

Chapter – 11

Environmental and Ecological Aspects of the Project

11.1 General

The development of water, while providing food, shelter and fibre to the mankind, can result in adverse impacts on environment. The environment is degraded by both inappropriate development and lack of development. The developing nations have to go by the second school of thought. Basically there are two schools of thought in so far as environment is concerned. One school of thought holds that ecological system is fragile and highly unstable. It is implicit therefore; that environment should be left as much as possible, in its natural state and its diversity should be preserved at any cost. Modification for the purpose of development should be minimal and confined to the range of tolerance limits of elements of ecological system. The second school of thought assures that the environment is globally stable and there is large element of built-in resilience in ecological system.

The impacts of environmental implications attributed to Water Resources Development can be broadly classified into three parts (1) Physical impacts (2) Biological impacts and (3) Impacts on human life.

Some of the important implications under Physical impacts are (i) sedimentation in storage reservoir which is the main cause in reducing the life of the reservoir (ii) Changes in hydrological regime due to large impoundments (iii) Water quality modifications, water logging and salinity caused by the excessive irrigation and seepage. The construction of dams creates large volume of standing waters which are subject to biological and chemical changes. Over a period of years the reservoirs tend to become rich in nutritive substances. This process known as Eutrophication, encourages, increasing population of algae which may adversely affect the quality of water. The important serious impact of storage reservoir in tropical countries is spreading of water born diseases that affect millions of human beings. The two most important diseases are Malaria and Shistosomiasis.

The removal of people living in areas which may be submerged is the human impact. The fact that benefits of the projects usually go to people living away from the affected areas and not to the displaced persons also creates resentment among them.

11.1.1 Existing land use in the catchment

Par-Tapi-Narmada link project involves creation of 7 reservoirs having total submergence area of 7,559 ha. The total forest area in the submergence is about 3,572 ha. The total river portion of the area is 1137 ha. The balance area of land excluding forest and river portion amounting to 2850 ha, comprises of agricultural land, cultivable waste land, roads, nallas and village habitats etc. Out of the total submergence area, the forest land is 47.25%, river portion is 15.05% and the balance 37.70% being culturable and other land.

The land use statistics in the catchment area of these seven reservoirs show that about 38% forms forests and about 45% culturable land and the rest being barren and pasture lands.

11.1.2 Submergence area

The details of submergence area of each of the seven reservoirs are furnished in Table - 11.1

Table - 11.1
Details of submergence area

Sl. No	Reservoir	Proposed F.R.L. (m)	Forest land (ha)	Culturable and other land (ha)	River portion (ha)	Total Submergence (ha)
1.	Jheri	246	408	256	172	836
2.	Mohankavchali	158	743	486	265	1494
3.	Paikhed	248	317	589	88	994
4.	Chasmandva	214	300	255	60	615
5.	Chikkar	210	300	332	110	742
6.	Dabdar	169	614	482	153	1249
7.	Kelwan	164	890	450	289	1629
	Total		3572	2850	1137	7559

The forest land consists of revenue forest and reserved forest. In the revenue forest, major plant species are mahua, khair, sadad, mango, lemon, papaya, guava, coconut etc. The departmental forest area is under two forest divisions viz. Valsad and Dang divisions. The density of forest in the submergence area has been reported to be varying between 0.2 to 0.5 and the height of trees

varies from 8 to 15 m. The wood obtained from these forests can be utilized for construction of project colonies etc.

11.1.3 Proposed period of construction

The entire Par-Tapi-Narmada link canal project is proposed to be completed over a period of 7 years.

11.1.4 Labour

A large force of labour will be required during construction of the project. The labourers both skilled and unskilled are available in the vicinity of the project areas.

11.1.5 Population density

The population density in the submergence area of the reservoirs is about 153 persons per Sq km which is less than the population densities of 204 and 174 persons per Sq km for Maharashtra and Gujarat states respectively.

11.1.6 Villages affected and population displaced

The number of villages, families and the population affected due to submergence of each of the seven reservoirs are given in Table - 11.2.

Table - 11.2
Details of villages and population under submergence

Sl. No.	Reservoir	No. of villages			No. of families	Population	
		Full	Part	Total		Human	Live stock
1.	Jheri	--	7	7	140	1122	685
2.	Mohankavchali	5	8	13	423	3194	1764
3.	Paikhed	2	9	11	363	2266	1570
4.	Chasmandva	--	7	7	206	1434	612
5.	Chikkar	2	7	9	174	1016	682
6.	Dabdar	4	7	11	331	1780	1176
7.	Kelwan	11	6	17	610	4020	2540
	Total	24	51	75	2247	14832	9029

Thus, it is seen that 75 villages in whole or part will be affected. Both habitation and land will be affected in 41 villages and only land will be affected in remaining 34 villages. The total number of families to be affected will be 2247. However the human and live stock population requiring rehabilitation will be 14832 and 9029 respectively as per 1991 census.

11.1.7 Details of development activity in the affected area

There is no development activity programmed in the submerged area of reservoirs because these areas are thinly populated and mostly covered with forests with poor communication network.

11.1.8 Physical aspects

The impoundment of water in reservoirs will improve the condition of the ground water aquifers in adjoining area. Land slides are not expected in the periphery of reservoirs. There will be improvement in the land use pattern and practice. Some aquatic life and vegetation may grow along the periphery of the reservoir which is expected to be harmless. This impounding of water will also provide relief to the flood affected villages located in the downstream of reservoirs.

11.1.9 Resources impact aspect

There has been no identification of submergence of mineral deposits, monuments, recreational facilities etc. However there will be loss of reserved forest for which provisions have been made for compensatory afforestation. The impoundment will improve the aquatic life such as fish, crocodiles etc. The reservoirs will increase the production of power and food grain.

11.1.10 Socio-cultural aspects

Out of total population, about 75% belong to Scheduled Tribes. The people earn their livelihood through cultivation of crops, forest products and working as labour in fields. The livestock also provides sizeable earnings. When the affected families will be shifted to new places having all civic amenities such as, water supply facilities, medical facilities, schools and community building for recreation purposes, there will be general improvement in the life style of the people and their culture. Compensation package for displaced families has been discussed in the subsequent paragraphs under "Resettlement Plan".

11.1.11 Public health aspects

The formation of reservoirs is not expected to create any public health hazards. The reservoirs are located in remote areas having thin population density. It is unlikely that this area will attract much of population from outside, except during construction period for which adequate provision for medical facilities has been made.

11.1.12 Environmental status

11.1.12.1 Known sources of pollution in the project area

There are no major or medium industries in the project area which may cause air or water pollution. Similarly, there are no plans to establish new industries in near future in the project area.

11.1.12.2 Details of the aquatic life (fish, crocodiles etc.)

Both un-economical and economical fishes are available in the project area. There is no crocodile breeding ground coming under the submergence of the project.

11.1.12.3 Wild animals and birds

a) Wild animals

The wild life in the area is not very rich. The wild animals reported in the area are blue bull, cheetah, wild bear, wild pig, deer, rabbits and creepers etc.

b) Birds

The important birds found in the project area are peacock, crow, sparrow, fly catcher, owl, cuckoo, weaver birds, swallaone, dovers, sandours, earni and kingfisher.

The National Park near Vansda and Botanical Garden at Waghai are outside the submergence area at a distance of 8 km and 5 km respectively from the nearest submergence area of the reservoir. However, the main canal of about 3.5 Km length and feeder canal from Chikkar weir of approximately 1 km length will pass through the National Park. This aspect requires consideration while implementing the scheme.

11.1.12.4 Tourism

- a) The project area of Par-Tapi-Narmada link is not having any significant importance from the points of view of tourism presently.
- b) The area is not having archaeological importance.
- c) The wild life sanctuaries, National park and botanical garden are well outside the submergence area of the project.

11.1.13 Environmental impacts

11.1.13.1 Beneficial impacts

The reservoirs created will have some beneficial effect. The reservoir will offer opportunities for growth of aquatic life like fish, crocodile etc. Fresh water prawns, migratory fish may be cultured in the reservoirs. The reservoirs are suitable for fish culture. Suitable remedial measures will be taken if there is any loss of aquatic production.

Tourist hutments can be constructed along the periphery of the reservoirs and picnic spots can be developed for tourism. Area near Chikkar, Dabdar and Kelwan reservoirs can be developed into tourist spots because these areas are already attracting some tourists due to existence of National Park at Vansda, Botanical garden at Waghai and Satpura hill station on Waghai-Nasik Road. Water sports facilities can be created in the reservoir to attract tourists. In addition to this, the project will provide adequate employment opportunities during project construction as well as maintenance stage. Project will help lot of persons in getting involved in various trades and this in turn will help in their socio-economic growth.

11.1.13.2 Adverse impacts

There will be some adverse impacts due to the project. The displaced persons will have to move to new places in course of their resettlement. They will lose their present lands, houses etc. This is bound to affect their sentiments. There will be immediate loss of forest and agricultural land due to submergence. The concentration of population during the period of construction will increase considerably. This may create inconvenience to local people. Some problems like health hazards, pilferage of forest product, price rise, criminal activities, mishaps etc. may occur. Due to construction activities and temporary settlements of labourers and officials engaged in construction work and to meet

their requirements of fuel and fodder, biotic pressure will increase on the adjoining forest. Due to activities in forest, wild animals are likely to migrate to safer places. These aspects will have to be given due weightage at the time of implementation of the project with a view to minimize the adverse impact.

11.2 Impact of link canal

In comparison to the reservoirs, the impact of link canal on environment will be less. However, some of its impacts are described below :-

11.2.1 Existing land use in the command

Due to increased facilities of irrigation, farmers can adopt the latest cropping pattern for their fields. It will increase the production of food grains. At present due to the lack of irrigation facilities, the farmers sow only those crops which require little water. But after completion of the project, they will grow high yielding varieties of crops. The irrigation facilities will also increase the production in Rabi season.

11.2.2 Physical aspects

The link canal is lined with cement concrete throughout its length. Therefore, seepage is reduced to 0.6 Cumecs/M Sq m of wetted perimeter. Small amount of seepage will not affect the position of water table. The designed velocity is 0.95 to 1.14 m/sec in Par-Tapi-Narmada canal while velocity in feeder canals varies between 0.69 to 1.02 m/sec. It is non-scouring and non-silting velocity.

11.2.3 Resources impact aspects

There are no identified deposits of mineral wealth, monuments and valuable properties in the land to be acquired for canal. Canal has also enroute irrigation. Hence, the irrigation facilities will improve the production of crops in the nearby area. It will improve the socio-economic standard of the people of surrounding area.

11.2.4 Socio-cultural aspects

During the construction of canal, colonies are developed in the nearby area. The local people get employment in construction work. They will come in contact with the people of different parts of country. This will improve the life style of the people.

11.2.5 Public health aspects

The running water in the canal will not create mosquito problem. Adequate provision for medical facilities will be made at the time of construction.

11.2.6 Environmental aspects

The running of canal in the lean season will bring more greeneries in the area. The project will give employment to local people during construction and maintenance stage. Due to increase in irrigation facilities, production of food grain will increase. A number of villages which are not connected by roads at present will be connected by the network of roads due to this link canal. There will be power generation from the feeder canal where there is a fall. Not much adverse effect will be caused due to construction of this link canal. Land along its alignment will have to be acquired by the project authorities at suitable compensation.

11.3 Resettlement and rehabilitation plan

The creation of seven reservoirs will result in displacement of about 14832 persons. This will result in disturbance of people from their natural habitat and an abrupt disruption of their age old relationship with their ambient ecology. Hence there is need to plan rehabilitation programme scientifically and implement them properly so that there is no bitterness among the displaced persons. The main thrust of Rehabilitation strategy should aim at providing for fair and equitable treatment of persons displaced from their houses, professions and farms by creation of these reservoirs. The policy should not only aim at providing reasonable compensation to the displaced persons but ensure a better quality of life for them. The displaced persons should also have a share in the benefits accruing as a result of the projects. To achieve these objectives, it is necessary to provide the following basic requirements under the resettlement and rehabilitation strategy effectively.

- (i) Housing and resettlement
- (ii) Amenities for community welfare
- (iii) Agricultural land
- (iv) Alternative occupation

Once these basic requirements are adequately provided in R&R package and implemented effectively, it may be possible to harness the support of the affected persons for the construction of project.

11.3.1 Housing and resettlement

This is the most important consideration in the rehabilitation policy and calls for providing with a suitable built up house in keeping with the requirements of the size of each family. The present policies being followed up by some project authorities in the form of providing cash and compensation with provisions of transportation of material do not seem to be sufficient. To expect a displaced person to construct a house for himself would only add to woes. Therefore, it becomes essential to provide a properly built house to each and every displaced family. Besides this, the displaced family should also be provided with a sufficient open space around the house for keeping the cattle and growing vegetables. For this purpose, it is proposed to provide built up houses of EWS, LIG and MIG category having plinth area of 30, 50 and 70 Sq m on a plot area of 150,250 and 350 sq m respectively to displaced families free of cost in lieu of the house acquired. In absence of detailed property survey, no separate provision for HIG group has been made and the ratio of EWS people to LIG people to MIG people has been kept as 5:3:2. In order to keep all the displaced families of one reservoir at one place, it is proposed to resettle them at one place in the form of model village nearer to the reservoir site so that their social and cultural life is least affected. Model villages will be located at following places.

Sl. No.	Name of reservoirs	Location of model villages
1.	Jheri reservoir	Sawarana village (10 km from site)
2.	Mohankavchali reservoir	Dhamni village (13 km from site)
3.	Paikhed reservoir	Pindval village (10 km from site)
4.	Chasmandva reservoir	Bopi village (5 km from site)
5.	Chikkar reservoir	Near Waghai-Nasik road (2 km from site)
6.	Dabdar reservoir	Near Waghai on Waghai-Ahwa road (8 km from site)
7.	Kelwan reservoir	Bheskatri village (2 km from site)

Resettlement of tribal population affected by the project requires special treatment. Since the location of proposed model villages is mostly within 10 km of the existing villages with better communication, education and health facilities, it is expected that majority of the people should have no objection.

11.3.2 Community facilities

Facilities for health, education, water supply, sanitary and transportation for the new villages are to be provided as per the norms prescribed for the population served. Necessary provision of fund has been kept in the estimate for creation of these community facilities. It is also proposed to give employment to the project affected persons for execution and maintenance of these facilities.

11.3.3 Land

There are considerable variations in the norms prescribed by different states in respect of land compensation to the project affected persons. In case of Par-Tapi-Narmada Link Project, the policy of providing land for land has been proposed. It is also suggested that one Rehabilitation Committee consisting of senior officers of concerned departments should be constituted before undertaking the construction of the projects for sorting out the disputes of the project affected persons.

11.3.4 Alternative occupation

The rehabilitation of project affected persons (PAP) who are engaged in occupations other than farming also need to be paid adequate attention while framing the rehabilitation policy. The trades and occupations practised by such persons can always be restored in new villages in due course of time. All those who are engaged in business/trade can be allotted built up shops in the village centre. Similarly those engaged in other community services are required to be encouraged to resume their professions. Rehabilitation grants and long term interest free loans may be provided to them for their proper settlement. Educated, unemployed, skilled and unskilled persons from the displaced area should be given preference in employment in the project construction and maintenance works. A number of persons can also be employed in environmental improvement and afforestation programmes and other project related works. Since the number of affected persons in respect of size of project is less, it would not be a problem to provide employment to them. A rehabilitation grant of Rs.10,000 per family and maintenance allowance of Rs.1000 per month is proposed to be paid to all PAPs for a period of one year or until his employment/occupation is restored whichever is earlier.

Thus, it is expected that with adoption of aforesaid norms, it would be possible to convince the PAPs and resettle them without hurting their sentiments. The

total cost of rehabilitation and resettlement for Par-Tapi-Narmada link project work out to Rs.102.64 Crores.