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# Ghazi Barotha Power Project - A Case Study in Environmental Protection and Resource Reservation

**By**

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# GHAZI BAROTHA POWER PROJECT
# A CASE STUDY IN ENVIRONMENTAL PROTECTION AND RESOURCE ONSERVATION

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## INTRODUCTION

The 'Earth Summit' at Rio-de-Janeiro in 1992 caused the environmental issue to be highlighted in all future developmental projects, as well as economic and sectoral policy making in the world. As a result the World Bank and all the donor agencies decided that environmental protection and sustainability will be an integral part of all future major projects supported by them.

Because of the above policy, GBHP had the specific directive to include social and environmental mitigation plan in the basic design of the project, to tone down the adverse effects.

The Project Consultants are "Pakistan Hydro Consultants " (PHC), a consortium of four foreign and two local consulting firms. The monitoring consultants appointed by the World Bank for the initial implementation of the project in Aug '95 was a joint venture of TAMS of USA and ICEPAK of Pakistan. The World Bank, apart from its own supervision mission, has appointed an Environmental and Resettlement Review Panel (ERRP) to review the social and environmental planning and its implementation. Wapda Environmental Cell (WEC) with the help of monitoring consultants are required to monitor the social and environmental mitigation plan during pre-project, during project implementation and hopefully during post-project period. An NGO, Ghazi-Barotha Taaraqiati Idara (GBTI) has been inducted in the project area to act as a bridge between the project implementation staff and the project affectees.

I worked as a member of Monitoring Consultants team and have selected GBHP as a case study to highlight the judicious use of developmental activity for protecting and maintaining environmental quality to ensure resources sustainability in the long run.

## GHAZI-BAROTHA HYDRO POWER PROJECT (GBHP) - AN OVERVIEW

GBHP envisages harnessing the potential head offered by a steep length of the Indus river which starts below Tarbela Dam and extends through the Attock gorge. For this purpose a barrage, 7 km downstream of Tarbela Dam (near Ghazi village) is being built, which will feed a 54 km long power channel to carry about 1000 cumex of Indus river waters to the junction of Indus-Haro rivers (near Barotha village ) where a power-house is being built to generate approximately 1450 MW of electricity (see Anx A). The Power Channel water falling back in Indus river.

This power generation will be more environmentally friendly and sustainable as compared to the thermal power plants being established in the country. GBHP has been so designed that it keeps open the option of constructing Kalabagh Dam and hence it is a project acceptable to all the provinces.

## SOCIAL AND ENVIRONMENTAL EFFECTS OF THE PROJECT COMPONENTS

The major components of GBHP are the barrage, power channel and the power complex. A summary of the salient social and environmental effects as analysed by PHC are given below:

Effects of the Barrage

Downstream of the barrage site is used for watering livestock, washing, limited irrigation and sewage disposal. Little water is taken for drinking, reliance being placed on tubewells and dugwells.

The effect of the project on the flora and fauna of the river-rain area is expected to be minimal. The loss in the river-rain ecosystem because of barrage panel is expected to be balanced by the development of an aquatic system in this reach, by regulating the river flows and thus reducing the flood peaks. River-rain fisheries may be affected as a consequence of reduced dry season flows, but the barrage pool fisheries should be able to replace this loss.

At present Indus river is cutting the lands of the villages near the river bank on the left bank, downstream of the barrage site when constructed, the barrage will eliminate this scouring.

Provision of a bridge over the barrage will be an important regional benefit as it will reduce the present road distance between Ghazi and Topi ( Villages opposite each other on both banks of the river) by 10 kms. The sensitive crossing over the Tarbela Dam will also be avoided and the travel time from Rawalpindi/Abbotabad to Swabi/Mardan will also be reduced. Further, the bridge will boost the market economy of the area.

Effects of the Power Channel

By avoiding population centres, graveyards and shrines the potential adverse socio-economic effects will be minimised.

The alignment is substantially in cut, hence about 70 M cum of excess soil will have to be disposed off. For an environmentally satisfactory solution, the spoil will be used for channel embankments, terracing of wasteland, reclamation of land along the left bank of the river and filling deep gullies and nalas. The spoil banks and terraces will be levelled and covered with top soil and provided tubewell irrigation. These improved spoil banks will be sold back to the affectees.

Village surveys carried out to ascertain the views of the potential affects show that a majority will like to have land for land. The concept of spoil banks, however, has not yet appealed to the affectees, possibly because there is no existing model to convince them of its benefits, WAPDA has now decided to undertake a pilot project to demonstrate its practicability and convince the affectees.

To avoid safety hazards, chain link fencing will separate the channel from population centres. Other safety measures will be cattle grids to prevent live stock from wandering on the service road and accidentally falling in the channel, floating booms and grab rails will assist in climbing out of the channel, in case of an accidental fall. There will be 46 crossings over the entire channel length to facilitate flow of traffic on both sides of the channel.

Many seasonal nalas cross the channel alignment which experience flash floods in the rainy season. The nalas will be provided super passages over the channel with provision of over flow water falling in the channel, in case of abnormal floods.

Effects of the Power Complex

The effect of taking barani agricultural land for the power complex and head ponds will be mitigated by development of tubewell irrigation on more fertile river terraces.

The irrigated land near Barotha village which takes its supplies from small perennial flows in Barotha nala will have its supplies safely guarded. The head ponds can provide opportunities for fish development.

A bridge across the tailrace channel will ensure communications between the village and the lands to its south.

## POTENTIAL SOCIAL AND ENVIRONMENTAL EFFECTS

Effects on Health

Malarial mosquitoes and other disease vectors breed in pools along the Indus river bed and in water logged depressions in the Chhach plains. The project will reduce both these effects. The barrage pond and the head ponds will be poorly suited for mosquito breeding due to frequent changes in water level. Oriental sore could become a problem in construction workers, but can be readily controlled by destroying rodent burrows and residential insecticides in dwellings.

Archaeological Sites.

An archaeological study of the project area has been carried our. Two ,mounds of archaeological interest which fall in the alignment of the power channel have been excavated by the Archaeological department and a report submitted to all concerned. Necessary removal of finds will be done b the department. A chance finds procedure to deal with any chance find during excavation of the power channel/power complex has been prepared by the monitoring consultants. Graves and mosque located near the power channel alignment have been saved.

Law and Order.

The seasonal lowering of the deep stream could lead to increased incidents of social conflict in the Indus riverain. It could also stop being a barriers against unwanted intrusion from the right bank villages.

## MITIGATION AND RESETTLEMENT

Approach.

The purpose of a mitigation programme is to manage environmental effects in a manner that it minimises adverse impacts and maximises secondary benefits. As mitigation is a process of making a project more compatible with its environments, two approaches exists:

- To refine the project for reducing its effect on resources

Alter its environment to the same end

Planners prefer to keep the project in its idealised state and make compensatory changes in the environment, but many acts of mitigation take place before the first project component reaches its ultimate configuration.

Mitigation Actions Incorporated in Planning and Design of GBHP

The power channel alignment has been selected in such a manner as to avoid population centres, archaeological sites and cultural sites to the maximum.

The excavated spoil from the power channel (which is a very large quantity ) has been used to provide embankments, filling of deep gullies and nalas, levelling of terraces and preparing spoil banks with fertile top soil so that the spoil banks can be used for agriculture with the help of tubewells which will be sunk by the project funds.

Providing fair market price for land acquired for the project through 'Land Valuation Committees' and ensuring that land compensation process is transparent.

By providing land and three model housing colonies for the project affectees in the project area as experience of Tarbela Dam Resettlement has shown that a large majority of the affectees prefer to stay in the same area where their roots are. The model housing colonies have been provided water supply, sewage and electricity facilities as well as a mosque, school and dispensary in each model colony.

By providing maximum opportunities for employment on priority basis for the effecttees through the issuance of blue and green work permits. The green work permit will be issued to those affectees only who have no other means of livelihood once their land has been acquired.

Since the construction of the project is in a phased manner, the land acquired for the project will only be vacated by the affectees when ACTUALLY required for construction by the contractor. To ensure this an elaborate procedure has been work out in the Resettlement Action Plan.

Providing vocational training to the affectees and education and health measures as well as credit schemes for the women folk.

By providing numerous crossings over the Power channel to ensure that flow of traffic is not impeded on the existing routes from the villages towards the river bank.

By implementing an Integrated Regional Development Programme through the project NGO's for the general welfare and prosperity of the project area with special priority for the project affects.

## THE MONITORING PROGRAMME

The objective of the monitoring programme is to ensure that the Environmental Mitigation Plan and the Resettlement Action Plan are implemented as specified in the project documents. For this, Monitoring Consultants have prepared monitoring protocols for each monitoring task which will be

undertaken jointly by the Monitoring Consultants and The WAPDA environmental cell. The Monitoring Consultants formally advise WAPDA and the World Bank through monthly and semi-annual reports of both successes and problems encountered in the implementation of specified aspects of the proposed project.

Out of the total monitoring tasks prepared by the Monitoring Consultants, some have started during the pre-construction phase, the rest will be activated during the construction phase and some will remain for the Post Construction/Operation phase.

Monitoring Tasks Protocols

The Monitoring Consultants have prepared seven social monitoring tasks as follows:

SM-1 IRDP Programmes/Project NGO activities
SM-2 Land Acquisition and Compensation
SM-3 Housing Replacement for project affectees
SM-4 Spoil Bank Development and Allocation to affectees
SM-5 Hiring of the Labour and issuance of work permits
SM-6 Social change manifested in the Project Area
SM-7 Leasing of Borrow Areas and Compensation activities

For Environmental Monitoring, the following eleven environmental tasks have been identified:

EM-1 Surface water and groundwater monitoring design
EM-2 Eco-system monitoring design
EM-3 Sedimentation and erosion activity
EM-4 Archaeological salvage and chance find procedures
EM-5 Vector habitats, vectors and decease
EM-6 Power channel impacts on ground water movements
EM-7 Construction/Brotha construction area
EM-8 Waste water disposal
EM-9 Agricultural development
EM-10 Water compensation releases downstream of barrage
EM-11 Public safety

For monitoring of the above tasks, the methodology and resources required are given in the protocols and reporting is done through Micro Soft Computer Programming.

## CONCLUSION

The monitoring exercise carried out during from August 95 to March 97 has highlighted the following.

Land acquisition process has taken much longer than planned in the schedule, due to reluctance of affectees to accept the compensation awards as recommended by the land valuation committees fromed under the Resettlement Action Plan. As a result the handing over of land for power channel

construction to the contractor has been delayed. Secondly the housing colony planned at Feroze0Banda has been delayed due to non-availability of land for construction.

The cost of land compensation has increased more than twice than what was estimated in the plan, putting a big strain on the local component of the project budget (land compensation is to be paid from GOP funds and not from foreign project loan).

The proposed minimum flow of 28 cumex in the river channel after the barrage is completed is not being accepted by some of the local people and they are agitating to increase this minimum flow by almost ten times, which will have an adverse effect on the power generation.

The affectees generally are agitating that everyone should get employment, which is not possible as the contractor and WAPDA can employ only a number which is optimally required for construction and administrative duties. To ensure that the suitable persons get employment, blue and green permits have been issued to the affectees. The green permit holders get a higher priority for employment.

Since environmental protection has become a partner in project development for all large projects, specially those sponsored by WB and ADB, it is now incumbent upon all developmental agencies like WAPDA, irrigation department, communication and works department, to acquire the state of the art for Environment Assessment, Preparation of Environmental Mitigation Plans and Monitoring of Projects to judge the execution of the Environmental Mitigation Plans.

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