

Cost-Benefit Analysis of Construction of a vented barrage across Gangavali river at honnalli under combined water supply scheme to Karwar-Ankola towns, en route villages and project Sea- Bird.

The following Cost-Benefit analysis primarily meant for the forest diversion proposal has been prepared in accordance with GOI FC Guidelines **No. 7-69/2011-FC (Pt.) Dated 01st August 2017**

I. Assessment of Cost of forest diversion

1. Ecosystem services losses due to proposed forest diversion

- The Report prepared by the Centre for Ecological Services Management (CESM), Indian Institute of Forest Management (IIFM), Bhopal in collaboration with Forest Survey of India (FSI), Dehradun supported by **The Ministry of Environment, Forests & Climate Change**, GOI has been considered as the reference while evaluating cost of the ecosystem services losses.
- The report has considered the cost of ecosystem service losses due to different parameters. The parameters considered are,

Timber/Wood production, Bamboo production, Fodder production, NWFPs, Fuelwood, Carbon sequestration, Gene-pool conservation, Pollination and seed dispersal, Soil conservation, Water recharge, Carbon storage and Water Purification.

- Also report has divided forests into categories of VDF, MDF, OF and LTF.
- The Present proposed forest land to be diverted falls under the category of very Dense forest (VDF) in the Tropical Wet Evergreen Forests – Western Ghats.
- As per the Box 4 of the report, NPV for the project is 43.34 lakh/hectare

Total Ecosystem services losses due to proposed forest diversion is

43.34 lakhs × 34.15 Hectares = 1480.061 lakhs, say 14.8 crores

Therefore, Total Ecosystem services losses due to proposed forest diversion is **14.8 Crores**

2. Loss of Animal husbandry productivity including loss of fodder

- In the current project, there are not any specific animal husbandry activities in the proposed forest area to be diverted.
- Along with this cost of fodder have already been included under the Item 1

Therefore, loss of Animal husbandry productivity including loss of fodder **Nil**

3. Cost of Human Resettlement

- In the current project, there are not any issues related to the human resettlement.

Therefore, Cost of Human Resettlement is **Nil**

4. Loss of public facilities and administrative infrastructure

- In the current project, there aren't any issues related to loss of public and administrative infrastructure as project is located well away from residential and commercial areas

Therefore, Loss of public facilities and administrative infrastructure is **Nil**

5. Possession value of the Forestland diverted

- As per the Guidelines **No. 7-69/2011-FC (Pt.) Dated 01st August 2017**, possession value of forest land can be considered as 30% of NPV of Environmental costs.

Hence, Possession value is 0.3×14.8 crores = 4.44 crores

Therefore, Possession value of the Forestland diverted is **4.44 crores**.

6. Cost of suffering to oustees

- In the current project, there aren't any issues rehabilitation.

Therefore, Cost of suffering to oustees is **Nil**.

7. Habitat Fragmentation cost

- As per the Guidelines **No. 7-69/2011-FC (Pt.) Dated 01st August 2017**, this can be taken as 50% of the NPV of Environmental costs.

Hence, Possession value is 0.5×14.8 crores = **7.4 crores**

Therefore, Cost of suffering to oustees is **7.4 crores**.

Summary of **Assessment of Cost of forest diversion**

Particulares	Monetary Cost in crores
1. Ecosystem services losses due to proposed forest diversion	14.8
2. Loss of Animal husbandry productivity including loss of fodder	Nil
3. Cost of Human Resettlement	Nil
4. Loss of public facilities and administrative infrastructure	Nil
5. Possession value of the Forestland diverted	4.44
6. Cost of suffering to oustees	Nil
7. Habitat Fragmentation cost	7.4
Total Cost of Forest Diversion	26.64

II. **Assessment of Cost of forest diversion**

1. Increase in productivity attribute to the specific project

The current project aims at fulfilling the water demand for the 4 months of summer (120 days), during which water scarcity due to drying up the river has become a major issue. Therefore increase in productivity of the project mainly lies in the additional quantity of the water being supplied.

Hence a detailed analysis has been made considering the population in the successive decades and demand per capita, up to the year of 2068 up to which proposed vented barrage is expected to serve its purpose.

The monetary equivalent of the water supply quantity is based on the Government of Karnataka order no NAE/07/UWS/2011, Bangalore, Dtd: 20.07.2011.

Detailed analysis

Karwar Town

Year	Population	Avg Population	Demand (MLD) *	Total Demand (kL)	Rate (Rs/kl)**	Avg, rate	NPV of Rates***	NPV of benefit (crores)
2021	81350				13.00			
2031	90675	86013	11.61	1393403	16.90	14.95	12.288	17.12
2041	100085	95380	12.88	1545156	21.97	19.44	10.792	16.67
2051	109583	104834	14.15	1698311	28.56	25.27	9.478	16.10
2061	119166	114375	15.44	1852867	37.13	32.85	8.323	15.42
2068	163242	141204	19.06	2287505	48.27	42.70	7.753	12.41
						Total Benefit		77.73

Ankola Town

Year	Population	Avg Population	Demand (MLD) *	Total Demand (kL)	Rate (Rs/kl)**	Avg, rate	NPV of Rates***	NPV of benefit (crores)
2021	21600				13.00			
2031	24721	23161	3.13	375200	16.90	14.95	12.288	4.61
2041	28230	26476	3.57	428903	21.97	19.44	10.792	4.63
2051	32126	30178	4.07	488884	28.56	25.27	9.478	4.63
2061	36409	34268	4.63	555134	37.13	32.85	8.323	4.62
2068	52592	44501	6.01	720908	48.27	42.70	7.753	3.91
						Total Benefit		22.41

En route villages

Year	Population	Avg Population	Demand (MLD)	Total Demand (kL)	Rate (Rs/kl)**	Avg, rate	NPV of Rates***	NPV of benefit (crores)
2021	101758				13.00			
2031	126374	114066	3.99	479077	16.90	14.95	12.288	5.89
2041	155772	141073	4.94	592507	21.97	19.44	10.792	6.39
2051	189952	172862	6.05	726020	28.56	25.27	9.478	6.88
2061	228914	209433	7.33	879619	37.13	32.85	8.323	7.32
2068	363426	296170	10.37	1243914	48.27	42.70	7.753	6.75
							Total Benefit	33.23

Grasim Industries

Year	Demand (MLD)	Total Demand (kL)	Rate (Rs/kl)**	Avg, rate	NPV of Rates***	NPV of benefit (crores)
2021	1		52.00			
2031	1	120000	67.60	59.80	49.15	5.90
2041	1	120000	87.88	77.74	43.17	5.18
2051	1	120000	114.24	101.06	37.91	4.55
2061	1	120000	148.52	131.38	33.29	4.00
2068	1	120000	193.07	170.79	31.01	2.60
				Total Benefit		22.23

Project Sea- Bird

Year	Demand (MLD) *	Total Demand (kL)	Rate (Rs/kl)**	Avg, rate	NPV of Rates***	NPV of benefit (crores)
2021	20		26.00			
2031	40.86	4903200	33.80	29.90	24.58	120.50
2041	40.86	4903200	43.94	38.87	21.58	105.83
2051	40.86	4903200	57.12	50.53	18.96	92.94
2061	40.86	4903200	74.26	65.69	16.65	81.62
2068	40.86	4903200	96.54	85.40	15.51	53.22
				Total Benefit		454.11

(* Demand has been predicted based on guidelines form IS 1172 – 1993 as 135 l/p/d for domestic purposes)

(** Water rate hike has been considered at a constant rise of 30% per decade)

(*** NPV rate are estimated using formulae $P = F/(1+i)^n$,where P – Present value, F- Future value , i – Rate of interest (4% assumed), n- Future year)

Summary of Benefits

SL no.	Beneficiary	Monetary Benefit (crores)
1	Karwar	77.73
2	Ankola	22.41
3	En route villages	33.23
4	GRASIM Industries	22.23
5	Project Sea Bird	454.11
	Total Benefit	609.70

Construction and Maintainanace Expenditure

SI No	Particulars			Rs (crores)
1	Total construction Expenditure			158.62
2	Total Maintainance Expenditure			
	Rs 1 crore/ year for 48 years (2021-2068)			
	48	×	1	48
	Total Expenditure			206.62

Abstract of Increase in productivity attribute to the Current project

Particulars	Rs. in crores
Total Benefits due to increasing in water supply quantity	609.70
Total Construction and Maintainance Expenditure	206.62
Net Benefits due to increasing in water supply quantity	403.08

Therefore, Increase in productivity attribute to the project is **403.08 crores**.

2. Benefits to Economy due to the Project

- The incremental economic benefit which has to be considered under this head has already been included in the Item no 1. Therefore Benefits under this item is shown as Nil.

3. Number of Population benefited due to specific project

- All the calculations under Item no 1 has been done based on the population projection (Incremental increase method) and respective demand 135 l/p/d.
- Hence they have not been included in this Item.

4. Economic benefits due to direct or Indirect Employment

Year	(Minimum wage/day)	Avg. wage	Wages/month	Wages/year	Present Value*	Total wages/span/crores
2021	450.00	-	-	-	-	-
2031	585.00	517.50	15525.00	186300.00	153125.02	0.153
2041	760.50	672.75	20182.50	242190.00	134479.51	0.134
2051	988.65	874.58	26237.25	314847.00	118104.40	0.118
2061	1285.25	1136.95	34108.43	409301.10	103723.23	0.104
2068	1670.82	1478.03	44340.95	532091.43	96613.10	0.068
Total Wages/Employee						0.577
Total number of Employees						100
Total value						57.71

Therefore, Economic benefits due to direct or Indirect Employment is **57.71 Crores**.

5. Economic benefits due to Compensatory Afforestation

As per the Table 44 of The Report prepared by the Centre for Ecological Services Management (CESM), SCARF Adjustment (Rs. Lakhs per hectare) using 4% rate of discount for the western ghats is around 2.54 Lakhs/Hectare.

For 25.14 Hectares it turns out to be $25.14 \times 2.54 = 63.86$ lakhs = 0.64 crores.

Therefore, Economic benefits due to compensatory afforestation are **0.64 Crores**.

Summary of Assessment of Benefit of forest diversion

Particulars	Monetary Cost in crores
1. Increase in productivity attribute to the specific project	403.08
2. Benefits to Economy due to the Project	Nil*
3. Number of Population benefited due to specific project	Nil*
4. Economic benefits due to direct or Indirect Employment	57.71
5. Economic benefits due to Compensatory Afforestation	0.64
Total Benefits	461.43

(* already included in the Item no 1)

Conclusion

As per the GOI FC Guidelines **No. 7-69/2011-FC (Pt.) Dated 01st August 2017**

Total Cost of Forest Diversion = 26.64 crores

Total Benefits of Forest Diversion = 461.43 crores

Benefit:Cost = 461.43:26.64 = 17.32:1


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