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1. INTRODUCTION

1.1 The initiative: Realisation of the Ghazi Barotha hydropower project

The Pakistan Water and Power Development Authority (WAPDA) intends to implement in the northern Indus river plain, between the tailwaters of the Tarbela dam and the confluence of the Indus and Haro rivers, an activity called 'the Ghazi Barotha hydropower project'.

The main objective of the proposed project is to meet the acute shortage of power in Pakistan. The intended project will utilize the fall of about 76 metres of the river along a distance of about 63 kilometres. The project includes three basic elements: a barrage, a power channel and a power complex. The project will have an installed generating capacity of 1450 MW. The power will be transmitted to WAPDA's national grid system.

The project area forms the Northwestern part of the Potawar Plateau. The predominant land uses in this area are arable land and pasture. Some hilly areas are allowed to remain under scrub forest. The Indus water is used for watering livestock, washing, bathing, and some sewage disposal. Little water is taken for irrigation or drinking water, reliance being placed instead on wells and tubewells. The project area contains many graveyards and shrines, as well as archaeological and historical sites. In general these type of projects have major impacts on water and land resources. In this project, the main effect will be the partial redirection of the flow in the Indus river. The direct and indirect implications for the local population (resettlement) are deemed to be at least of equal importance.

The feasibility and design studies were funded by UNDP and the Government of Pakistan, with the World Bank (WB) as the executing agency. The environmental assessment study has been prepared in accordance with the Environmental Impact Assessment Guidelines of the Government of Pakistan and the World Bank Operational Directives.

A Study Appraisal Report (SAR), evaluating all relevant studies with regard to the project, is being formulated. This SAR will be discussed at a meeting of the board of directors of the WB, probably by the beginning of April 1995.

1.2 Motive for and objectives of this review advice

In its letter dated 22nd of December 1994 (appendix 1) the Minister for Development Cooperation in the Netherlands has invited the Dutch independent Commission for Environmental Impact Assessment to perform an advisory review *on headlines* of the environmental assessment executive summary of the environmental and resettlement documentation for the project.

Objective of this advice is to review on headlines the environmental assessment executive summary of the Ghazi Barotha hydropower project¹] on the basis of Pakistan and international review standards.

This advice has been prepared by a working group of the Commission. The composition of this working group is presented in appendix 2. The group represents the Commission and will therefore be referred to as 'the Commission'. In the Commission the following disciplines are represented: civil engineering, ecology, agriculture, rural development and its environmental aspects, human settlements development and urban and regional planning.

1 Prepared by Pakistan Hydro Consultants in October 1994.

1.3 Guidelines used for this review

The environmental assessment study has been prepared in accordance with:

- ! the Environmental Impact Assessment Guidelines of the Government of Pakistan framed under Ordinance No. XXXVII (December 1983);
- ! the Antiquities Act (1975);
- ! the World Bank Operational Directives (ODs), the most applicable of which are OD 4.01, Environmental Assessment, and OD 4.00, Annex B, Environmental Policy for Dam and Reservoir Projects;
- ! the requirements of OD 4.30, Involuntary Resettlement, and OD 4.50, Cultural Property.

The review of the summary has been carried out according to the majority of these documents, completed with guidelines from the Asian Development Bank (appendix 3). These documents and guidelines do not contain site-specific elements. Nevertheless, the experience and acquaintance with the local situation in Pakistan of the working group members permitted to use the above mentioned documents and guidelines as a review framework. For this reason, it was not considered necessary to develop new site-specific guidelines, also because the summary was to be reviewed on headlines.

1.4 Handicaps experienced and approach adopted

In preparing the advice the Commission has experienced certain handicaps. The main handicaps, in order of importance, are:

! The (inevitably) limited information of an executive summary

The Commission was asked to review the environmental assessment executive summary for the Ghazi Barotha hydropower project *on main issues*. The summary mentions a great number of aspects and impacts of the intended activity but does not proceed to a quantitative analysis of these aspects and impacts. As a consequence the validity and significance of the conclusions and proposed mitigating measures can hardly be verified. As the detailed studies, referred to in the summary, were not available, the Commission has only been able to review the underlying studies on probable completeness and not on accuracy of the information.

! No site reconnaissance

The Commission did not have the opportunity to visit the site and to have discussions with parties involved. In order to cope with this problem, the Commission has made extensive use of the services of a local resource person (see appendix 2) and information furnished by reliable institutions. Moreover selection of the members of the Commission was focused on their familiarity with local circumstances in Pakistan.

1.5 Justification of the approach

The Minister for Development Cooperation in the Netherlands has asked the Commission to focus the review on the main features of the summary. This review advice will be important in determining the Netherlands position in the discussions on World Bank funding of this project.

As the underlying documents of the environmental assessment executive summary are formally not available for examination by the Netherlands Directorate General for Development Cooperation and moreover are partly confidential, the following approach was proposed (see also letter in Appendix 1):

The Commission could raise questions concerning the Environmental Assessment Executive Summary on the project, which could be put forward to the World Bank by the Directorate General for Development Cooperation.

Depending on the answers on these questions, the advice could be finalized.

The Commission has been able to benefit from the local resource person in Pakistan, who has been able to gain insight into some of the underlying documents and to contact relevant individuals and institutions (appendix 4). Part of the questions raised by the Commission could therefore be already verified and answered.

However, a number of aspects remain open to questioning and a few vital issues (vital in the opinion of the Commission) have not been found in the Summary. This review focuses on these aspects in chapter 2, where the main findings of the Commission are presented.

2. REVIEW FINDINGS

2.1 General conclusion

The Commission notes that a considerable number of extensive studies have been undertaken. Apparently, key elements of the EIA-procedure have been correctly executed and an independent Review Panel has been monitoring and conducting the studies.

The Commission realizes that due to the location, the environmental damage of the implementation of the Ghazi Barotha hydropower project will be relatively small. The project area is located in the Indus river plain downstream the Tarbela dam. The Indus plain is fertile and had supported for centuries a dense human population. As a consequence, all natural vegetation has been converted to crop or range lands. The Tarbela dam had a major impact on the environment and the water flow of the Indus river in the project area. The impact of a second dam (the Ghazi Barotha hydropower project) will be minimal as compared to the Tarbela dam.

The overall impression of the Commission concerning the summary is positive. Nevertheless, the Commission would like to emphasize that before a balanced and judicious decision can be made, the summary should be amplified with information on three issues mentioned under section 2.2. Two of these issues were not covered by the underlying documents at all. Information on the third issue is available in the underlying documents, but not represented in the summary. The Commission deems it necessary to complete the summary with this information.

Additionally, the Commission remains with some questions, which could not be verified. These questions are described in section 2.3.

Chapter 3, finally, states the importance of including clear conclusions and a justification for the choice of the preferred alternative in the summary, essential information for decision making.

2.2 Missing information in the summary

Information missing in the summary and in the background documents

! In the analyses and comparison of alternatives as shown in Table 2 of the summary, one important alternative has not been described. This concerns the alternative of dividing the project into smaller units and dams. The Sungi Development Foundation, a non governmental organisation, working with communities affected by Tarbela Dam and the proposed Ghazi Barotha hydropower project, believes that alternatives to mega hydro projects have not been taken seriously by the government. At the same time the provincial government of North Western Frontier Province (NWFP) has expressed an interest in pursuing small dam options to exploit its hydro potential. A small government body, the Small Hydel Development Organization strongly

advocates smaller dams in the country's northern regions because they would occupy less land, create smaller reservoirs and lead to more decentralized control over power. Considering the above mentioned view points, the summary should include an analysis and comparison on the alternative of a series of smaller hydroelectric projects.

- ! The summary does not mention a Disaster Management Plan. Analyses on consequences of a dam failure (Tarbela Dam and/or the new barrage), amongst others flood routing calculations, flood management and hazard warning have not been addressed in the underlying documents. It is important to have a risk analyses study performed, including for example earthquakes, loads and threats by floods, due to extreme rainfall, large scale deforestation and/or other possible human interventions in the river upstream the Tarbela Dam. This Disaster Management Plan should cover the dam's safety aspects, consequences of significant overflow, impacts of extreme flood situations (for the dam and down stream population and land uses), high levels of land slides or land erosion as a result of unexpected seismic events, consequences when the dam(s) will collapse and measures to be taken.

Information available in the background documents, but missing in the summary

- ! The summary does not show which part of the water will keep on running through the river bed of the Indus and which implications this will have on ground and surface water (in quantitative terms). One of the most important environmental effects of this project is the intervention in the riverine system, in the ecological flow²], the impacts of changes in water availability for agriculture etcetera. This aspect has not been covered sufficiently in the summary, although apparently relevant information is available in the underlying documents. In the summary the effects on water resources receive equal attention (medium page) as biological resources, whereas the effects on the latter resources are expected to be minimal.

2.3 Observations and questions by the Commission

This section describes some observations and questions which could not be verified in the available documents.

Environmental impacts

In the summary the relationship between the proposed project and the life-span of the Tarbela Dam is not mentioned. It is not clear what will be the influence of sedimentation (completely filled in 2050) of the Tarbela reservoir on (extreme) floods towards the new barrage and what will be the lifetime of the reservoir of the new barrage with respect to sedimentation. In the underlying documents (Environmental Assessment, Volume 7, April 1991) is stated that:

"The mode of operation of Tarbela in the future will be determined by several factors, foremost among them the extent of sedimentation of the reservoir, the availability of upstream storage, and the overall generation picture. At present, Tarbela retains more than 90% of the sediment carried in by the Indus River. The sediment had formed an alluvial delta whose front is moving towards the dam at about 600 m per year. The rate varies with the flows. When the delta reaches the dam, an event estimated to occur in about 2015, sediment outflow will increase substantially. The time will be stretched out if the proposed dam is constructed at Basha, 320 km upstream of Tarbela. When Tarbela is essentially filled with sediment, around 2050, the out flow water will contain about the same sediment content as the inflow (less some of the coarser material). With little storage capacity, Tarbela will then operate as a run-off-river plant. In the interim, which includes most of the project life of the Ghazi Barotha hydropower project, Tarbela is expected to move to a peaking mode during the low flow season, providing most of its discharge to the barrage pond during four hours per day of peak electricity demand."

According to the above mentioned information, the Ghazi Barotha hydropower project will cease to function in about 2050. Therefore, the project will only provide a temporary solution for the

2 Ecological flow is that part of the original river discharge that is needed throughout the year to maintain the ecological characteristics and values of the river ecosystem.

problem of shortage of power in Pakistan. Although clear Cost-Benefit Analyses are missing, the summary states that economic studies have demonstrated that the project forms part of the least-cost expansion of the Pakistan power system. Although apparently the economic sustainability of the project is guaranteed, the environmental sustainability of the project is not considered. The impacts of this project are small as compared to the Tarbela dam, but still considerable and irreversible. In about 50 years the problem of power shortage will arise again in an even greater extent.

Social implications and socioeconomic impacts

In order to assess the social implications (direct and indirect) and socioeconomic impacts of the project in the project area, a detailed description of the existing situation with regard to land tenure (formal and informal landownerships rights and user's rights on land) and the anticipated developments in the case of 'no-action', is deemed essential. The following items will be subject to significant impacts as a result of the project: ethnic composition and organisational structure of the local community, religions and places of religious worship, social coherence and leadership structures, relationship between land rights and social rights, means of living, poverty and causes thereof, family structure, gender related workload sharing and family economy, dependency and use of local and external resources, production and marketing systems and patterns.

The summary describes some of the expected impacts (chapter 5, page 8). For the loss of private-owned land compensation measures are proposed in Table 6. For other social impacts (on the above mentioned issues) no mitigating actions have been described. It may, however, be expected that in the 'Integrated Rural Development Plan' attention will be paid to these impacts and mitigation measures.

The Summary contains a list of persons and organizations consulted during the process of writing the Environmental Impact Studies (appendix 5 to this advice). It does not become clear, however, which have been the results of these consults and to which extent possible remarks or suggestions for another approach have been taken into consideration.

Institutional considerations

In Pakistan environment has only recently been acknowledged as a comprehensive policy area. The WAPDA Environmental Cell will be strengthened to execute the environmental monitoring programme for this project. According to the summary the Cell will also get involved in all kinds of other activities (chapter 'institutional needs'). There is insufficient information about coordination and tuning of the functioning of the Cell as against the functioning of other agencies like the Environmental Protection Agency (EPA) and the Planning, Environment and Development Department.

Finally, it is not clear to the Commission whether during the operational phase the (environmental, water and disaster) management of the Tarbela dam and the new barrage will be integrated.

3. CONCLUSION AND JUSTIFICATION AS MENTIONED IN THE SUMMARY

The Commission recommends to incorporate in the summary a chapter concerning clear conclusions and a justification for the choice of the preferred alternative.

The summary does not present a comprehensive integral analysis and comparison of alternatives, leading to conclusions with regard to the social, the socioeconomic and the environmental costs. For each alternative a summary of probable adverse impacts (in quantitative terms if possible) should be discussed. Subsequently it should be determined to which extent the preferred alternative minimizes the negative impacts in comparison to other alternatives and is within acceptable environmental limits.