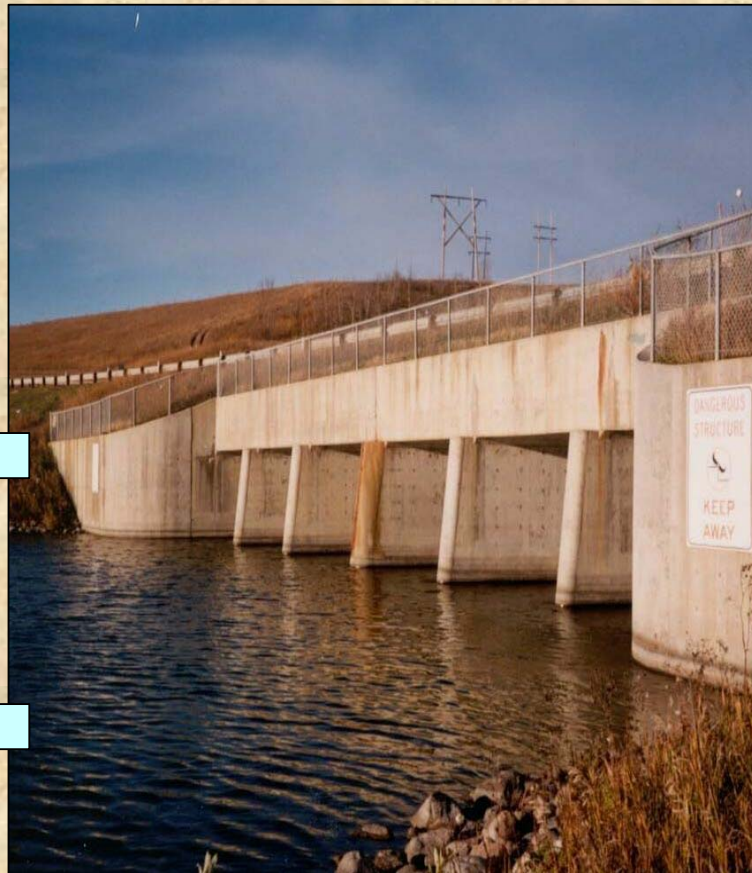
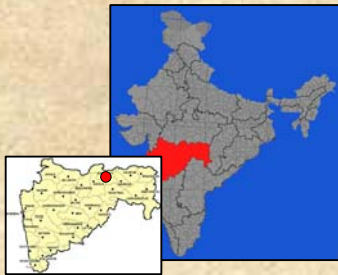


Environmental Impact Assessment for the Construction of Uma Barrage Across the River Uma near Village Borta in Tahsil Murtizapur, Dist. Akola, Maharashtra

Sponsor :

Water Resources Department,
Government of Maharashtra



National Environmental Engineering Research Institute
Nehru Marg, Nagpur 440020 (India)

March 2011

Executive Summary

1.0 Introduction

As per the guidelines of the Ministry of Environment and Forest (MoEF), Government of India, Environmental Impact Assessment (EIA) is a prerequisite for launching any major development project. In compliance with this requirement, the Water Resource Department, Maharashtra retained the National Environmental Engineering Research Institute (NEERI), Nagpur to prepare the Environmental Impact Assessment (EIA) report for the proposed construction of Uma Barrage across the river Uma to fulfill the demand of irrigation and drinking in the district.

The EIA report presents the objectives and scope of this study, the environmental baseline status of the project area, identification of major environmental impacts, prediction of various impacts during and after the proposed developmental activities, evaluation of these impacts, followed by suggestions for effective environmental management plan to minimise the adverse impacts.

The project envisages construction of Barrage across river Uma, a left bank tributary of river Purna in the main basin of river Tapi. Uma river originating from hills of Satpuda then after coming to the plains, it flows through flat area mostly saline track from Unkhed to dam site. The Uma river runs through rich culturable land of Vidarbha region in Akola District which is seasonal river. The objective of the project is to provide irrigation facilities in Akola District. The Akola District is backward district as meager irrigation facilities are available and people in the region are dependent on the rains. This project is expected to provide irrigation facilities to Amravati district.. The project is proposed in the highest irrigation backlog area of the Akola District and completion of this project will result in assured production irrigation, drinking water and financial stability to the district Akola.

The proposed project site is located on latitude of 20°49'30"N and longitude of 77°28'30"E. The proposed project is located 1 km towards east, U/s of village Borta in Murtizapur Tahsil and about 17 km from Murtizapur city.

The Uma barrage is a medium project scheme envisages construction of earthen dam. Project is attractive from the technical point of view and economically feasible as per the norms of medium project.

1.1 Salient Features of the Project

This project is framed as a medium project irrigation scheme envisages construction of a barrage having of 142 m long with 8 nos. of vertical lift type gates of size 15 x 8.5 m across Uma river and earthen dam is constructed upto 1298 m long approaches on both the flanks. The maximum height of dam is 14 m with a gross storage of 20.79 mm³. As per A.A. the flow irrigation about 900 Ha. With 8.22 km. length of canal and lift irrigation about 4610 Ha. with 7.44 km. length of canal was proposed. But as per the revised survey the total 5510 Ha. Area is proposed by lift irrigation with right and left canal of 4.80 km. and 7.60 k.m. length respectively.

The lift irrigation scheme to irrigate 5510 Ha. area is included with rising main of 3.53 km. length and with diameter of 1350 mm, distribution chamber of size 8.60 M x 8.60 M and to lift the water for 16 m. hight two pumps of 709 HP each are proposed. The area under submergence would be 645,16 ha which includes 597.67 ha private land and 47.49 ha govt. land. There are three are four villages coming under submergence area namely Rohana, Pohi and and Mana with partially & Langhapur with 100% in Murtizapur Tahsil and Akola district.

The drainage area of the river upto proposed dam site is 454.76 sq.km. The major part of the drainage area is hilly and having hilly slope with fan shape. The total catchment area upto dam site is 454.76 sq.km. The entire catchment area is classified as good catchment area, by computing yield on the basis of 75% dependability, monsoon rainfall and that is worked out 52.79 Mm³ including P.M. flow 4.73 %. The gross yield at 75% dependability is 52.79 Mm³ after deducting 18.00 Mm³ yield which is reserved for U/s side project net yield available is 34.78 Mm³. Thus total regeneration considered for this project is 1.8005 Mm³ hence the total yield available for planning is 36.58 Mm³. Annual utilization of this project is 32.928 Mm³.

The yield and utilization is as follows :

1. 75% dependable yield	:	50.4661 Mm ³
2. 4.73% per month flow	:	2.3803
3. Total yield at site	:	52.7903
4. U/s Reservation	:	18.005
5. Balance yield	:	34.7853

6. Regeneration flow : 1.8005
7. Net yield available for planning : 36.5858 Mm³
8. The storage capacity of dam is as follows :
 - a. Dead storage (MDDL) : 2.22 Mm³
 - b. Live Storage : 18.57 Mm³
 - c. Gross Storage : 20.73 Mm³

1.2 Description of the Environment

The study area mainly comprises the catchment area, the area of submergence, and the command area of the Uma barrage project. The command area is 5510 ha, mainly is in Murtizapur taluka of Akola district. The total catchment area is 454.76 sq.km, falling in Akola and Washim district. The area of submergence is 645.16 ha.

2.0 Baseline Environmental Status and Identification of Impacts

2.1 Air Environment

Four major air pollutants viz., suspended particulate matter (SPM), respirable particulate matter (RPM), sulphur dioxide (SO₂) and dioxide of nitrogen (NO_x) representing the basic air pollutants in the region were identified for AAQM.

The pollutant levels (24 hourly avg.) at these sampling stations reflect that the regional background, i.e. mean levels of SPM is 89-139 µg/m³ whereas RPM is 33-50 µg/m³ respectively. The concentration of other gaseous pollutants were, SO₂ : 5-8 µg/m³ and NO_x : 6-11 µg/m³ respectively during the study period. The 98th percentile values of SPM ranged between 97-161 µg/m³. The 98th percentile values (µg/m³) of 24 hrly RPM were below the CPCB standard (100 µg/m³) for residential and rural areas.

The average concentrations of SO₂ at all stations were in the range of 5-8 µg/m³ at individual locations while the maximum concentrations were recorded between 3 µg/m³ and 10 µg/m³. The 98th percentile value of SO₂ varied in the range of 6-10 µg/m³. The mean concentrations of NO_x were in the range of 6-11 µg/m³ and the 98th percentile values varied between 8-13 µg/m³.

2.2 Noise Environment

The noise levels in the residential zone and the commercial zone ranged between 50-55 dBA during daytime and 38-43 dBA during night time and between 59-64 dBA during daytime and 49-53 dBA at night time respectively.

Noise levels were also monitored in schools, hospitals and temples in the study area i.e. silence zone. The noise levels varied from 42-46 dBA during daytime and 32-39 dBA during night time.

2.3 Water Environment

The surface and groundwater samples collected were analysed for physico-chemical parameters to arrive at the baseline environmental status of water quality.

The physico-chemical characteristics of surface water for winter season indicates temperature 25°C, pH : 8.0-8.7, TDS : 740-2630 mg/l and TSS : 1-45 mg/l. Alkalinity is 176-461 mg/l, whereas total hardness was found to be 163-1098 mg/l as CaCO₃. The chloride and sulphate were observed to be 106-1049 mg/l and 65-358 mg/l respectively. Whereas sodium and potassium concentrations were found to be 144-596 and 9-31 mg/l respectively.

The organic load in terms of COD was found to be in the range of 13-20 mg/l, nutrient parameters with respect to nitrates and phosphates were found to be 0.2-3.0 mg/l and 0.04-0.77 mg/l respectively. Heavy metals except iron were found to be within the permissible limits of drinking water.

The physico-chemical characteristics of groundwater indicate pH in the range of 7.9-8.3; temperature 25°C; turbidity <1 to 3 NTU; TDS 1030-2180 mg/l. Total suspended solids (TSS) concentration was in the range of 1-5 mg/l.

The inorganic parameters viz. alkalinity hardness chloride, sulphate, are in the range of 202-502 mg/l, 282-1098 mg/l, 215-689 mg/l and 127-350 mg/l respectively.

Organic parameter COD, was found to be 1-16 mg/l whereas nitrates and phosphates were 102 mg/l. 0.04-0.08 mg/l respectively. Concentrations of heavy metals viz. copper and nickel, cadmium, chromium, lead, iron, manganese and zinc were found to be below prescribed standards except iron in some places.

The surface water was found to be faecally contaminated and hence need chlorination before consumption. Most of the groundwater samples were also found to be faecally contaminated and hence need chlorination before consumption.

The total count of phytoplankton was found maximum upto 154 no./ml with the moderate diversity. The SWD index varied between 1.4 to 2.3 indicates moderate to good productivity.

Zooplanktons are absent in most of the groundwater samples, while in surface water samples, total counts were observed to be in the range of 500-900 /m³ containing two groups of organisms namely *Rotifera* and *cladocera*.

2.4 Land Environment

Major part of the study area is dominated by unirrigated land i.e. 88% followed by 6% of culturable waste land. Area not available for cultivation is confined to 4% whereas 2% land comes under forest.

Jowar, Mung, Soyabean, Cotton, Tur are grown in Kharif season. Unirrigated crops like Til and Chana are the prominent crops grown in the Rabbi season. Cotton is the major crop in Kharif season and Mung, Tur, Jowar and Soyabean are prominent crops of the study area.

The texture of the soil is clay. The bulk density of the soil is in the range of 1.14 to 1.28 g/cm³ whereas the porosity and water holding capacity are in the range of 47.80 to 51.20 % and 46.80-62.20% respectively. pH is an important parameter which indicates the alkaline and acidic nature of soil. The pH of the soil in the study area is slightly to moderately alkaline in reaction having pH in the range of 7.64-8.92. The EC for the soil samples are in the range of 0.29-0.82 dS/m. The soluble salts content in all the soils are low (EC<1 dS/m), chemical analysis shows that the soils are normal. The most important cations present in soluble state in the soil are calcium and magnesium. It was observed that calcium and magnesium are in the range of 4.44 to 18.60 meq/l and 0.40-17.40 meq/l respectively. Sodium and potassium in the soils are varies from 0.80 to 5.02 meq/l and 0.02 to 0.62 meq/l respectively.

In general, the soil in the region has very high adsorption capacity as evident from the cation exchange capacity which was found to be in the range of 28.94-54.62 c mol (P⁺) Kg⁻¹ soil. Soils from all the villages are normal with respect to alkalinity as exchangeable sodium percentage of soil is below 15. The soils of all the villages have very high adsorptive capacity and also have high productivity.

Organic carbon and available nitrogen, phosphorous and potassium are found to be in the range of 0.12 to 0.60 % and 114.15 to 801.06, 10.43 to 31.59 and 84.07 to 196.30 kg/ha respectively. Soil samples are poor to medium level content in organic carbon. Data indicates that soil are medium fertile but the available potassium present in the soils shows high fertility level.

Remote Sensing/GIS studies revealed that the study corridor mainly comprises of nine different classes are identified within study area. Waterbody (lakes and ponds) is indicated by Darkblue colour and rivers indicated by blue colour. The vegetation present all over the area is assigned by green colour. Sand/bare soil cover 3.36% is assigned by white colour. The cropland spread in 13.99% of the area and assigned by dark green colour.

2.5 Biological Environment

Total 12 sampling locations were selected for study on biological survey based on topography, land use, vegetation pattern, etc. The study area mostly comprises of agricultural fields, rivers and nallahs. Out of total area studied, 102 plant species were recorded, comprising 60 trees, 16 shrubs, 20 herbs, 06 climber. The dominant plant species in the study area were *Balanites aegyptica*, *Acacia nilotica* and *Prosopis juliflora*, *Tamarindus indica*, *Zizyphus jujube*, *Azadirachta India* etc. which are commonly found in open scrub land and near village wasteland. *Balanites aegyptica*, *Acacia nilotica* and *Prosopis juliflora* are a common trees near the villages, road side and on the peripheri of agricultural field. The *colocasia sp.* *Lpomoea sp.* Were commonly observed in muddy soil near the banks of rivers and around the seasonal ponds.

All the species observed were common and no threatened or endangered plant species and known to exist in or near in study area. The commonly found wild animals in the study area are monkey, squirrel, lizards. They live in the agricultural field and near the river and nallah side. Some reptiles like cobra, water snakes, monitor lizards and common lizards were also observed near the village boundary.

A total of 20 birds species were observed in the study area at 12 sampling locations. The dominant birds in the study area are green bee eater, little bron dove, common myna, black drongo, little egret, pond heron, whitebreasted kingfisher, Grey shrike, Coppersmith etc.. Spoonbill, whitenecked stork, grey heron etc.

2.6 Socio-economic Environment

The socio-economic profile of 15 villages falling in the area in the vicinity of the project has been covered in varied perspectives. It includes information on demography, infrastructural facilities, economy, health, literacy and cultural and aesthetic attributes. The quality of life (QOL) index for the villages show a reasonably satisfactory level.

The area under submergence which is Akola district is flat and plain. The most of the land under submergence is culturable. The villages in the command area welcome the project. In villages under submergence, people of villages Rohna, Pahi and Langhapur are willing to support the project provided compensation package is attractive to them.

The project would irrigate 5510 Ha of non-irrigated land. On the other hand 645.11 ha of land would be submerged. There is no forest and commercial area coming under submergence. The project affected population would be rehabilitated and resettled as per the latest norms of the Government of Maharashtra. The water from the reservoir will be used for industrial, irrigation and drinking purposes.

Good economic conditions in terms of income, employment, food, clothing and shelter contribute towards higher QoL-value, while factors like inadequate medical and educational facilities, social-insecurity, water scarcity, insufficient irrigation facilities, inadequate sanitation facilities bring the QoL-Value down.

The average QoL index values are estimated as:

QoL (S)	=	0.46
QoL (O)	=	0.48
QoL (C)	=	0.47

In general the project appears to improve conditions for a large number of people. The main objective of Bordi Nalla dam project is increasing the productive capacity of the land in the command areas since the people have are dependent largely on rainfed farming.

2.7 Identification of Impacts

For the activities envisaged under the project, impacts have been identified for the preconstruction, construction and post construction and operation phases of the project using the network approach which involves an understanding of the cause condition effect relationship between an activity and environmental parameters. The networks indicate the primary, secondary and tertiary impacts due to the various activities

The significant environmental issues due to the proposed Bordi nalla project are broadly identified as under:

- impact on river hydrology and sediment transport
- impact on water table and consequent water logging
- impact on the water quality
- impact on the terrestrial flora and fauna due to site clearance and construction activities in the project area including loss of forest cover in the submergence area.
- impact on the land use pattern and land availability
- impact on air quality and noise levels during the construction period
- direct and indirect impacts on the local community
- impact on wildlife, sensitive area, and archaeological sites

3.0 Prediction of Impacts

3.1 Air Environment

During construction phase of the project, the major activities are drilling, blasting, quarrying transportation and construction of barrage and other components of project. All these activities lead to an increase in concentration of air pollutants, particularly SPM, NO_x and hydrocarbons (HC) which are further added due to increased vehicular traffic. However, the levels of SO₂, NO_x and Hydrocarbons were observed well below the stipulated standards during the construction phase.

It is predicted from CL4 model that the maximum contribution to ground level concentrations of CO, HC, NO_x and SPM due to vehicular movement will be less than 5 µg/m³ beyond 500 m from the road. It is noteworthy, that this activity is mainly located away from this proposed project.

3.2 Noise Environment

The study area is heavily affected by transportation due to State Highways i.e. SH-6 SH-200 and SH-194. The trucks, buses, cars, jeeps and two wheelers are running through this route. Considering natural growth and increase due to proposed project, following traffic composition was considered for SH-6, SH-200 And SH-194 :

The predicted cumulative noise level at 50m -100m from the center of the road i.e. SH-6 ranges between 65-70 dBA. On SH-200 the cumulative noise level at 50-100 m varied between 62-65 dBA. The cumulative noise level on SH-194 is predicted to be in the range of 55-57 dBA at 50-100m from centre of the road.

Compressor, feed pumps and generator etc. would be the main sources of noise during the construction phase of the dam. The noise levels expected would be in the range of 75-85 dBA due to construction activity. This temporary increase in noise levels would not have any significant impact on the community.

3.3 Water Environment

Surface water quality was monitored to assess the impact of the proposed activity. The assessment parameters indicated that surface water is good physico-chemically. The water from river contains moderate dissolved solids. However there will be maximum dilution due to rain water runoff collected in the dam if river and Nallahs are discharged into the Dam. If the discharges are properly managed, then there will not be any impact of these rivers and nallahs on the dam water collected during rainy season. The surface water is faecally contaminated and not useful for drinking purposes unless chlorinated.

The water requirement of crops has been calculated. The average rainfall for the period from 1942 to 2002 in nearby command area is considered for this computation. The water requirement is 27.949 Mm³ for 4126 ha. The entire irrigation is planned for conventional Irrigation system and efficiency of has been assumed. The net yield available at dam site is 51.097 Mm³ out of which 27.949 Mm³ of water is planned to be utilised.

3.4 Land Environment

The construction of the earthen dam will cause rise of the water table in the upstream part of the dam. The soil here is clayey and topographically the area is senile (i.e. relatively flat). Hence water logging may occur in a large area.

Seepage from irrigation canals and excess irrigation of fields would lead to rise of water table, and increase in salinity of soils. Further assured water supply for irrigation may lead to use of HYV (High Yielding Variety) seeds. HYV seeds demand considerable use of fertilisers which could play a role in increasing the salinity of soils.

Existing Crop Pattern

The predominant crops prevailing in the area are Jowar, Cotton, hy. Jawar, groundnut, pulses of wheat and chillies. The command area comprises mostly of medium to light soils for irrigated cultivation.

Existing Crop Pattern

Sr. No.	Name of the Crops	% of the Crops
1.	Hy.Jwar	10
2.	Soyabean	5
3.	Cotton	25
4.	Tur/Pulses	25
5.	Other Pulses	20
6.	Sunflower	15
	Total	100

Proposed Cropping Pattern

The cropping pattern proposed is based mainly on the agroclimatic zoning of the region keeping in view of soil condition. The L.S. cotton, Hy. Jawar & Oil Seed also find place in view of the fact that these are high yield crops when adequate supply of water is assured. People can be encouraged to grow these profitable varieties in lieu of the conventional crops. The proposed cropping pattern which is predicted after the dam construction will be as follows :

Proposed Cropping Pattern

Sr. No.	Name of Season	Name of Crop	Percentage
A.	Two Seasonal :		
1.		Hy. Cotton	3
2.		Chilies	2
		Total	5
B.	Kharip Seasonal Irrigated		
3.		Hy.Jawar	20
4.		Soyabean (kh)	17
5.		Vegetable (kh)	30
		Total	67
C.	Kharip Seasonal unirrigated		
6.		Cotton	12
7.		Hy. Jawar	5
8.		Sunflower	2
9.		Pulses	7
10.		Soyabean	2
		Total	28
D.	Rabi Crops (Follow on Crops)		
11.		Wheat (R)	5
12.		Gram (R)	6
13.		Safflower (R)	4
14.		Sunflower (R)	5
15.		Vegetable	14
		Total	34
		Grand Total	134

The area under submergence is 448.75 ha, which is flat and plain. Thus most of the land coming under submergence is culturable land.

Rehabilitation

The land under submergence is fertile. Sufficient provision for rehabilitation of souls coming under submergence is made in the estimate. This includes acquisition of new gothans area and provisions of Roads, Wells, Schools, Post Offices, Dispensaries, Bus stops etc. In the new gothans provisions are made for transportation of dismantled materials and house hold materials.

Submission for land acquisition and rehabilitation of villages under submergence and other activities regarding rehabilitation of above villages are under process.

3.5 Biological Environment

- Megha river is a seasonal river hence there is no prominent fishing activity, it may not be affected
- The proposed earthen dam on Bordi nalla river may be used for pisciculture
- The area under submergence is mostly agricultural land with rainfed farming so there is very low floristic and faunal diversity
- No endangered or endemic plant was recorded from study area
- Wild faunal diversity only represented by monkey, squirrels etc. which may not be affected due to project activities.

3.6 Socio-economic Environment

The project mainly refers to providing irrigation facilities as major source of livelihood is agriculture. The project will create employment and business opportunities during construction phase at local as well as district level. Agriculture related employment will continue during operation phase of the project. Increased revenue to the government through taxes will be an indirect benefit.

Improved infrastructural facilities like road, communication, market, health, services and other amenities will help in the development of the region. The project would setup a new township with improved infrastructural facilities. These facilities would be used by local people and would help in betterment and upliftment of the quality of life of local people. The formation of reservoir at Borgaon (Mohana) may promote tourism activities in the project area as well as a source of income for the local people.

Expected change in subjective quality of life (QoL) may increase up to 0.49 and cumulative may increase to 0.50 in the project region as the activity may bring development.

4.0 Environmental Impact Statement

4.1 Air Environment

The air pollutants relevant to the activities of project were identified as SPM, SO₂ and NO_x. The 98th percentile values of SPM, SO₂ and NO_x during winter season varied between 101-131, 8-10 and 13-23 µg/m³. Lower levels of SPM were contributed due local atmospheric surroundings with flat plain area without industrial activities. The concentrations of RPM, SO₂ and NO_x were well within the established standards while the CO values were observed to be non-detectable at all sampling locations.

The potential air pollution sources are due to vehicular traffic. Presently the traffic density is concentrated on SH-6, SH-200 and SH-194. The vehicular density will be expected to rise after the construction of proposed dam is completed. The impact of vehicular activity on air quality adjacent to vehicular movement on SH-6, SH-200 and SH-194 is predicted using CALANE 4 model developed by USEPA. It is predicted that the maximum contribution to ground level concentrations of CO, HC, NO_x and SPM due to vehicular movement will be less than 5 µg/m³ beyond 500 m from the road.

4.2 Noise Environment

On the basis of expected noise levels estimated through standard attenuation model, it is observed that general noise levels on the dam site and in the surrounding villages will be within the prescribed standard limits.

4.3 Water Environment

The data collected during winter season indicate that surface water interms of river water is fit for drinking water, physico-chemically. However maximum provision has been made to use this dam water for irrigation purpose. If used for drinking purpose it should be chlorinated first. Due to maximum collection of rain water into the dam, the dilution effect may reduce the mineral content and there will not be much impact on the productivity of soil and crops if used for irrigation.

The groundwater of nearby villages is moderately mineralized interms of dissolved solids, hardness, chloride and sulphate. It was also found to be faecally contaminated at certain locations so proper precaution should be taken to avoid any further contamination of the ground water.

4.4 Land Environment

Soils of proposed Bordi nalla Irrigation Project are dominantly (82%) deep to very deep (50 to 100 cm and above), dominantly (78%) medium to fine texture (c, sic, sil, sicl, l), retentive for available water (184 mm/m), good in infiltrability of surface water (0.95 cm/hr), moderate in drainability (0.7 cm/hr), calcareous in nature, moderately alkaline in reaction (pHs = 7.3-8.0), free from salinity ($E_{ce} = 0.28-1.91$ ds/m).

Megha river water is of "Moderate Quality". However it can be used for irrigation (pH = 8.0, EC_w = 420 μ s/cm and RSC = Nil) and free from salinity and sodicity hazards. Groundwater from dug wells and bore wells during summer season is also free from water salinity and sodicity hazards (pH : 7.8-8.7, dissolved solid : 300 to 967 mg/l). Residual sodicity of groundwater is absent in 65 – 75% dug and bore wells but is found high (RSC = 4.16 to 4.40 meq/l) in 35% observed dug wells i.e. Alkaline groundwater in certain pockets.

4.5 Biological Environment

The associated activities of the proposed project may have adverse impact on the natural vegetation and animal life. However, with the implementation of mitigation measures like tree plantation and greenbelt development, afforestation and irrigation activities, the ecosystem balance in the region will be restored to a great extent.

4.6 Socio-economic Environment

It is envisaged that implementation of welfare measures including provision of basic facilities/amenities would result into increase in subjective QoL Index (QOL_(s)) from 0.49 to 0.50. However, objective QoL index needs to be ascertained after implementation of EMP. Overall, there would be positive impact on socio-economic environment due to upliftment of living standard of the people as a result of implementation of suggestions given in EMP.

5.0 Environmental Management Plan

The project activates during the preconstruction, construction and operational phases will have impacts, both positive and negative on various environmental components. An environmental management plan has been suggested for mitigation of adverse impacts and to maximise beneficial impacts.

The catchment area of 323.89 sq.km has been divided into different watersheds based on the tributaries or nallahs, which are non perennial. Under this CATP issues addressed are (i) forestry (ii) wood plantation (iii) soil conservation and irrigation proposals.

For effective implementation of recommended environmental monitoring plan, it will be necessary to establish and develop adequate facilities for sampling and analysis. It will be

desirable to set up an environmental monitoring cell at Bhatkuli and Water Resources Department, Maharashtra, with competent trained staff and adequate instrumentation support.

The implementation of the mitigation plan should be regularly reviewed by a high level committee consisting of members drawn from Bordi nalla project, Water Resources Department, Maharashtra, Pollution Control Boards, Central Water Commission and Forest Department so as to ensure compliance with the recommendations.

National Policy on Resettlement and Rehabilitation for project affected families as per 2003 has been suggested.

Under the Disaster Management Plan, Approach to Disaster Management Plan is being done for the project. It is derived from the report that some of the settlements downstream of the proposed dam are going to be affected. As a preventive measure, it is suggested to constitute an Emergency Response Organization, which will take charge of overall planning, execution and coordination of all the activities of the Disaster Management Plan. Some of the vital activities of the organization may include demarcating emergency zones, carrying out emergency actions like extending relief, first-aid, human assistance, carrying out evacuation, if necessary and organization of rehabilitation centres. Similarly the Catchment Area Treatment Plan, Afforestation Plan, Biodiversity and Conservation Plan, Health Management Plan and details about the Rehabilitation and Resettlement Plan are presented in the report.