


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 centres, 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


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 ecosystem services due to diversion of forests shall be the net present value (NPV) of the forest land being diverted.	<div>Calculation of NPV: 1.Distt. Shimla:<table><tr><td>1.1 Surface Forest Land</td><td>196.0543 ha.</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 (Surface @ 100%)</td></tr><tr><td>NPV of forest</td><td>196.0543 ha. x 6,99,000 = 13,70,41,956</td></tr><tr><td>1.2. Notional Forest Land</td><td>0.6800 ha.</td></tr><tr><td>NPV rate of Notional land</td><td>50% of NPV</td></tr><tr><td>NPV of Notional Forest Land</td><td>0.6800 ha. x 6,99,000 x 50% = 2,37,660</td></tr></table></div>	1.1 Surface Forest Land	196.0543 ha.	Eco-Class of Forest	Class VI	Forest Cover	Open Forest (OF)	NPV rate of Class VI Forest	6,99,000/- per hectare (Surface @ 100%)	NPV of forest	196.0543 ha. x 6,99,000 = 13,70,41,956	1.2. Notional Forest Land	0.6800 ha.	NPV rate of Notional land	50% of NPV	NPV of Notional Forest Land	0.6800 ha. x 6,99,000 x 50% = 2,37,660	2685.89
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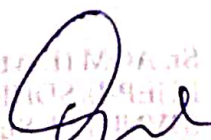
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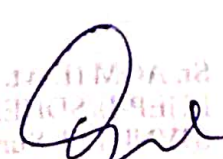
			<table><tr><td>2.1. Surface Forest Land</td><td>197.2404 ha.</td></tr><tr><td>Eco-Class of Forest</td><td>Class-V</td></tr><tr><td>Forest Cover</td><td>Open Forest (OF)</td></tr><tr><td>NPV rate of Class VI Forest</td><td>6,57,000/- per hectare (Surface @ 100%)</td></tr><tr><td>NPV of forest</td><td>196.0543 ha. x 6,57,000 =12,95,86,943</td></tr><tr><td>2.2. Notional Forest Land</td><td>3.1945 ha.</td></tr><tr><td>NPV rate of Notional land</td><td>50% of NPV</td></tr><tr><td>NPV of Notional Forest Land</td><td>3.1945 ha. x 6,57,000 x 50% = 10,49,393</td></tr><tr><td>2.3. Bani area</td><td>0.7171 ha.</td></tr><tr><td>Eco-Class</td><td>Class V</td></tr><tr><td>Forest Cover</td><td>Very dense Forest (VDF)</td></tr><tr><td>NPV rate of Class-V VDF forest</td><td>100% of 9,39,000/- per hectare (Surface @ 100%)</td></tr><tr><td>NPV of Bani Area</td><td>0.7171 ha. x 9,39,000 x 100% = 6,73,357.00</td></tr><tr><td colspan="2">Total NPV = 13,70,41,956 + 2,37,660 + 12,95,86,943 +10,49,393 + 6,73,357.00 = 26,85,89,309.00 = 2685.89 Lakh Total Parameter Cost: 2685.89 Lakh</td></tr></table>	2.1. Surface Forest Land	197.2404 ha.	Eco-Class of Forest	Class-V	Forest Cover	Open Forest (OF)	NPV rate of Class VI Forest	6,57,000/- per hectare (Surface @ 100%)	NPV of forest	196.0543 ha. x 6,57,000 =12,95,86,943	2.2. Notional Forest Land	3.1945 ha.	NPV rate of Notional land	50% of NPV	NPV of Notional Forest Land	3.1945 ha. x 6,57,000 x 50% = 10,49,393	2.3. Bani area	0.7171 ha.	Eco-Class	Class V	Forest Cover	Very dense Forest (VDF)	NPV rate of Class-V VDF forest	100% of 9,39,000/- per hectare (Surface @ 100%)	NPV of Bani Area	0.7171 ha. x 9,39,000 x 100% = 6,73,357.00	Total NPV = 13,70,41,956 + 2,37,660 + 12,95,86,943 +10,49,393 + 6,73,357.00 = 26,85,89,309.00 = 2685.89 Lakh Total Parameter Cost: 2685.89 Lakh	
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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	<div>Calculation:</div> <div>I) Self-Quantified</div> <div>1. Distt. Shimla:</div> <table><tr><td>1 Surface Forest Land</td><td>196.0543 ha.</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>Rate of fodder production</td><td>6236/- lakhs/year</td></tr><tr><td>(As per Montane & Moist Temperate Forest)</td><td></td></tr><tr><td>Economic value of fodder production</td><td>196.7343ha. x 6236/- = 12,26,835</td></tr></table> <div>2. Distt. Mandi:</div> <table><tr><td>2.1. Surface Forest Land</td><td>197.2404 ha.</td></tr><tr><td>Eco-Class of Forest</td><td>Class-V</td></tr><tr><td>Forest Cover</td><td>Open Forest (OF)</td></tr><tr><td>Rate of fodder production (As per Subtropical Pine/ Broadleaved Hill Forests)</td><td>4514/- lakhs/year</td></tr><tr><td>Economic value of fodder production</td><td>197.2404 ha. x 4514/- = 8,90,343</td></tr></table> <div>Total quantified loss of animal husbandry productivity, including loss of fodder =1226835 + 890343 = 21,17,178 =211.71 Lakh</div> <div>II) MoEFCC suggested 10% of NPV</div> <div>10% of NPV = 10% of 26,85,89,309.00 = 26858930.90 = 268.59 Lakh</div> <div>As MoEFCC suggest 10% of NPV is higher than self-quantified value That is, 268.59 Lakh > 211.71 Lakh</div>	1 Surface Forest Land	196.0543 ha.	Eco-Class of Forest	Class VI	Forest Cover	Open Forest (OF)	Rate of fodder production	6236/- lakhs/year	(As per Montane & Moist Temperate Forest)		Economic value of fodder production	196.7343ha. x 6236/- = 12,26,835	2.1. Surface Forest Land	197.2404 ha.	Eco-Class of Forest	Class-V	Forest Cover	Open Forest (OF)	Rate of fodder production (As per Subtropical Pine/ Broadleaved Hill Forests)	4514/- lakhs/year	Economic value of fodder production	197.2404 ha. x 4514/- = 8,90,343	268.59
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Thus, Loss of animal husbandry
productivity, including loss of fodder

= 268.59 Lakh

Total Parameter Cost: 268.59 Lakh



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3	Cost of human resettlement	To be quantified and expressed in monetary terms as per approved R&R Plan	Calculation: R&R Plan is under preparation and will be finalized by District Authorities in consultation with Project Affected Families. Presently, as per EIA/ EMP report, R&R cost estimated for 45 project affected families is Rs. 179.09 Crores. Total Parameter Cost: 17909.00 Lakh	17909.00
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 is no such public facilities or infrastructure identified. However, loss of public facilities and administrative infrastructure (if any, identified later) will be taken up as a part of the R&R Plan at the time of its finalization. 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 26,85,89,309.00 = 8,05,76,792.70 = 805.77 lakh Total Parameter Cost: 805.77 lakh	805.77
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	Calculation: R&R Plan is under preparation and will be finalized by District Authorities in consultation with Project Affected Families. Presently, as per EIA/ EMP report, 45 project affected families have been identified. Social cost of rehabilitation of oustees = 45 x minimum daily wages x 2 years x 1.5 times = 45 x 300 x 365 x 2 x 1.5 = 1,47,82,500/-	147.825

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		per R&R plan) be worked out as 1.5 times of what oustees should have earned in two years had not been shifted.	Total Parameter Cost: 147.825 lakh										
7	Habitation fragmentation cost	While the relationship between 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 thumb rule.	Calculation: 50% of NPV = 50% of 26,85,89,309.00 = 13,42,94,654.50 = 1342.95 Lakh Total Parameter Cost: 1342.95Lakh		1342.95								
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	<table><tr><td>Estimated cost for compensatory afforestation (as per proposal for diversion of forest land)</td><td>153245378/-</td></tr><tr><td>Soil and moisture conservation works to be taken up in approvedCAT Plan</td><td>52018470/-</td></tr><tr><td>Total</td><td>153245378 + 52018470 = 20,52,63,848/- = 2052.63 Lakh</td></tr><tr><td colspan="2">Total Parameter Cost: 2052.63 Lakh</td></tr></table>		Estimated cost for compensatory afforestation (as per proposal for diversion of forest land)	153245378/-	Soil and moisture conservation works to be taken up in approvedCAT Plan	52018470/-	Total	153245378 + 52018470 = 20,52,63,848/- = 2052.63 Lakh	Total Parameter Cost: 2052.63 Lakh		2052.63
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Total	153245378 + 52018470 = 20,52,63,848/- = 2052.63 Lakh												
Total Parameter Cost: 2052.63 Lakh													
Grand Total					25212.655								

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	Net design energy	1381.77 GWH.	258667.344


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		counting	<table><tr><td>(Annual)</td><td></td></tr><tr><td>Rate of saleable net energy</td><td>3.90/kwh (levelized tariff)</td></tr><tr><td>Percentage of electricity being provided to state free of cost</td><td>12%</td></tr><tr><td>Cost of saleable net energy</td><td>= 1381770000 x 3.90 X 0.12 = 64,66,68,360 = 6466.6836 Lakh For 40 years =258667.344 lakhs</td></tr></table> <p>Total Parameter Benefit: 258667.344 Lakh</p>	(Annual)		Rate of saleable net energy	3.90/kwh (levelized tariff)	Percentage of electricity being provided to state free of cost	12%	Cost of saleable net energy	= 1381770000 x 3.90 X 0.12 = 64,66,68,360 = 6466.6836 Lakh For 40 years =258667.344 lakhs					
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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	<p>Calculation:</p> <p>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).</p> <table><tr><th>States</th><th>Gross Invest ment Rate (GIR)</th><th>Growth Rate of GSDP</th><th>ICOR</th></tr><tr><td>Haryan a</td><td>27.67</td><td>8.19</td><td>3.38</td></tr><tr><td>Himac hal Prades</td><td>42.28</td><td>6.77</td><td>6.24</td></tr></table>	States	Gross Invest ment Rate (GIR)	Growth Rate of GSDP	ICOR	Haryan a	27.67	8.19	3.38	Himac hal Prades	42.28	6.77	6.24	38911.427
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			<table><tr><td>h</td><td></td><td></td><td></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>Rajasthan</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>Uttarakhand</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>ICOR</td><td colspan="3">GIR = GR of GSDP = 3.95</td></tr><tr><td>Increment to Output</td><td colspan="3">Investment /ICOR = 53889.03 Lakh / 3.95 = 13,642.79 lakh</td></tr></table> <p>1% Additional Free Power for development of Panchayats: =0.01 x 1381770000 x 3.90 = 538.8903 lakhs For 40 years: = 21555.612 Lakhs Local Area Development Fund (1.5% of Project Cost) =0.015 x 247535 Lakhs = 3713.025 Lakhs</p> <p>Total Parameter Benefits in lakhs: 13,642.79 + 21555.612 + 3713.025 = 38911.427 Lakhs</p>	h				Madhya Pradesh	26.60	4.85	5.48	Punjab	18.39	6.38	2.88	Rajasthan	18.30	6.03	3.04	Uttar Pradesh	14.85	7.24	2.05	Uttarakhand	36.14	7.84	4.61	Average			3.95	ICOR	GIR = GR of GSDP = 3.95			Increment to Output	Investment /ICOR = 53889.03 Lakh / 3.95 = 13,642.79 lakh			
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3	No. of population benefited due to specific project  Sr. AGM (Envt. & Forest Deptt.)	As per detailed project report	<p>Calculation: The completion of the project will directly benefit the population residing in project affected 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).</p>	0.00																																				


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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 3500 skilled and unskilled manpower for about 5 years/till completion of the project in addition to 219 of SJVN. After the completion of the project, about 200 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 200 people get employment after completion of project Average benefits = 200 x 40000 (Av. Income per month) x 12 = 9,60,00,000 Total Parameter Benefit: 960.00 Lakh	960.00										
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	<table><tr><td>Land covered by Compensatory Afforestation</td><td>798 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 798 =55,78,02,000 =5,578.02</td></tr><tr><td colspan="2">Total Parameter Benefit: 5,578.02 lakh</td></tr></table> Calculation :	Land covered by Compensatory Afforestation	798 ha. (Twice of the forest land diverted)	Forest Type	Eco-Class VI	NPV	699000 per ha.	Total NPV	699000 x 798 =55,78,02,000 =5,578.02	Total Parameter Benefit: 5,578.02 lakh		5,578.02
Land covered by Compensatory Afforestation	798 ha. (Twice of the forest land diverted)													
Forest Type	Eco-Class VI													
NPV	699000 per ha.													
Total NPV	699000 x 798 =55,78,02,000 =5,578.02													
Total Parameter Benefit: 5,578.02 lakh														
			Grand Total	304116.791										

C) Benefit/Cost ratio:

TOTAL BENEFIT	304116.791
TOTAL COST	25212.655
BENEFIT COST RATIO	= 304116.791/25212.655 = 12.06


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