



NATIONAL WATER DEVELOPMENT AGENCY

(A Government of India Society under Ministry of Water Resources)

COMPREHENSIVE ENVIRONMENTAL IMPACT ASSESSMENT STUDY

KEN-BETWA LINK PROJECT: PHASE-I



EXECUTIVE SUMMARY



AFC

AFC INDIA LIMITED

(Formerly Agricultural Finance Corporation Limited)

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**ENVIRONMENTAL IMPACT ASSESSMENT STUDY
OF
KEN-BETWA LINK PROJECT, PHASE-I**

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I. INTRODUCTION

1. Most of the developmental projects in the fields of Irrigation, industry, power etc, require a Comprehensive Environmental Impact Assessment (CEIA) studies and preparation of suitable Environmental Management Plans (EMP) to mitigate adverse affects, if any.
2. Detailed technical studies for diversion of water from Ken river basin to Betwa river basin of Ganga main basin have been carried out by National Water Development Agency (NWDA), a GOI society under Ministry of Water Resources. These studies established that Betwa is a water short basin. In order to assess various environmental impacts from the project as well as to take mitigation measures, the National Water Development Agency desired to have comprehensive environmental impact assessment study of the Ken-Betwa Link project Phase – I along with formulation of Environmental Management Plan. Accordingly the Agency had entrusted Agricultural Finance Corporation Limited (AFC), the task of conducting CEIA studies and preparing necessary reports for obtaining environmental clearance. The scope of EIA studies inter-alia does not include water balance studies.
3. The report is divided into four volumes comprising Volume – I : Baseline status and EIA , Volume : II Environment Management Plan and Volume – III : Socio-Economic Survey and Resettlement and Economic Rehabilitation Plan (R and R). All the maps with necessary references are presented separately in Volume –IV.

II. STUDY DESIGN

4. Initially Agricultural finance Corporation Limited (AFC) carried out EIA study of the project as per the Terms of Reference (ToR) approved by Ministry of Environment and Forests (MoEF) for EIA chapter in Detailed Project Report (DPR). The study report along with the draft ToR for EIA study was submitted to Expert Appraisal Committee (EAC), MoEF and the same was considered by EAC during its 45th meeting held on 20th December 2010. The Committee, during this meeting, approved the ToR for EIA study with a stipulation that some additional studies may need to be carried out. MoEF stipulated additional ToR consisted the following:

- Floral survey of all groups of plants to be covered. Number of sampling sites along with their locations to be given.
- Plan for conjunctive use of ground and surface water in the existing and proposed command area, of the project.

- Demonstration plots for pressurized irrigation at three locations, of about 500 ha each in project command area to be developed at project cost to be incorporated.
- Aquatic bio-diversity of Ken-river to be furnished, which may be studied by Central Inland Fisheries Research Institute (CIFRI), Barrackpore, Kolkata.

5. Since MoEF specifically recommended that the aquatic bio-diversity study of Ken River may need to be undertaken by CIFRI, the NWDA entrusted this additional study to CIFRI. Further, the NWDA entrusted the study of other three components to AFC vide their letter number NWDA/IC/GNL/T-24(E)/1010-14 dated 19.5.2011 and subsequent MoU signed by both the parties i.e., NWDA and AFC on 09.07.2011. The final EIA report of the project had been prepared after incorporating the findings of AFC and CIFRI.

III. STUDY AREA

6. Both Ken and Betwa are interstate rivers and confluence with Yamuna river. The total length of Ken river is 427 km while the length of Betwa river is 590 km. The Ken-Betwa link project phase – I mainly envisages construction of a dam across Ken river near Daudhan village which is 2.5 km upstream of existing Gangau weir, 218.70 km long link canal and two power houses. The link canal passes through Chhatarpur and Tikamgarh districts of Madhya Pradesh and Mahoba and Jhansi districts of Uttar Pradesh. The main components of Ken-Betwa link project, Phase-I are:

- Daudhan dam across Ken river with a gross storage capacity of 2853 MCM at FRL / MWL of 288.00 m and with live storage capacity of 2683.74 MCM based on simulation studies and to meet various demands as per MoU between MP and UP for preparation of DPR .
- Link canal of 218.695 km long from the reservoir terminating into Barwa Sagar and to carry 1074 MCM of water annually out of which 591 MCM will be diverted to Betwa river
- Upper level tunnel of about 1.929 km long from the exit of which K - B link canal starts.
- Lower level tunnel of about 1.1 km long from the exit of which proposed Ken LBC starts through PH2.
- Two power houses, one at the foot of the dam (2 x 30 MW) and another at the exit of lower level tunnel of about 1.10 km long (3 x 6 MW) .

7. After preparation of Detailed Project Report (DPR) for Ken-Betwa Link Project in December 2008, the DPR was circulated to the Governments of Madhya Pradesh and Uttar Pradesh in February 2009 for their suggestions and observations. Subsequently, the GoMP suggested an alternative proposal for utilizing the water in Upper Betwa reach according to which the height of the proposed Makodia dam is proposed to be reduced to avoid large scale submergence in the vicinity of Bhopal city and proposed several medium and minor scheme to utilize equivalent quantity of water in Upper Betwa reaches.

8. To discuss various issue raised by the Governments of Madhya Pradesh and Uttar Pradesh, a Secretary level meeting was convened by MoWR on 03.02.2010 at New Delhi between the officials of both the Governments & MoWR. During the meeting, it was opined that the Survey & Investigation of the alternative project / schemes proposed by Madhya Pradesh in Upper Betwa region will take about 2

years time. Therefore, in order to avoid undue delay in implementation of Ken-Betwa Link Project, it was decided to reframe the DPR in two separate parts viz., DPR of Ken-Betwa Link Project (Phase-I) comprising components of Daudhan dam power houses, link canal and DPR of Ken-Betwa Link Project (Phase-II) comprising Upper Betwa projects. Accordingly, the first part i.e., present DPR of Phase-I is prepared including the cost of remodeling / renovation of Bariyarpur weir and Parichha weir also. The Phase-I Ken - Betwa link project has been proposed to fulfill the following basic objectives:

- Annual Irrigation to 3.23 lakh ha in new command area of Chhatarpur and Panna districts of MP as proposed under KMPP command.
- Annual Irrigation to an area of 2.52 lakh ha in existing command of Banda district of U.P. (being irrigated through Bariyarpur PUW Head works)
- Enroute irrigation along the link canal to the extent of 60,294 ha out of which 46599 ha is in MP and 13695 ha is in UP.
- Drinking water facility to enroute urban and rural settlements in MP and UP for about 13.42 lakh people.
- Hydro power generation to the extent of 78 MW

Water Use

9. As per the tripartite Memorandum of Understanding (MoU) signed between Govt. of India and the two state (i.e. MP and UP) Governments on 25-08-2005, the commitments from Ken river at Daudhan excluding ecological requirements is 3387 MCM, out of which, share of UP is 1700 MCM and that of MP is 1687 MCM & the balance water available will be diverted to Betwa river after meeting the enroute irrigation and domestic needs. However, due to the increased availability of water at Daudhan dam site at DPR stage, the MP would be able to utilise 2379.62 MCM against 1687 MCM. On the other hand, out of 1700 MCM of allocated water to U.P., 1600 MCM will be released through Daudhan dam in its downstream to take care of existing command in Banda district whereas remaining 100 MCM will be provided through link canal to meet their enroute requirement.

Topography

Daudhan Dam and Link Canal

10. The stratigraphy of rock formations found in the region is mostly alluvial soils, Deccan traps, Lameta beds and Vindhyan system. The proposed Daudhan reservoir area lies in Panna and Chhatarpur districts of Madhya Pradesh and is occupied by Bundelkhand granite overlain by Bijawar group and in turn Vindhyan super group. Topographical features along the route of link canal include isolated hill tops, valleys, reserve forests, streams and rivers.

Geology

11. Proposed dam site at Daudhan comprises of very hard and dense quartz granite which appears to be competent from the foundation grade point of view. Presence of Bundelkhand granite and rocks of the Bijawar group are confirmed in the reaches along the proposed link canal alignment.

Climate

12. The climate of the project area is tropical, semi arid to dry sub humid. About 90% of the annual rain fall is received during the monsoon period, i.e., from June to October. The average maximum and minimum temperatures are 33.2°C and 18.8°C respectively. The average Relative Humidity (RH) in the project area at 08.30 hrs is 64 percent while it is 47 percent at 17.30 hrs. The average wind speed in the area is 4.00 kmph. Usually maximum cloud cover is observed during the months of July or August where as the minimum cloud cover is observed during December.

Catchment Area

13. The Catchment area up to the proposed dam at Daudhan on Ken river is arrived to be 19,633 sq km, which is about 70.5 percent of the total catchment area of Ken river. The catchment area is spread over parts of 8 districts of Madhya Pradesh i.e., Panna, Chhatarpur, Sagar, Damoh, Satna, Narsinghpur, Katni, and Raisen. The nature of flora are tropical dry deciduous teak, Saja, Salai, Khair, Tendu, Tinsa, Amla, Dhaoa Lendia, Mahuwa, Amaltas, Papra and Ber. The forest areas are rich in wild life and Birds/Animals such as Tigers, Panthers, Nilgai, Chinkara, Chita and Black Buck. Panna National Park for wildlife preservation is an important part of the Reserve forest.

Command Area

14. The Ken-Betwa link project, Phase-I constitutes three main components. The listing of these command areas along with CCA and annual irrigation is as follows:

<i>Command</i>	<i>CCA(ha)</i>	<i>Annual Irrigation(ha)</i>
Ken command (M.P.)	2,41,306	3,23,350
Ken command (U.P.)	2,13,610	2,52,017
Enroute command area	60,294	60,294
Total	5,15,210	6,35,661

Area of Submergence

15. The submergence area under the proposed Daudhan dam based on actual topographical surveys done by NWDA at DPR stage are as below :

SI.No	Land Use	Area (ha)	%
1	Built up land	89	0.99
2	Agricultural land (Crop land)	2171	24.12
3	Tanks/Rivers/Streams	1571	17.46
4	Open scrub	150	1.67
5	Dense Forest	590	6.56
6	Open Forest	261	2.90
7	Scrub forest	4168	46.31
	Total	9000	100.00

16. Formation of dam across Ken River near Daudhan involves submergence of 9000 ha at the proposed FRL/MWL of 288 m. Out of the above, forest land accounts for to 5258 ha, rest of the area

being agricultural lands, settlements, scrubs and water bodies. Ten villages are likely to be submerged. Area of Panna national park or Tiger reserve accounts for about 79 percent of total forest area under submergence with 4141 ha.

III. BASELINE STATUS

17. Baseline status has been ascertained for the following areas:

- Air environment
- Water environment
- Land environment
- Biological environment
- Socio-economic environment

AIR ENVIRONMENT STATUS

Ambient Air Quality

18. Ambient air quality status has been observed at four locations covering Daudhan dam site and link canal. The value of suspended particulate matter (SPM) varied between 154 and 242 $\mu\text{g}/\text{Nm}^3$, whereas Sulphur dioxide (SO_2) ranged between 7 and 13 $\mu\text{g}/\text{Nm}^3$ and oxides of Nitrogen (NO_2) varied between 12 and 16 $\mu\text{g}/\text{Nm}^3$. The values are within permissible limits i.e. ambient air quality for SPM is 70-500 $\mu\text{g}/\text{m}^3$, SO_2 is 15-120 $\mu\text{g}/\text{m}^3$ and NO_x is 15-120 $\mu\text{g}/\text{m}^3$ depending upon the nature of area such as sensitive, residential and industrial as per the National Ambient Air Quality standards issued by CPCB, GSR 176 dated 02.04.1996.

Noise Levels

19. Existing noise levels have also been observed at different locations as above. They are found to vary between 48 and 51 dB (A). The permissible limits vary between 50 to 75 dB (A) during day time in areas such as industrial, commercial, residential and silence zones (50). Thus the noise levels are within permissible limits.

Climate and Rainfall

Climate

20. The climate of the project area is divided in to three distinct seasons namely monsoon or rainy season from June to October (b) Post monsoon from November to February and (c) Pre monsoon from March to May. The area is mostly influenced by south west monsoon.

Rainfall

21. Rainfall data has been collected in respect of rain gauge stations maintained by IMD for the years from 1990 to 2005/2006. The mean annual rainfall of the Daudhan catchment area is 1080 mm with 44 rainy days. The monsoon rainfall accounts for 95.4 per cent of the annual rainfall.

Meteorology

22. Indian meteorological department is maintaining observatories at seven locations in the project area namely Khajuraho, Satna, Sagar, Jabalpur, Nowgaon and Tikamgarh. Average maximum and minimum temperatures at Daudhan dam area are 32.3°C and 19.5°C. Relative humidity on average is 64% and 47% at 8.30 hr and 17.30 hr respectively. The average wind speed is 4 km/hr. For link canal the average maximum and minimum temperatures are 33°C and 17.6°C respectively. The relative humidity in the morning and evening hours on average are 66% and 56% respectively. Average wind speed is 3.2 kmph.

WATER ENVIRONMENT STATUS

23. Surface and groundwater samples were collected and analysed for different parameters. The results indicated that all the parameters are within permissible limits. The groundwater is good and fresh. From the study of hydrographs, it was observed that the groundwater levels were falling in the proposed command districts of Ken-Betwa link project: Phase-I. The fall in groundwater levels in these districts is mainly due to changes in climatic conditions (low rainfall) and land use.

24. All the command area districts, except for Mahoba district in UP, have substantial groundwater potential available for irrigation. In the entire command area of the project the stage of groundwater development is less than 72 per cent except for Mahaoba district wherein it is over 106 per cent. Thus, the majority of the command area falls in the "safe category".

LAND ENVIRONMENT STATUS

Land Use and Land Cover

25. Land use and land cover in respect of Daudhan dam catchment including reservoir submergence comprises 33.62% forest areas (of open, scrub, dense categories), open scrubs 15.81%, croplands of 48.09%, water bodies 1% and settlements of about 1.44%.

Slope

26. Slope analysis has been made in respect of the catchment and command area of the project area with the help of remote sensing technology. The analysis in the Daudhan catchment found that slope range of 0-1% i.e. nearly level was 74%. Similarly in the command area it is 69 and 76 per cent respectively for Daudhan and link command.

Soils

27. The soils of the Ken basin have been broadly grouped into five categories namely Soil on hill and hill stages (Entisols), Plateau soils (Entisols, Inceptisols and Alfisols, Pediment soils (Entisols and Alfisols), Soils of level alluvial plain and flood plain and Soils of dissected flood plain.

BIOLOGICAL ENVIRONMENT STATUS

28. In pre-project scenario, there is no problem for flora & fauna in general. However, during summer, wild life including animals & birds face the problem of drinking water due to reduced flow in river & its tributaries.

SOCIO-ECONOMIC ENVIRONMENT STATUS

Agriculture

29. Agriculture is the main occupation of the population. Among cereals in the districts, wheat is the most prominent crop followed by maize and jowar. Among oil seed crops, sesame and soybean are the important crops. Among pulses Bengal gram and red gram occupy the important place among others.

30. In the nine connected districts of Madhya Pradesh, substantial area is under irrigation through wells. Chhatarpur, Tikamgarh and Katni districts have large number of tanks. Maximum number of land holdings in all the connected districts belong to marginal farmers (less than 1 ha) followed by small farmer (1-2 ha). Big farmers are maximum in Damoh district (10-20 ha).

Literacy

31. Total literacy in the project area districts of Madhya Pradesh varies from 46.27% in Damoh to 77.12% in Narsinghpur. Female literacy in Madhya Pradesh varied from 30.46% in Damoh to 68.46% in Narsinghpur. The percentage of male literacy varied from 58.9% in Panna to 96.12% in Narsinghpur. In Jhansi of Uttar Pradesh the total literacy is 54.94% out of which male literacy is 66.19% and female literacy is 42.02%.

32. Infrastructural facilities like road connectivity, power, post office, telephone, theatre are available to a major extent in all the districts under the project area.

Public Health and Drinking Water Supply

33. The public health facilities in the districts pertaining to Ken-Betwa link project in Madhya Pradesh are average to below average. The medical and health facilities in the districts are covered through the government and private hospitals at the district level. While at block/tahsil level the primary health centers take care of the medical services. Private allopathic doctors and Registered Medical Practitioners are also available.

34. In many of the districts, efforts are being made to provide protective drinking water supply to as many numbers of villages as possible. Mainly water supply is through taps and pumps.

35. The villages in the area are lacking in drainage system. Even in semi urban area open drainages prevail. Open air defecation is still a common sight in the villages in the project area. Many children in rural area are suffering from malnutrition due to under nourishment.

Geological Aspects

36. The Daudhan dam and reservoir area comprises of very hard, compact and dense quartz – arenite which appear to be very competent from the foundation grade point of view. The Dam bed area is occupied by inter-bedded sequence of arenaceous and argillaceous sediments represented by hard, compact and massive sand stone on left flank, thinly bedded sequence of sand stone silt stone and shale exposed sparingly in the river section and thinly bedded to laminated porcellanite with black shale and schist on the right flank.

Seismicity

37. According to the Seismic Zone map of India, the project area of Daudhan dam and its neighborhood lies in zone – II. Historically and instrumentally recorded data on earth quakes show that the area of Daudhan reservoir project and its neighborhood fall within Narmada zone lineament zone which passes through Central India from West to East and is seismically active. The region experienced earth quakes up to magnitude of 6.5 on Richter scale.

IV. ENVIRONMENTAL IMPACT ASSESSMENT

AIR ENVIRONMENT

38. The present air quality is quite normal in the project area. The maximum increase in SPM, SO₂ and NO_x will be 3.3%, 21.53% and 20.0% respectively. The proposed activities creating air pollution such as fugitive emissions from drilling, excavation, tunneling etc have marginal adverse effects with respect to air quality.

39. The study of the existing noise levels indicated that they ranged between 48 and 51 dB (A) during day and 40 to 41dB (A) during night. The existing noise levels are within permissible limits. During construction period the noise levels may increase to 70 to 95 dB (A) for which necessary management measures are required.

WATER ENVIRONMENT

40. Water pollution is due to presence of some contaminants that produce a change in its physical, chemical or biological characteristics that can harm the health and welfare of living organisms or natural systems.

Changes in the Regime of the River

41. The design peak flood of 57202 cumec is moderated for Daudhan dam. The FRL of Daudhan dam has been fixed as 288.0 m, which is 53 m above the present pond level of Gangau weir existed at 2.5 km down stream of the site. No major change in the regime of Ken River due to Daudhan dam is anticipated. In case of Daudhan reservoir due to hydro chemical river regime, the water quality in reservoir may improve in view of the process of natural purification resulting from sedimentation, dilution, destruction of organic substances

Change in the Hydrological Cycle

42. Necessary provisions are made towards ecological purposes. The existing ground water resources in the catchment area will not be affected in view of the storage. Hence impact due to change in the hydrological cycle are not anticipated. An attempt has been made to visualize qualitative changes in hydrological cycle and river regime due to creation of Daudhan Reservoir. The creation of Daudhan Reservoir modifies river flow down stream of the dam. The water storage in the reservoir affects natural hydrological regime, volumes of river flow, alluvial river flow, hydro chemical regime, thermal regime, and ice regime and ichito fauna. Due to impounding of water in the reservoir and sustained irrigation the groundwater recharge will improve around the reservoir and the command area. The level

groundwater in some parts of the proposed command area during post monsoon season is less than 2 m. Such areas are susceptible for water logging and resultant salinity problems.

Pollution due to Agro Chemicals

43. Spurt in cultivation of high yielding varieties with application of fertilizers and plant protection chemical lead to pollution of soil and ground water. Necessary measures of management are suggested under EMP.

Acidification of Lakes and Water Bodies

44. The rocks and minerals in the catchment area comprise rocks like alluvium, sandstone, shale, bauxite, basalts, dolomite and quartz. Granite is occurring to a limited extent on the surface. As per the National Bureau of Soil Survey and Land Use Planning the percentage of organic carbon in the area is in the range of 0.12% to 2.0%. No significant rich mineral deposits are identified in the catchment area. The impacts due to acidification of the reservoirs are expected to be negligible which will still be reduced by sewage treatment measures.

Impact on Water Quality

45. The major sources of impact on water quality are sewage from labour colonies and effluents from crushers and other sources. Minimum flow in the Ken River of about 1.16 cumecs is adequate to dilute the untreated sewage. Hence the impact on the surface water quality is negligible, which will still be reduced by sewage treatment measures.

Eutrophication

46. This occurs mainly due to the disposal of nutrient rich effluents from the agricultural fields into the reservoir. The agrochemical dosing is low in the area due to considerable rainfed cultivation existing to a major extent. The eutrophication risk for Daudhan reservoir is of low intensity due to decay of forest produce in submergence area and diamond mining activity. The necessary management plan for reducing the risk of eutrophication has been suggested. Proper deforestation of submergence area will mitigate the risk of eutrophication in Daudhan reservoir.

Impact on Groundwater Quality

47. The existing quality of groundwater in terms of salinity is within permissible limits. Based on the chemical analysis of water samples in the phreatic aquifer, the groundwater is good and fresh.

Pollution Due to Seepage from Reservoir

48. The reservoir is covered by semi quartzitic sandstone which is compact and hard. Hence the possibility of leakage from the bed of the reservoir can be considered negligible. Also the submergence area is mostly covered with different types of vegetation in addition to small arable lands. The entire length of link canal is proposed to be lined. Hence the possibility of ground water pollution due to seepage appears to be negligible.

Impact on Drainage System

49. The submergence area due to the dam encroaches some of the tributaries and streams which are likely to deposit silt at their mouths. This will be minimised with catchment area treatment measures. Link canal crosses several rivers and rivulets during the course of its 218 km length. Cross drainage works will be provided to these streams and hence the impact is negligible. Even on drainage in the command area, no impact is anticipated.

LAND ENVIRONMENT

Impact on Land Use/ Land Cover

50. Excavation of material of from different quarries for construction of dam produce depressions, etc which will naturally change the micro topography of the area. About 19.50 MCM of muck is estimated to be generated including Daudhan dam, Link Canal and Ken LBC system. Of which about, 9.20 MCM is utilizable for the construction activities. The muck generated and to be disposed to the extent of 10.30 MCM causes several adverse impacts like dust generation, breeding of mosquitoes in the stagnated water area besides land slides in certain cases. Hence the quarries are to be treated properly and the management of muck generated is to be planned suitably. In respect of Daudhan dam on Ken River the area of submergence is about 2.98 per cent of the Ken command (MP) and Link canal.

Change in Land Use in the Command Area

51. In the Ken command area, presently about 0.26 lakh ha area is having irrigation facilities. This will increase to 3.232 lakh ha of annual irrigation excluding UP commitments. Under link canal the existing irrigation facilities for 5320 ha will boost up to 60,294 ha due to the Phase-1 project. Hence the proposed projects will have a positive bearing on the change in land use as far as command area is concerned.

Reservoir Induced Seismicity

52. The project area falls under seismic zone - II. The faults in the area appear to be water tight as opined by experts. The results by seismic refraction method for arriving at the classic behavior of the bed rocks at dam site indicate that they are of good quality.

Reservoir Induced Salinity/Waterlogging

53. It is observed that the water quality parameter values which induce salinity are well within permissible limits. In respect of groundwater also, the various factors likely to induce salinity is within permissible limits in Ken and Upper Betwa basins. Proper drainage management and conjunctive use of surface and ground water shall be planned to reduce the effects of waterlogging which is indicated under EMP.

Impact due to Mineral Sources

54. No minerals or injurious minerals which may change the quality of the reservoir water are available in the submergence area. Thus no impact is predicted.

Impact due to Soil Erosion

55. Soils of the command area formed by parent material such as quartzite, granite and sandstone. Major portion of the command area is covered with sandy loam to sandy clay loam, rest of it is under clay loams and clay. The topography is nearly level to gentle slopes. The soils possess slight to moderate erosion which may come down due to intensive irrigation during operation period.

BIOLOGICAL ENVIRONMENT

56. Daudhan reservoir cause submergence of 9000 ha and hence pose greater risk to terrestrial flora and fauna. Due to the Daudhan dam 5258 ha of forest area including submergence of National Park in 4141 ha of land is going to reduce the habitat of the wild life park to the extent of 7.67 per cent of the total area of the Park (54300 ha). The reservoir could have formed a barrier for migration or movement of the wild animals, but it is good that tigers are reported to have their shelter on right bank of the river only. Major part of National Park is on right bank of river.

57. The change in habitat is not very significant except for the wildlife of Panna National Park. There are no known migratory routes for birds including the occasional visitors. The access for food and shelter for the habitat may not be severally affected due to the project on the other hand; the animals would get plenty of water so that they don't need to venture out of forests during summer for water.

58. The Daudhan reservoir is capable of effecting the distribution of Tigers since the Tiger reserve of 4141 ha (National Park) will be submerged. But at the same time, the reservoir may prevent encroachments of the park and invasion by livestock so that a relatively more secure and compact habitat is formed on Right flank of Daudhan dam which may be beneficial.

Aquatic Environment

59. None of the species of aquatic plants comes either under rare or endangered or endemic or threatened categories (REET). Interlinking of these basins through link canal will facilitate rapid migration of the fish easier. Formation of reservoirs, creation of irrigation facilities and changes in cropping pattern are likely to favour aquatic communities including fisheries. The Daudhan reservoir can be used for development of fisheries. The fish has a tendency to migrate upstream. The inter linking of rivers provide another route for fish migration from Yamuna to Betwa and ultimately from Betwa to Ken. Further, the distance from Duadhan dam to the place of confluence of Ken with Yamuna is longer as compared to the distance from the place of confluence of Betwa with Yamuna and Daudhan dam through link canal. Thus, this route will facilitate rapid migration of fish.

Impact of Growth of Aquatic Weeds

60. As long as the flow of water is rapid, the rate of growth of aquatic weeds is lower. When the water is impounded and the nutrient load of water is higher, it triggers eutrophication. The problems are manageable through bio-manipulation of reservoirs. However serious problems are not anticipated since the Ken river is less polluted. In case of excessive growth of aquatic weeds, they can be managed by introduction of certain fishes like gumbusia or by controlling the fish that feed on herbivores.

Impact due to Changes in Ecological Functions of the River System

61. The major change in the function of the river system results from the transformation of lotic to lentic body. Stagnated body can get rid of their pollutants by sedimentation while lotic body carries its load of pollutants downwards.

SOCIO-ECONOMIC ENVIRONMENT

Impact on Sensitive Locations

62. The Daudhan reservoir submerges ten villages including land physically possessed by the affected families, homes, cattle sheds etc. Public properties like school, panchayat buildings and committee lands etc. also affected. Survey of the area indicated that the affected villages do not have places of historical importance. Also, the submergence area do not affect any religious places of national importance expect for few local temples which can be established in the new proposed settlement colonies.

Impact on Tourism

63. The Panna Tiger Reserve area coming under submergence is mainly located in right flank of dam covered by steep hills, dense forest. Hence the dam site and its surroundings are not a major attraction for tourists. Presently most of the tourists visit the Pandava Falls and only Plateau regions of the National Park where open gross land with abundant numbers of herbivorous. These areas are in downstream of Daudhan dam and will not submerge. On the other hand, reservoir is going to become a tourism attraction when impounded with water. There are several tourist spots around the proposed Daudhan area due to which the project site develops into a good tourist resort which is a positive impact.

Public Health

64. Malaria is already prevalent in the area. The condition during construction and operation phase will favour the spread of Malaria and gastroenteritis. There is scope for spread of STD and HIV diseases.

Change in Occupational Pattern

65. The resettlement and rehabilitation will result in change in occupational pattern. There will not be a remarkable change in the pattern and it could be considered as low.

V ENVIRONMENTAL MANAGEMENT PLAN (EMP)

66. The EMP comprises Catchment Area Treatment, Land Management, Command Area Management, Bio-Diversity Management, Surface and Groundwater Management, Public Health Management, Environmental Monitoring Programme and Disaster Management.

CATCHMENT AREA TREATMENT

67. The catchment area treatment involves understanding the erosion characteristics of the terrain and to suggest remedial measures to reduce the erosion rate. In the present study Silt yield Index Method developed by AISLUS is followed. Prioritisation of the smaller hydrologic units (sub water sheds) has been done as per the methodology developed by AISLUS. Sub water sheds categorized as very high and high priorities are proposed for various treatment measures. An amount of **Rs. 3091.13 crore** is earmarked under this item which include the following four components.

a) Forestry and Silvi Pastoral Measures –Afforestation /Reforestation

An area of 49031 ha will be treated with afforestation/Reforestation in the open scrub forest and open scrub areas. Target shall be achieved in a period of 7 years. The cost of afforestation at the rate of 300 - 500 plants per ha works at to Rs. 27,000 per hectare. Choice of species shall be as indicated by Forest department. The above measures cost **Rs. 132.39 crores**.

b) Soil and Water Conservation Measures – Engineering / Mechanical Works

Engineering measures are to be adopted to prevent washing away of the soil by large volume of run off thereby to establish vegetation in the gullies. The measures include Double Row Post Brush dam, Loose Boulder check dam, Staggered Trenches, Mini Percolation tanks and Bench Terracing. Total cost for the above proposed measures is worked out as **Rs. 41.11 crore** for Daudhan and Link canal projects.

c) Reservoir Rim Treatment

Construction of dam across Ken river near Daudhan village impounds 2853 MCM of water at FRL/MWL + 288m. Wide water spread areas are formed due to this reservoir which is 9000 hectares. Along the periphery of the water spread area green belt with foreshore plantation is proposed to be developed. The periphery line beyond the MWL will be in submerged condition for a few days only during flood period and will be vacant during other period which is estimated to the tune of 956 ha.. This area will be utilized for plantation. Cost of development of greenbelt with foreshore plantation along the reservoir rim is **Rs. 2.59 crore**.

d) Compensatory Afforestation Plan

The total forest area under submergence of the proposed Daudhan reservoir and K-B link canal is taken as 5258 and 170 ha respectively. Assuming that non forest land is not available, the area for raising compensatory afforestation would be 10516 ha and 340 ha for the above two since non-forest area could not be provided. Modest rate of Rs. 50,000 per ha reckoned for working out in the cost of compensatory afforestation, keeping in view of the data from Madhya Pradesh Forest Development. The provision for the cost of afforestation alone works out to **Rs. 54.28 crore**. The total cost estimation for compensatory afforestation will also include cost of deforestation (*Rs. 26,250 per ha*) and cost of land acquisition (*Rs. 1,22,000 per ha*), NPV cost for Terrestrial Forest of 1287 ha (*Rs. 8.87 lakh per ha*) and NPV cost for Panna National Park of 4141 ha (*Rs. 88.70 lakh per ha*) in the total estimated submergence of 5428 ha of forest land. Hence the total cost of Compensatory Afforestation is **Rs. 2,915.06 crore**, of which the NPV alone accounts to 94.30 per cent.

LAND MANAGEMENT PLAN

68. Land Management comprises of formulation of plans towards mitigative measures identified in the fields of catchment area, command area and other aspects. Aspects of land management not covered above are dealt with under this plan. They are a) Muck disposal plan b) Restoration of quarry areas, c) Transportation of silt across river basins, d) Free fuel to labourers, e) Landscaping of project sites, f) Tourism development and g) Protection of sensitive and archeological monument sites. The total provision for land management has been estimated at **Rs. 26.01 crore**.

COMMAND AREA MANAGEMENT

69. The Ken-Betwa link project is contemplated to provide annual irrigation facilities in Chhatarpur, Panna and Tikamgarh districts in Madhya Pradesh; Mahoba and Jhansi districts in Uttar Pradesh. The total provision for command area management has been estimated at **Rs. 265.55 crore**. In addition an amount of **Rs. 71.625 lakh** will be required for demonstration of pressure piped irrigation system in the command areas of link canal and Daudhan reservoir. The details are as follows:

Land Leveling and Shaping and Field Channels: Ken command area and Link Canal Command Area in Madhya Pradesh require land development for the areas going to be brought under irrigation newly. The development includes land levelling, sloping, construction of field channels and water courses, besides a drainage plan. The total land requiring levelling is estimated as 104,221 ha. The corresponding provision of **Rs 229.29 crore** was provided at the rate of Rs 22,000 per ha.

Provision for Drains: Density of surface drainage in the command area was worked for Ken command and command of Link canal and is 19.48 and 15.37 m/ha respectively. Surface drainage density is observed to be comparatively low in respect of Link canal command area. Area requiring drainage in the command areas is estimated to be 90,655 ha. The total financial requirements for providing natural drains is worked out to be **Rs. 36.26 crore**.

BIO-DIVERSITY MANAGEMENT PLAN

70. Department of Forests & Wildlife, Madhya Pradesh shall take up the work of Bio-diversity conservation under the direct administrative control of the Principal Chief conservator of Forests / Chief wild life warden. Also a committee under the chairmanship of Principal Chief Conservator of Forests, Madhya Pradesh shall govern the conservation work along with renowned ecologists / conservationists / local NGOs and a Central Government representative of MOEF. The total cost provisions of the plan including Fisheries development plan is about Rs. **40.00 crore**.

a) Conservation and Management of Mahasheer in Daudhan Reservoir

There is a proposal to develop carp based fisheries in Daudhan reservoir with an anticipated production of 470 MT/ year providing livelihood to 500 fishermen families. The total cost estimation worked out to **Rs. 332.40 lakh** in order to place the regular stocking of fingerlings, putting a screen at spillway and sluices and control over Mahasheer angling through sport licensing.

b) Habitat Improvement in Panna Tiger Reserve Forest

Panna Tiger Reserve Forest area to a extent of 4141 ha will be submerged due to the formation of Daudhan reservoir. In addition to the compensatory, afforestation in lieu of this diversion, the project

authorities shall provide funds to the extent of **Rs. 1200 lakh** for habitat improvement in the balance area of Panna Tiger Reserve Forest. The plan will be prepared by the wildlife department of Madhya Pradesh Government.

c) Conservation of REET Species

Funds to a tune of **Rs. 1000 lakh** are required for conservation of REET species in the submergence area. Detailed plans will be prepared by the bio-diversity board, Department of Forest, GOMP.

d) Research Grant

The project authorities will be provided research grants to an extent of **Rs. 200 lakh** to the universities for research work directed towards bio-diversity improvement in the project affected areas.

e) Fisheries Development Plan

Fish production from the reservoir will be increased steadily on a sustainable basis to attain a yield of 60 tones on full development by adopting the measures suggested. The project will generate employment to 500 tribal fishermen on regular basis. It will also provide employment to another 30 tribal families on ancillary activities. The project will provide engagement to women folk in fish vending, net making, mending, pattas and basket making etc. besides encouraging them to take up integrated farming. In addition it is proposed to construct and run carp and mahaseer hatcheries at a cost of **Rs. 364.40 lakh**. The total cost of fisheries development plan is **Rs. 962.72 lakh**.

f) Green Belt Plantation (Canal bank Plantation)

It is also proposed to take up green belt plantation on either side of the canals with unit cost of Rs 26,000 per ha in about 933 ha. Accordingly the total estimated cost is **Rs. 242.58 lakh**.

GROUND WATER MANAGEMENT PLAN

71. About 35337.15 ham of groundwater is available for harnessing in the Ken command area. will be available for extraction. About 14000 tube wells in the Ken and Link canal command areas are feasible. The average unit cost of one tube well is estimated to be Rs 45,000 and therefore, the total cost of the wells including equipment works out to **Rs. 63.00 crore**. The total cost for groundwater harnessing including 0.20 crores for modeling and conjunctive use studies is estimated to be **Rs. 63.20 crore**.

PUBLIC HEALTH MANAGEMENT PLAN

72. It is proposed to provide mobile units at important districts like Chhatarpur, Tikamgarh, Jhansi and Mahoba with necessary staff. Supply of protected drinking water supply in the temporary labour camps during construction phase is necessary. About 106 villages in the link canal area covering 6.28 lakh people require protected drinking water supply. Sewage waste disposal also has been proposed in the construction period. Public health measures includes Administration and equipment, Protected drinking water supply along link canal villages, Sewage waste disposal, STD/HIV/AIDS Control and Amenities during construction period like a) Water facility, b) Sanitation facility, c) Cooking places, d) Health facilities and e) Baby care centers. The total cost provision made for the Public Health Management. Plan works out to **Rs 50.20 crore**.

ENVIRONMENT MONITORING PROGRAMME

73. The total financial requirement for environmental monitoring under the project is assessed to be **Rs. 5.62 crore**. The various environmental parameters that need to be monitored during the construction phase are effluents from septic tanks, air quality, land use and ecology in relation to water borne diseases. Provision for testing the contents of sewage before and after treatment on monthly basis and others on season basis was recommended. Total provision made under the programme during the construction is **Rs. 135.17 lakh**. Similarly during the operation phase water quality, effluent from sewage treatment plant, water-related diseases, soil erosion and siltation, aquatic ecology and Land use pattern are proposed for monitoring. A total of **Rs. 427.00 lakh** had been budgeted for undertaking environmental monitoring under the project.

DISASTER MANAGEMENT PLAN

74. Both hardware and software aspects need to be integrated into the design of emergency management. The budget for different management activities required to be carried out for mitigation and prevention of dam break is **Rs. 60 lakh**. The provisions for various activities include are Installation of alert systems, setting up of control room etc. (**Rs. 25 lakh**), Setting up of communication system (**Rs. 10 lakh**), Setting up of emergency response organization (**Rs. 10 lakh**), Public information system (**Rs. 10 lakh**) and Training and other miscellaneous (**Rs. 5 lakh**).

EMP COST

75. The cost of EMP proposed in the present study is **Rs. 3,543.98 crore** covers land environment including catchment area treatment and compensatory afforestation, command area management, bio-diversity management, public health management, and noise environment management, groundwater management and environment monitoring programme.

VI RESETTLEMENT AND ECONOMIC REHABILITATION PLAN

Need for R&R Plan

76. Like most of the Water Resources Projects in the Country, Ken-Betwa Link Project will also submerge some of the area in 10 villages of the proposed Daudhan reservoir. It is, therefore, proposed to prepare R&R Action Plan so that Project Affected Persons/Families (PAP/PAF) can be provided proper package. National Policy on R&R – 2007 as well as R & R Policy of Govt. of Madhya Pradesh has been taken into consideration for preparing this action plan. Normally, this plan is seen by Ministry of Environment & Forests before giving Environmental clearance. However, since in this case, tribal population is also affected in Daudhan, thus R&R Plan will also have to be referred to Ministry of Tribal Affairs (MOTA).

Involuntary Displacement

77. The Ken-Betwa Link Project (Phase-I) would affect the houses and lands, both patta and Government lands, due to submergence and construction of irrigation infrastructure and such aspects are required to be assessed as per the State Land Acquisition Act.

78. The project displaced persons are required to be resettled nearer to project area and are rehabilitated as per the provisions of National R&R Policy 2007 and Madhya Pradesh R&R Policy 2002.

SOCIO-ECONOMIC ENVIRONMENT

Submergence of Lands

79. The construction Daudhan reservoir under the project results in submergence of 2,171 ha of land. In addition about 4,209.67 ha of land is required and to be acquired for Link Canal (2,492.32 ha), Ken LBC (1,706.36 ha) and power houses (11.00 ha). In addition to this about 42.37 ha of land is required for township, Housing plots, Infrastructure and civic amenities and green belt. The creation of the Daudhan reservoir results in the submergence of 10 villages. All the villages coming under submergence due to the construction of reservoir are located in Chattarpur district of MP. The number of households in these affected villages was in the range of 46 to 438 per village.

Project Affected Villages

80. The Project Affected Villages are those villages where the Government lands, private lands or both have to be acquired for construction of the proposed Phase-I Ken-Betwa Link Irrigation Project. There are 10 project affected villages and their total geographical area. About 1585 household families are going to be affected due to construction of Daudhan reservoir.

Demography

81. The total population of these 10 villages is 1585 as per the door to door survey. The sex rate is 866 females per 1000 males in the study area.

Literacy

82. The literacy rate of the study area is 37.4%. The male literacy rate (42.3%) is about 10 percent higher than the female literacy rate of 31.4%. Among all the villages, Shahpura has the highest rate of literacy at 40.9 % in Daudhan submergence area.

SC and ST Affected Households

83. The SC and ST population is present in 4 and 9 villages out of 10 project affected villages respectively, in the study area. Against the total population of 7,224 of the study area it was found that over-all percentage of SCs and STs to be 13.3% and 36.1% respectively.

Occupational Distribution

84. The occupational distribution of the workers indicated that the prominent occupation is agricultural labour which accounted for about 56.38% of total workers and is followed by cultivators (38%). All other services account for 2.07 % ranks as the next important category followed by livestock (0.66%), trade and commerce (0.65%) and industry (0.04%). About 63% of the female workers are engaged in agriculture labour while 52% male workers are dependent on it. The percentage of cultivators among the male workers is 41.69 % and is higher than the corresponding percentage of 32.86 % among female workers.

Livestock

85. The project is dominated by cows and goats with 5 and 6 animals per household respectively. To a lesser extent, it is he-buffaloes (0.13) and sheep (0.18).

Agricultural Implements

86. Agricultural implements of the project area mainly consists of Yolks, electrical pumps and diesel pumps

Income and Expenditure Pattern

87. The average gross household income per annum of the project affected families is assessed to be Rs 54,837 for Daudhan. The major source of the income for the project families is from the Agriculture based activities which accounts nearly 90% of the overall income, followed by selling of Minor Forest Produce (8%). Similarly the major part of the expenditure was on Food (36.64%) and some sort of recurring costs on Agriculture and livestock (24.63%). It was interesting to note that about 10 per cent of the expenditure was incurred towards health.

Housing

88. The major part of the project submergence area falls in Semi pucca houses category. This category of housing accounted for about 65%, where it is covered tiles and followed by kutcha (huts) houses made of agricultural waste covered roof which accounts to 33% and very small percentage (1.26) of houses are pucca houses.

Age Distribution

89. The age-distribution of household population of the 7224 affected households (1585) indicated that the children up to 6 years of age formed 12.06 percent of the total population while persons above 60 years of age constituted 4.84 percent. Thus, the young and old people together accounted for about 17 percent of the total population.

RESETTLEMENT AND ECONOMIC REHABILITATION PLAN

90. National Rehabilitation and Resettlement Policy – 2007 formulated by The Department of Land Resources (DLR), Ministry of Rural Development (MORD), Government of India (GOI) and further, the Department of Rehabilitation (DOR), Government of Madhya Pradesh (GOMP) formulated a policy known as "Ideal Rehabilitation Policy of Madhya Pradesh – 2002 (IRPMP-2002)" was compared and the best possible entitlements are made to PAFs. On comparison it was noticed that NRRP – 2007 provided for better assistance to PAFs as compared to those of IRPMP except for the following two aspects. All major sons in a joint family are to be treated as separate families and will be entitled for all R & R benefits; and All major unmarried daughters in a family are to be treated as separate families for provision of R & R benefit.

91. The Project Affected Families have been identified on the basis of the following:

- (i) All families who have been physically displaced due to submergence of house/ house site;

- (ii) Families who lost substantial i.e more than 50 per cent of land holding and left with less than 5.0 acres (2.0 ha) of dry land or 2.5 acres (1.0 ha) wet land;
- (iii) Families rendered land less after land acquisition for construction of reservoir;
- (iv) Families whose land loss was less than 50 per cent of total land holding and left with less than 0.2 ha of land i.e deemed to be functionally landless ;
- (v) Vulnerable persons such as the disabled, destitute orphans, widows, un-married girls, abandoned women or persons above fifty years of age who are not provided or cannot immediately be provided with alternative livelihood and who are otherwise not covered as a part of family ; and
- (vi) All major sons and unmarried daughters in a family are to be treated as PAFs.

Identified Project Affected Families

92. The total affected families (1585) of Daudhan dam are located in ten villages. The total number of Project Affected Families in six villages due to Daudhan dam is assessed to be 806. However, the likely project affected families from four villages, namely Mainari, Kharyaru, Palkoha and Daudhan are located in Panna Tiger Reserve are to be rehabilitated as per the provisions of the National Tiger Conservation Authority (NTCA) by the State Forest Department. The number of households in these four villages is assessed to be 779. Therefore it is only 806 project affected families and there are no other affected families in the project affected villages.

93. Backward communities accounted for 38.3% of the total PAF households with 607 households and was followed by the STs (557 HH), OCs (212 HH) and SCs (209HH) and with 35.1, 13.4 and 13.2 percent respectively. The action plan is prepared for these households for payment of land compensation for the land acquired. Further an economic rehabilitation plan for the identified PAFs of reservoir system is also prepared. The Economic Rehabilitation of the PAFs is made as per best of the National Rehabilitation and Resettlement Policy 2007 and IRPMP - 2002. On comparison of the both the policies, it was found that all the entitlements are more in National policy than MP policy, therefore, adopted the provisions as per National Rehabilitation and Resettlement Policy 2007.

- i Housing grant of Rs. 40,000 for each displaced BPL, PAF household.
- ii. Each affected family that is displaced and has cattle shall get financial assistance of Rs. 15,000
- iii. Each affected household that is displaced shall get one time financial assistance of Rs. 15,000 for construction of cattle shed.
- iv. Each affected family that is displaced shall get one time financing assistance of Rs. 10,000 for shifting of the family, building materials, belongings and cattle.
- v. Financial assistance of Rs. 25,000 per each PAF household who is a rural artisan, small trader and self employed person and Rs. 40,000 agricultural or non-agricultural labour.
- vi. Displacement grant of Rs. 15,360 for each PAF and major sons who has lost his house or house site.
- vii. Provision of land to land to the extent of land acquired, to the ST and SC PAFs.
- viii. Financial assistance to the extent of
 - a) Rs. 48,000 whose total holding is acquired or
 - b) Rs. 32,000 if he becomes a marginal farmer (< 1.0 ha) after land acquisition or
 - c) Rs. 24,000 if he became a small farmer (>1.00 ha and <2.0ha) after land acquisition.

94. All the above entitlements have been worked out on the basis of the guidelines issued by the MORD, GOI and GOMP at the prevailing (during 2006-2007) minimum agricultural wage of Rs. 64/- per

day per person. The best R&R policy out of MP Government and Central Government has been adopted.

The R & R Cost

95. The cost of relief, resettlement and rehabilitation of the affected households under the Ken-Betwa Link Project has broadly three major components : i) land compensation; ii) resettlement and economic rehabilitation of displaced persons ; and iii) economic rehabilitation of PAFs who have lost only land but not house / house site.

Land Acquisition

96. According to the Socio-Economic Survey, a total of 6,380.67 ha of patta land has to be acquired in respect of Daudhan reservoir for submergence (2171.00 ha), K-B Link Canal(2492.32 ha), Ken LBC (1706.36 ha), and Power Houses at Daudhan (11.00 ha). In addition about 38.37 ha for township and 4.0 ha for green belt may be required. It is also proposed to provide land to land compensation to ST and SC PAFs by purchasing the land in the command area of the project from private land owners on mutual negotiation basis. This is proposed since no suitable government land is available in the command area of the project for this purpose. The estimated land requirement for this purpose is about 358 ha. Thus, the total land acquisition required for the project is estimated to be 6,423.04 ha. However, the cost of land acquisition is estimated for 6,781.04 ha only, since land to land compensation is proposed for the ST and SC PAFs. The displaced persons will be settled in colonies near the areas where the affected persons are currently staying. Necessary provision has been made for housing plots, infrastructure like schools and other civic amenities.

97. The average cost (which is arrived from the village level rates) of involuntary acquisition of irrigated land varied between Rs. 2,30,000 and Rs 350,000 per ha and for un-irrigated and unculturable land between Rs. 61,000 and Rs 1,80,000 per ha in Daudhan reservoir submergence area, Link canal and Ken LBC system Canals. The other provisions in the land acquisition include solatium of 30 per cent for compulsory land acquisition, Standing Crop loss, interest, demarcation, legal and establishment charges. Also lump sum provisions were made towards rent for use of land prior to acquisition, rehabilitation measures, compensation for temporary acquisition of borrow area, provision for branch canals. The total compensation for land acquisition is estimated to be **Rs. 314.28 crore**.

Resettlement

98. The implementation of the Phase-1 of Ken-Betwa Link Project results in the involuntary displacement of 806 families as their houses get submerged under the reservoir. The establishment of colonies including assistance for house construction, schools and other infrastructure is estimated to cost **Rs. 3.45 crore**.

Economic Rehabilitation

99. The Economic Rehabilitation package for 806 PAF households identified under the SES is estimated to cost about Rs. 8.11 crore. However, this amount excludes the grant for house construction which has already been taken into account under the resettlement plan. Further, a margin of 5 per cent is allowed in the indicative budget to meet any additional claims that might arise when the actual implementation of R & R programme is taken up. Thus the total cost of economic rehabilitation

programme of PAF households would be about **Rs. 8.52 crore** including an indicative budget of Rs. 0.41 crore.

Compensation to Properties

100. Under the R & R, compensation for loss of properties of PAFs like houses and cattle sheds has been provided. In addition to the loss of 806 houses and an additional 5 per cent budget has been included in the Indicative Budget. Out of the 4251 houses it was found that 271, 2989 and 991 are Pucca, Semi pucca and Kutcha and the provisions made are Rs. 1.25 lakh, Rs. 0.5 lakh and Rs. 0.10 lakh respectively. Budgetary provision for loss of 419 cattle sheds, 967 productive trees and 40 farm houses at the rate of Rs. 15,000 per house, Rs. 3,000 per tree and Rs. 5,000 per farm house have also been made. The total cost for compensation of properties works out to **Rs. 5.88 crore**.

Land for Colonies during Construction

101. The Ken-Betwa project is a very big project and takes comparatively longer time for construction. Keeping in view of the smoother and safer execution of the project it is essential that the following item has been provided with provisions namely Colony Area (Residential and Non-Residential) including Stores, Approach Roads to dam site, Material Stock Yards (2 Nos), Working and Plant Area, Land for Switch Yard, Transformer Yard for Ph-1 and Land for Quarries All the items are also provided with solatium Charges (30 %), Interest charges for time lag for 2 years (9% per annum), Legal charges (1%) , demarcation charges (1%), and establishment charges (6.25%). Accordingly, the total cost for land and infrastructure during construction works out to **Rs. 1.60 crore**.

Total Financial Requirement

102. The total financial requirement for the implementation of Resettlement and Economic Rehabilitation Plan would be about **Rs. 333.78 crore**.

TRAINING

103. The cost involved for training departmental staff involved in EMP implementation may be drawn from the normal budgetary provisions of the respective departments. However, the personnel involved in R&R implementation are trained at the project cost. Therefore, the cost involved for training of the staff and the PAFs in particular only has been assessed. The training of beneficiary farmers may also be drawn from the agricultural extension budgetary provisions of agricultural department. The total financial requirements are to the tune of **Rs. 4.98 lakh** which includes training of R&R staff including NGOs (*Rs. 0.20 lakh*) and training of PAF and women groups.

ORGANISATION AND MANAGEMENT

104. The implementation of Environmental Management Plan (EMP) for Ken-Betwa Link Project involves various line departments like Irrigation, Agriculture, Forests, Public health, Electricity, Panchayat Raj and Rural Development, rural housing etc. The Institutional setup required and its functions are also defined at Government, Department and Project Levels. Also executing agencies like Revenue, Forest, Agriculture, Fisheries, Integrated Tribal Development Agency (ITDA), SC Corporation, Medical and Health, District Rural Development Agency, Electricity, Employment, Industry, Lead Bank, NGOs are described. Grievance Redressal Mechanism Committee shall include representatives from the project, Government land acquisition agencies, rural development agencies,

local NGOs, so as to take care not only of the issues of land acquisition but also provisions and entitlements of all affected households including non-titled and landless persons which go beyond the provisions of the LA act for their economic rehabilitation and resettlement under the project.

MONITORING AND EVALUATION

105. The successful implementation of Resettlement and Rehabilitation of Project Affected Families Economic Rehabilitation Plan requires continuous monitoring of the programme at different levels namely project/district and state levels. Therefore, a need for constituting state level and district/project level monitoring committees for overseeing the implementation of R&R plan of the project.

IMPLEMENTATION SCHEDULE

106. Timely completion of the project is of utmost importance for channelising the anticipated benefits out of the project. Any delay in implementation of irrigation development projects in particular would abnormally escalate the project cost resulting in delayed benefits and the cost of the project could ultimately overtake the benefits accruing from the project. Therefore, proper implementation planning is very essential for periodic monitoring; taking corrective and timely measures with a view to complete the work within the stipulated time frame. The Multi Purpose namely Ken-Betwa Link Project is scheduled to be completed over a period of 8 years including the concurrent implementation of the Environmental Management Plan (EMP).