

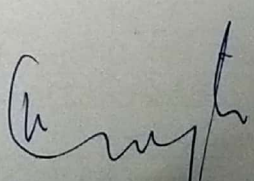
CHECK LIST NO. – 33

COST BENEFIT ANALYSIS OF PROJECT

(Ref: MoEF guideline No. 7-69/2011-FC (Pt.) dated 01st AUG, 2017)

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

Sr. No.	Nature of Proposal	Applicable/ not applicable	Remarks
1.	All categories of proposals involving forest land up to 20 hectares in plains and up to 5 hectares in hills.	Not Applicable	
2.	Proposal for defense installation purposes and oil prospecting (prospecting 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 ha 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, T.V towers etc.	Applicable	This is 16.50 MW Hydro Electric Project being constructed in the hilly area of Distt. Chamba (HP) for which barest minimum 11.9813 Hect. Forest land for various component of the project has been identified for diversion. Meticulous exercise has been carried out to minimize the use of forest land and trees (which has been accepted after the site inspection by the forest officers of the area) and keeping the public interest intact.


Divisional Forest Officer
Churab Forest Divn. Salooni

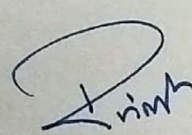
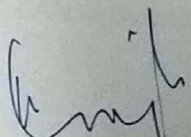

Sr. Executive Engineer,
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Table B: Estimation of cost of forest diversion

Sr. No.	Parameters	Remarks	Monetary Equivalent	Total loss (in lakh)										
1.	Ecosystem services losses due to proposed forest diversion.	<p>Economic value of loss of ecosystem service due to diversion of forest shall be the net present value (NPV) of the forest being diverted as prescribed by the Central Government (MoEF & CC).</p> <p>Note: In case of National parks the NPV shall be ten (10) times the normal NPV or otherwise prescribe NPV by the ministry or any other competent authority.</p>	<p>However, economic value of loss of ecosystem services shall be the net present value (NPV) of the forest land being diverted</p> <p>Calculation of NPV</p> <table><tr><td>Surface Forest Land</td><td>11.9813 hac.</td></tr><tr><td>Eco-Class of Forest</td><td>Class VI</td></tr><tr><td>Forest cover</td><td>Open Forest(OF)</td></tr><tr><td>NPV rate of class VI Forest</td><td>6,99,000/- per hectare</td></tr><tr><td>NPV of forest</td><td>11.9813 hac. x 6,99,000/- = 8374929/- = 83.74 lakh</td></tr></table> <p>Hence losses to Ecosystem in Rupees is 83.74 lakh.</p>	Surface Forest Land	11.9813 hac.	Eco-Class of Forest	Class VI	Forest cover	Open Forest(OF)	NPV rate of class VI Forest	6,99,000/- per hectare	NPV of forest	11.9813 hac. x 6,99,000/- = 8374929/- = 83.74 lakh	83.74
Surface Forest Land	11.9813 hac.													
Eco-Class of Forest	Class VI													
Forest cover	Open Forest(OF)													
NPV rate of class VI Forest	6,99,000/- per hectare													
NPV of forest	11.9813 hac. x 6,99,000/- = 8374929/- = 83.74 lakh													
2.	Loss of animal husbandry productivity, including loss of fodder.	<p>To be quantified and expressed in monetary terms or 10% of NPV applicable whichever is maximum.</p>	<p>Winters are very severe and prolonged so people do keep minimum number of cattle. Local requirement for fodder is generally is met from their own agricultural fields and grazing pastures. Infact, majority people do keep sheep goats and other small animals. Sufficient forest land is available to meet out the requirements.</p> <p>However, amount 10% of NPV (as per MoEF Guidelines) has been considered as loss for animal husbandry productivity including loss of fodder.</p> <p>I. Self Quantified</p> <table><tr><td>Forest Land</td><td>11.9813 hac.</td></tr><tr><td>Eco-Class of Forest</td><td>VI</td></tr><tr><td>Forest cover</td><td>Open Forest(OF)</td></tr><tr><td>Rate of fodder Production</td><td>6236/- lakhs/year</td></tr><tr><td>Economic value of fodder production</td><td>11.9813 hac. x 6236/- = 74,715/-</td></tr></table>	Forest Land	11.9813 hac.	Eco-Class of Forest	VI	Forest cover	Open Forest(OF)	Rate of fodder Production	6236/- lakhs/year	Economic value of fodder production	11.9813 hac. x 6236/- = 74,715/-	8.37
Forest Land	11.9813 hac.													
Eco-Class of Forest	VI													
Forest cover	Open Forest(OF)													
Rate of fodder Production	6236/- lakhs/year													
Economic value of fodder production	11.9813 hac. x 6236/- = 74,715/-													

			<p>Total quantified loss of animal husbandry productivity, including loss of fodder = 74,715/- = 0.75 lakh.</p> <p>II. 10% of NPV i.e. Rs. 8374929/- = 8.37 lakh.</p> <p>10% of NPV is higher than self-quantified value.</p> <p>i.e. 8.37 lakh > 0.75 lakh</p> <p>Thus, loss of animal husbandry productivity, including loss of fodder in Rupees is 8.37 lakh.</p>	
3	Cost of human resettlement.	To be quantified and expressed in monetary terms as per approved R&R Plan	<p>There is no human resettlement in the proposal.</p> <p>However, as per LARF (Land Acquisition Resettlement Action Plan) funds amounting to Rs. 16,64,80,181 has been proposed for implementation of Social mitigation Plan including Rehabilitation and Resettlement.</p> <p>Thus, cost of human resettlement in Rupees is 1665 lakhs.</p>	1665.00
4	Loss of public facilities and Administrative infrastructure (Roads, buildings, schools, dispensaries, electric lines, railway etc) on forest land, or 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.	<p>There will be no loss of public facilities and Administrative Infrastructure (Roads, buildings, schools, dispensaries, electric lines, Railway etc).</p> <p>However, if any such case arises later on, it will be considered on actual cost basis.</p>	0.00
5	Possession value of forest land diverted	30% of environmental cost(NPV) due to loss of forests or circle rate of adjoining area in the district should be added area a cost component as possession value of forest land whichever	<p>30% of environmental costs (NPV) = 30% of Rs. 8374929/- = 2512479/- = 25.12 lakh.</p> <p>Thus, loss due possession value of forest land diverted is 25.12 lakh.</p>	25.12

		maximum.								
6	Cost of Suffering to oustees.	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 oustees should have earned in two years had he not been shifted.	Not applicable for this project since no resettlement is involved as there is no outsee being evicted.	0.00						
7	Habitat Fragmentation Cost	While the relationship fragmentation and forest goods and services is complex for the sake of simplicity the cost due to fragmentation has been pegged at 50% of NPV applicable as a thumb rule.	$50\% \text{ of NPV} = 50\% \text{ of } 8374929$ $= 4187464$ $= \text{₹ } 41.87$ Thus, Habitat Fragmentation Cost is 41.87 lakh	41.87						
8	Compensatory afforestation and soil and moisture conservation cost.	The actual cost of compensatory afforestation and soil moisture conservation and its maintenance in future at present discounted value.	<table><tr><td>Estimated cost of compensatory afforestation (as per proposal for diversion of forest land)</td><td>₹ 2759190/-</td></tr><tr><td>Soil and moisture conservation cost (as per Cost of CAT plan i.e. 1.5% of 15303 lakh = 230 lakh)</td><td>₹ 23000000/-</td></tr><tr><td>Total</td><td>25759190/- = 257.59 lakh</td></tr></table> Loss due to Compensatory afforestation and soil and moisture conservation cost in Rupees 257.59 lakh	Estimated cost of compensatory afforestation (as per proposal for diversion of forest land)	₹ 2759190/-	Soil and moisture conservation cost (as per Cost of CAT plan i.e. 1.5% of 15303 lakh = 230 lakh)	₹ 23000000/-	Total	25759190/- = 257.59 lakh	257.59
Estimated cost of compensatory afforestation (as per proposal for diversion of forest land)	₹ 2759190/-									
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Total	25759190/- = 257.59 lakh									
Total				2081.69						


 Divisional Forest Officer
 Chitrah Forest Divn. Salooni

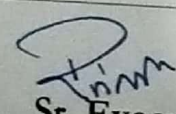
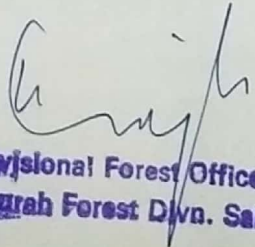

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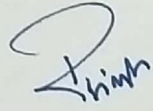
Table C: Existing guidelines for estimating benefits of forest diversion in CBA

Sr. No.	Parameters	MoEF guidelines	Monetary Equivalent.	Total benefits																											
1.	Increase in productivity attributable to the specific project.	To be quantified & expressed in monetary terms avoiding doublecounting.	<table><tr><td colspan="3">Revenue generated from the project for 40 years</td></tr><tr><td>I.</td><td>Capacity of the project.</td><td>16.5 MW</td></tr><tr><td>II.</td><td>Power Tariff for supply of Power House bus bars has been assumed (Avg. Total for 40 years).</td><td>₹ 3.22 per unit.</td></tr><tr><td>III.</td><td>Unit sold per year.</td><td>74.66 million units</td></tr><tr><td>IV.</td><td>Revenue has been assessed accordingly for 75 % dependable year.</td><td>₹ 2404 Lakh/ year</td></tr><tr><td>V.</td><td>Total revenue generated for 40 years.</td><td>₹ 96160 lakhs</td></tr><tr><td>VI.</td><td>Deducting 60% considering maintenance and other losses.</td><td>(-) ₹ 57696 lakhs</td></tr><tr><td>VII.</td><td>Deducting 90% of total project cost considering 10 % salvage value.</td><td>(-) ₹ 13773 lakhs</td></tr><tr><td colspan="2">Total</td><td>₹ 24691 lakh</td></tr></table> <p>Benefits due to increase in productivity attributable to the specific project in rupees is ` 24691 lakh.</p>	Revenue generated from the project for 40 years			I.	Capacity of the project.	16.5 MW	II.	Power Tariff for supply of Power House bus bars has been assumed (Avg. Total for 40 years).	₹ 3.22 per unit.	III.	Unit sold per year.	74.66 million units	IV.	Revenue has been assessed accordingly for 75 % dependable year.	₹ 2404 Lakh/ year	V.	Total revenue generated for 40 years.	₹ 96160 lakhs	VI.	Deducting 60% considering maintenance and other losses.	(-) ₹ 57696 lakhs	VII.	Deducting 90% of total project cost considering 10 % salvage value.	(-) ₹ 13773 lakhs	Total		₹ 24691 lakh	24691.00
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Total		₹ 24691 lakh																													
2.	Benefits to Economy	The incremental economic benefit in monetary terms due to the specific project.	<p>Calculation:</p> <p>Hydel power is not only one of the cleanest, cheapest and environmental 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).</p> <table><tr><th>State</th><th>Gross investment rate</th><th>Growth rate of GSDP</th><th>ICOR</th></tr></table>	State	Gross investment rate	Growth rate of GSDP	ICOR	638.84																							
State	Gross investment rate	Growth rate of GSDP	ICOR																												

			<table><tr><td></td><td>(GIR)</td><td></td><td></td></tr><tr><td>Himachal Pradesh</td><td>42.28</td><td>6.77</td><td>6.24</td></tr></table> <table><tr><td>Increment to Output</td><td>Investment/ICOR = 2404/6.24 = 385.25 lakh</td></tr></table> <p>1% additional Free Power for development of panchayats</p> <p>= 74660000 x 3.22 x 0.01 = ₹ 24.04 lakhs</p> <p>Local Area Development Fund (1.5% of project Cost)</p> <p>= 0.015 x 15303 = ₹ 229.55</p> <p>= 385.25 + 24.04 + 229.55 = 638.84 lakh.</p> <p>Benefits to economy in Rupees = 638.84 lakh.</p>		(GIR)			Himachal Pradesh	42.28	6.77	6.24	Increment to Output	Investment/ICOR = 2404/6.24 = 385.25 lakh	
	(GIR)													
Himachal Pradesh	42.28	6.77	6.24											
Increment to Output	Investment/ICOR = 2404/6.24 = 385.25 lakh													
3	Nos. of Population benefited	As per the detailed project report.	About to 2875 number of peoples of villages Juther, Shalli, Naghai, Salwin, Dori, Buin and Khakri will be benefited by the construction of this project.	0.00										
4	Economic benefits due to of direct and indirect employment.	As per the detailed project report.	On average approximately 175 numbers of persons from affected population to be employed directly/ indirectly and approximately 65000 m-days of temporary employment will be generated during construction of the project for 4 years.	195.00										
			65000 x 300 = ₹ 195 lakh											
			Economic benefits due to direct and indirect employment is ₹ 195 lakh.											
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	<table><tr><td>Land covered by Compensatory afforestation</td><td>24 ha. (Twice of the forest land diverted)</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 24 = 16,776,000 = 167.8</td></tr><tr><td colspan="2">Total Parameter Benefit: 167.8 lakh</td></tr></table> <p>Economic benefits due to Compensatory</p>	Land covered by Compensatory afforestation	24 ha. (Twice of the forest land diverted)	Forest Type	Eco-Class VI	NPV	699000 per ha.	Total NPV	699000 x 24 = 16,776,000 = 167.8	Total Parameter Benefit: 167.8 lakh		167.80
Land covered by Compensatory afforestation	24 ha. (Twice of the forest land diverted)													
Forest Type	Eco-Class VI													
NPV	699000 per ha.													
Total NPV	699000 x 24 = 16,776,000 = 167.8													
Total Parameter Benefit: 167.8 lakh														

	compensatory afforestation for benefits of CA the guidelines of the Ministry for NPV estimation may be consulted	afforestation in Rupees 167.8 lakh	
Total benefits of the project (monetary equivalent)		$24691 + 638.84 + 0.00 + 195.00 + 167.8$ $= \text{Rs } 25692.64 \text{ lakh}$	25692.64


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Summary of cost benefit ratio

Total environmental loss

= ₹ 2081.69 lakh

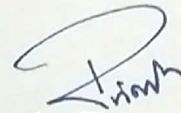
Total benefit to society

= ₹ 25692.64 lakh

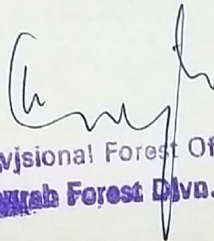
Cost Benefit Analysis Ratio (CBA Ratio) = Benefit/Loss 25692.64/ 2081.69

= 12.34:1

The cost benefit ratio is equal 12.34:1 which is > 1 so project is found valuable based on given/ above described criteria.



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