectare</td></tr><tr><td>NPV of Area in tons division</td><td>2.25 x 657000= 14,78,250/-</td></tr><tr><td colspan="2">Total NPV = 72490095+1478250= 7,39,68,345/- = 739.68345 Lakh Total Parameter Cost: 739.68 Lakh</td></tr></table>	Civil/forest land in GWLS &NP	22.067 ha.	Eco-Class of Forest	Class-V	NPV rate of Class V Forest	6,57,000/- per hectare	NPV of Civil/forest land in GWLS&NP	22.067 x 6,57,000x5 =7,24,90095/-	Forest land in Tons Forest Div.	2.25 ha.	Eco-Class	Class V	NPV rate of Class V Forest	6,57,000/- per hectare	NPV of Area in tons division	2.25 x 657000= 14,78,250/-	Total NPV = 72490095+1478250= 7,39,68,345/- = 739.68345 Lakh Total Parameter Cost: 739.68 Lakh		739.68
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2.	Loss of animal husbandry productivity,including loss of fodder.	To be quantified and expressed in monetary terms or 10% of NPV applicable whichever is maximum.	<p>Total forest land proposed for diversion= 24.317</p> <p>(i) Economic value of fodder production @Rs. 4514/year= 24.317x4514= 1.09 Lakhs</p> <p>(ii) 10 % of NPV applicable i.e 73.96 Lakhs</p> <p>Whichever is maximum Total parameter cost: 73.96 Lakhs</p>	73.96																		
3	Cost of human resettlement	To be quantified and expressed in monetary terms as per approved R&R Plan	<p>There is Nil resettlement in JSHEP. However for the benefit of 246 PAFs a R&R Plan of Rs 2125.80 Lakhs has been approved by Govt. of Uttarakhand</p> <p>Total Parameter Cost: 2125.80 Lakh</p>	2125.80																		


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4	Loss of public facilities and administrative infrastructure (Roads, building, schools, Dispensaries, electric lines, railways, etc.) on forest land, which would require forest land if these facilities were diverted due to the project.	To be quantified and expressed in monetary terms on actual cost basis at the time of diversion.	Calculation: There are no such public facilities or infrastructure identified on the land proposed for diversion. Total Parameter Cost: NIL	0.00
5	Possession value of forest land diverted	30% environmental costs (NPV) due to loss of forests or circle rate of adjoining area in the district should be added as per cost component as possession value of forest land whichever is maximum	Calculation: 30% of NPV = 30% of 7,39,68,345.00 = 2,21,90,503 = 221.91 lakh Total Parameter Cost: 221.91 lakh	221.91
6	Cost of suffering to outsees	The social cost of rehabilitation of oustees (in addition to the cost likely to be incurred in providing residence, occupation and social services as per R&R plan) be worked out as 1.5 times of what outsees should have earned in two years had not been shifted.	Calculation: There are Nil Houseless PAFs has been identified as Approved R&R Plan Total Parameter Cost: 00 lakh	00
7	Habitation fragmentation cost	While the relationship between fragmentation and forest goods and services is complex, for the sake of	Calculation: 50% of NPV = 50% of 7,39,68,345.00 = 3,69,84,173.25 = 369.84 Lakh Total Parameter Cost: 369.84 Lakh	369.84

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		simplicity the cost due to fragmentation has been pegged at 50% of NPV applicable as thumb rule.			
8	Compensatory afforestation and soil & moisture Conservation cost	The actual cost of compensatory afforestation and soil and moisture conservation and its maintenance in future at present discounted value	Estimated cost for compensatory afforestation (as per proposal for diversion of forest land)	185.10 Lakhs	865.10
			Soil and moisture conservation works to be taken up in approved CAT Plan	680 Lakhs	
			Total	865.10 Lakh	
			Total Parameter Cost: 865.10 Lakh		
Grand Total					4396.29

Table-C - Existing guidelines for estimating benefits of forest-diversion in CBA

Sr. No	Parameters	MoEF guidelines	Hydel Project		Total Benefits (Rs.in lakhs)
1	Increase in productively attribute to the specific project	To be quantified and expressed in monetary terms avoiding double counting	Net design energy (Annual)	166.19 GWH.	12563.96
			Rate of saleable net energy	7.56/kwh (levelized tariff)	
			Cost of saleable net energy	166190000x7.56= 1256396400/-	
			Total parameter cost= 12563.96 Lakh		


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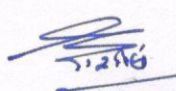
2	Benefits to economy due to the specific project.	The incremental economic benefit in monetary terms due to the activities attributed to the specific project	Calculation: Hydel power is not only one of the cleanest, cheapest and environmentally friendly sources of energy, investment in energy has several direct and indirect economic benefits. Hydroelectric installations bring electricity, highways, industry and commerce to communities, thus developing the economy, expanding access to health and education, and improving the quality of life. We calculate these incremental benefits in terms of addition to output (GSDP) made by this specific project through the concept of the incremental capital output ratio (ICOR).	6949.94																																																				
			<table><tr><th>States</th><th>Gross Invest ment Rate (GIR)</th><th>Growth Rate of GSDP</th><th>ICOR</th></tr><tr><td>Haryana</td><td>27.67</td><td>8.19</td><td>3.38</td></tr><tr><td>Himachal Pradesh</td><td>42.28</td><td>6.77</td><td>6.24</td></tr><tr><td>Madhya Pradesh</td><td>26.60</td><td>4.85</td><td>5.48</td></tr><tr><td>Punjab</td><td>18.39</td><td>6.38</td><td>2.88</td></tr><tr><td>Rajastha n</td><td>18.30</td><td>6.03</td><td>3.04</td></tr><tr><td>Uttar Pradesh</td><td>14.85</td><td>7.24</td><td>2.05</td></tr><tr><td>Uttarakh and</td><td>36.14</td><td>7.84</td><td>4.61</td></tr><tr><td colspan="3">Average</td><td>3.95</td></tr><tr><td colspan="2">ICOR</td><td colspan="2">GIR/GR of GSDP= 3.95</td></tr><tr><td colspan="2">Increment to Output</td><td colspan="2">Investment/ICOR = 12563.96 / 3.95 = 3180.75 lakh</td></tr><tr><td colspan="2">Adll. Energy @1 % for 30 years</td><td colspan="2">3769.189</td></tr><tr><td colspan="4">Total Parameter Benefit: 6949.94 Lakh</td></tr></table>	States	Gross Invest ment Rate (GIR)	Growth Rate of GSDP	ICOR	Haryana	27.67	8.19	3.38	Himachal Pradesh	42.28	6.77	6.24	Madhya Pradesh	26.60	4.85	5.48	Punjab	18.39	6.38	2.88	Rajastha n	18.30	6.03	3.04	Uttar Pradesh	14.85	7.24	2.05	Uttarakh and	36.14	7.84	4.61	Average			3.95	ICOR		GIR/GR of GSDP= 3.95		Increment to Output		Investment/ICOR = 12563.96 / 3.95 = 3180.75 lakh		Adll. Energy @1 % for 30 years		3769.189		Total Parameter Benefit: 6949.94 Lakh				
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3	No. of population benefited due to specific project	As per detailed project report	Calculation: The completion of the project will directly benefit the population residing in project affected	0.00																																																				


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			panchayats as well as the entire population of the state and rest of India through sale of electricity. However, exact quantification of this parameter is not possible as it is time and policy dependent. Total Parameter Benefit: Not Valued (NIL).											
4	Economic benefits due to of direct and indirect employment due to the project	As per detailed project report	Calculation: During the peak construction stage employment will be generated for about 100 skilled and unskilled manpower for about 5 years/till completion of the project. After the completion of the project, about 50 people are likely to be employed in various categories for operation, maintenance and security of the HEP & for the routine upkeep and maintenance of the roads and buildings etc. Assuming 50 people get employment after completion of project Average benefits = 50 x 40,000 (Av. Income per month) x 12= 240.00 Lakhs Total Parameter Benefit: 240 Lakh	240.00										
5	Economic benefits due to Compensatory afforestation	Benefits from such compensatory afforestation accruing over next 50 years monetized and discounted to the present value should be included as benefits of the compensatory afforestation for benefits of CA the guidelines of the Ministry for NPV estimation may be consulted	Calculation : <table><tr><td>Land coveredby compensatory Afforestation</td><td>49 ha. (Twice of the forest landdiverted)</td></tr><tr><td>Forest Type</td><td>Eco-Class VI</td></tr><tr><td>NPV</td><td>699000 per ha.</td></tr><tr><td>Total NPV</td><td>699000 x 49 =34251000.00 =342.51</td></tr><tr><td colspan="2">Total Parameter Benefit: 342.51 lakh</td></tr></table>	Land coveredby compensatory Afforestation	49 ha. (Twice of the forest landdiverted)	Forest Type	Eco-Class VI	NPV	699000 per ha.	Total NPV	699000 x 49 =34251000.00 =342.51	Total Parameter Benefit: 342.51 lakh		342.51
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			Grand Total	20096.41										


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