Environmental assessment study of the Safir-Hadramout Road project

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ABSTRACT

This case study is meant to investigate the procedure and format of an EIA study carried out in the Republic of Yemen for a project funded by the World Bank. The project is for a proposed road, 311km long, that will traverse the central part of the country, crossing areas of archeological and prehistoric importance. The EIA study was suggested and funded by the World Bank and it was carried out by a private consultancy company in conjunction with Yemeni experts. The EIA study for this project is considered the most effective EIA in Yemen to date and it resulted in modifying the design and alignment of the proposed road in favour of protecting the areas of archeological and prehistoric nature.

INTRODUCTION

The proposal is for constructing a road, 311km long, that will traverse the central part of the Republic of Yemen, connecting the Eastern Governorate with the capital Sana'a, by providing a shorter route that can act as a basic infrastructure to serve the developing oil industry and other agricultural/horticultural, social and tourist activities along the road.

The role of the environmental assessment for this project is to determine the baseline environmental conditions and to evaluate and reduce, or prevent, the direct and indirect negative cumulative effects on the biophysical, ecological, social and cultural environment, considering the conservation of archaeological and historical sites. The study also aims to develop a follow-up monitoring plan for management actions during the construction and operation of the project.

The focus of this case study is the investigation of methods and techniques used in the preparation of environmental assessment studies recently applied in Yemen and to identify guiding values and principles for improving the practice.

NATURE AND SCOPE OF THE ISSUES

The Environmental Protection Council (EPC) was established in Yemen in 1990, after the Yemeni Unity. Before its establishment, regulations governing

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environmental issues were scattered in different laws of the previously two republics.

After the establishment of the EPC, it had responsibility for proposing and submitting drafts of environmental laws on all aspects of environmental issues and for specifying standards. The Environmental Protection Law, issued in 1993 after being approved by the Cabinet of Ministers and the Yemeni Parliament, was still awaiting approval at the time of deciding that an EIA study would be essential for this project.

The EIA study was suggested and funded by the donor (The World Bank). The elements of the detailed EIA study were defined in the Draft EIA Law for Yemen, and these were in accordance with World Bank requirements.

The EIA study was carried out in 1992 taking into account the legal framework in Yemen including pertinent regulations and standards governing environmental issues such as environmental protection, rights to property, water and common land. A more detailed description of EIA elements and procedure was approved later within the Environmental Impact Assessment Policy For The Republic Of Yemen, issued in 1996.

PROCESS AND PROCEDURAL CONTEXT

The process for the EIA study followed more or less the same procedure described in the recently published EIA policy document.

The Terms of Reference (ToR) for the EIA study were as required under the World Bank Operational Directives 4.01, Environmental Assessment (Environmental Assessment Source Book, 1991). The scope suggested by the ToR was that the EIA study should cover the following issues.

DESCRIPTION OF THE PROPOSED PROJECT

Description of the environment: providing baseline data on the relevant environmental characteristics of the study area focusing on:

- Physical environment including a description of the geology, surface and groundwater hydrology and quality, heavy rains and flash floods, recharge areas, salinity of soils, wind conditions, temperature, and significant landscapes.

- Biological environment covering ecologically important or sensitive habitats, migration routes of wildlife and herds (camels, goats, sheep), location of significant grazing fields and water sources.

- Social and cultural environment covering such aspects as population distribution, community structure, tribal people, land tenure, existing settlements, infrastructure and services, public health and employment.

- Archaeological and historical sites of significance covering prehistoric and historic remains, including artifacts such as flints and ceramic material, monuments such as tombs and hydraulic structures as evidence of early agriculture. The work was to be done in two phases: Phase 1 was to be of 15 days duration and would be a reconnaissance of the full length of the road. Phase 2 extending through another 15 days would be concerned with the recording and fencing of archeological material with agreement with the concerned authorities in Yemen.

- Legislative and regulatory considerations: describing the pertinent regulations and standards governing the environmental issues and the protection of sensitive areas. Special attention should be given to water and land rights and customary law practices.

- Determination of the potential direct and indirect impacts of the proposed project: taking into account the views of the affected social groups, concerned Government agencies and NGOs.

- Development of an Environmental Management Plan: recommending feasible and cost effective measures to prevent or reduce negative impacts and enhance positive ones.

- Development of a Monitoring Plan: through the preparation of a detailed plan to monitor the implementation of environment management actions and the impacts of the project during construction and operation.

The output should be in the form of an Inception Report prepared within one month of the start of the study with the work programme and EIA methodology to be forwarded to the Government and IDA for review and comments. The Draft Final Report should be submitted to the Government and IDA within four months of the start of the study. The Final Report should be submitted within one month of receiving the comments of the Government and IDA.

APPROACH TAKEN

The methodology of the EIA study can be summarised as follows:

Pre-field stage

On the basis of available maps and information a base map was prepared at 1:250,000 scale. Thematic maps at smaller scale were presented based on secondary data to highlight important issues noted for reconnaissance.

Satellite images and aerial photographs had been studied to relate their interpretation to field observations/investigations. Thus ground features observed during reconnaissance surveys had been used to prepare the resource inventory. Accordingly maps on land, soil, land use capability and its actual use had been prepared.

Three schedules were prepared to collect information in the field in connection with the study of land unit, soil and nomadic/sedentary population which are essential to study desert ecology to formulate environmental impacts.

Field stage

The field stage was undertaken by all the experts along the entire length of the proposed road corridor for visual assessment and local inquiries and for meeting the critical data gaps, and identifying potential environmental and social impacts. This helped in understanding the regional environmental and ecological processes acting in the project area. This led to the identification and division of the proposed road into environmentally homogeneous segments for each of which the quality of environment was assessed and likely impacts due to road construction and actions for mitigating negative impacts (if any) were identified.

Post-field stage

Dynamics of desert environment

To assess the impact of the road construction on environment and on land degradation/desertification, studies had been undertaken in the context of natural/biotic (anthropogenic) intervention, over-exploitation of resources etc. The presence of desertification/land degradation had been identified with references to: movement of sand in broad terms; deflation of fine material – increase in coarse material; degradation of marginal lands – removal of top soil and grass cover; enlargement of rock outcrops or bare areas to indicate degrees of erosion; decreasing or disappearance of vegetative cover; rise and fall of water tables; and the practice of cutting trees.

Geology and hydrogeology

Objectives of the study, activities were planned as follows:

- collecting and review of existing geological and hydrogeological data and reports covering the study area (IJNDP and Department of Hydrogeology in the Ministry of Oil and Mineral Resources);
- study of topographic maps with ground contours, drainage channels and orientation with heights of sand dunes;
- study of sub-surface geology as obtained through the bore wells for identifying the aquifer zones and their aerial distribution;

- study of water maps to identify the occurrence and depth of groundwater;
- study of water table contour maps to identify the areas of recharge and discharge and also to find out the movement and gradient of groundwater;
- study of hydrochemistry of surface and groundwater;
- study of the aquifer characteristics as determined through pumping tests for various aquifer parameters to work out water balance;
- study of rainfall record for working out the rainfall infiltration;
- study of groundwater development and its effects on the groundwater regime on a long term basis; and
- regional development

For the regional planning and development strategy, the following sequential tasks had been carried out. The initial project objectives were to be seen in the context of the overall policies and programmes of the Republic of Yemen and in particular of the Governorates of Marib and Hadramout as the proposed road passed through these two Governorates.

A resource and data base had been prepared for all natural resources as well as man made features to understand the biophysical, socio-economic and cultural environment in the regional perspective. Major sectoral resources inventory namely water, soils and minerals, agriculture, livestock animal husbandry, flora and fauna, oil and energy had been undertaken along with physical and social infrastructure and linkages and communication systems.

The above was then analysed to determine the environmental status and the settlement systems, whereby identification of the development issues and growth potentials would be possible.

Social and cultural dynamism

For the social and cultural impacts of nomadic, semi-nomadic and settled Bedouins along the proposed Safir- Hadramout road alignment, the Consultants undertook the following activities through compilation of information from published and unpublished secondary sources as well as computation from selective questionnaires and interviews supplemented by personal observations. The objectives had been seen as follows:

Profiles of the social organisation and cultural patterns of the major nomadic, seminomadic and other settled social groups and their spatial distribution in the project area were done. In addition, a study was undertaken to assess the social perspective on development and response to the changing use of human resources. The analysis of these dimensions would reveal the nature of their expectations and priorities, movement and

settlement patterns. As a corollary to the above, it would be possible to indicate the anticipated clustering of people and activities along the proposed road alignment. This would enable the requirements of social and economic infrastructure, in response to the probable spatial arrangement of people and activities to be determined. Based upon the evaluation of social and cultural impacts, measures for addressing environmental impacts had been formulated.

Institutional study

Care had been taken to study organigrams of the National and Governmental administration highlighting the powers and responsibilities of the different departments Law regarding right to land property, access to water, land use controls, etc., were also referred to. The views of the Government of ROY on developmental prospects were also considered. The work done by some of the area developmental authorities and agricultural research stations were studied during field studies, the imperatives of the Environmental Management Plan and tasks of the monitoring unit had been formulated.

Segmentation of road alignment for impact assessment

Field studies were conducted jointly by all the experts along the entire length of the proposed road corridor. This led to the identification and partition of the road into 22 segments, for each of which the quality of the environment was assessed and actions for mitigating negative impacts were identified. The quality of road-segment environment was reviewed against the regional environmental setting. As a result, the actions required to enhance the environment were identified. This had been used to prepare the Environmental Management and Monitoring Plan.

Prehistoric/archeology resource study

The following methodology was adopted for this study:

- Pre-field stage
  This stage consisted of a comprehensive literature review of published and unpublished documents relevant to the prehistory and archeology of the general project area. Archival materials, including artefacts and manuscripts, had been inspected at the General Organization for Antiques, Manuscript and Museum (GOAMM) and library in Sana'a.
- Field stage – project corridor study
  This stage consisted of a comprehensive field survey aimed at locating and recording prehistoric and archeological sites within the proposed

corridor. Identified sites were accurately plotted through the use of topographic maps and a Magellan model 5000 GPS (Global Positioning System) unit. A standard form was used for reporting information in all sites to ensure consistency. Artefact collections were carried out, labelled and sent to laboratory for analysis.

- Site testing
  Upon completion of the site identification and reporting, limited site testing was required at several sites. The site testing was implemented in order to address site significance through utilising certain criteria such as site integrity and the presence of *in situ* cultural materials of regional, local and academic research importance.
- Data analysis/report preparation
  This stage of archeological investigations included analysis of recovered artefacts and preparation of a report. The report included findings at each site as well as a statement of significance for the encountered archeological sites. The report also included the expected impact(s) from the proposed project on the evaluated sites and recommendations.

RESULTS AND IMPLICATIONS

The results were presented in report form and as summary tables. The approaches used were successful in providing excellent information about the environmental features along the road. The division of the road into 22 segments of environmentally homogeneous segments helped in the assessment of the impact on the quality of the environment for each segment. The technique used was successful in describing the environmental features of the full length of the road corridor as well as the adjacent area.

The negative impacts expected to result from road construction activities and construction of camps, and those expected to occur after the completion of the construction of the road, were tabulated with their mitigating measures and actions to be included in the Environmental Management and Monitoring Plan. Similarly, positive environmental impacts were presented with the actions to be included in the Management and Monitoring Plan to enhance those positive effects.

The survey on Heritage Archeological and Prehistoric sites along the corridor of the road resulted in identification of 35 archaeological sites belonging to Bronze Age, South Arabic, Islamic, Modern Bedouins. Tables representing segments of road where archeological sites occur and the different actions necessary for the conservation of different sites ranging from:

- no action
- avoid quarrying.

- protect by fencing
- re-align road
- monitor during construction (GOAMM), and
- prepare maps for further information before road construction (GOAMM).

The survey also identified 50 prehistoric sites belonging to Lower Palaeolithic (Acheulean), Middle Palaeolithic, Upper Palaeolithic, and Neolithic Bronze Age. The survey indicated that 78 per cent of the sites were located in four segments of the road and that alternative sources for building materials should be sought and quarrying avoided in those sites as they could act as a guide for future explorations in the adjoining regions.

The survey also recommended that GOAMM should attach itself to the project to carry out further investigations and to contribute in the Management and Monitoring Plan by associating a Palaeogeomorphologist with a competent Prehistorian.

The EIA study also recommended actions to enhance positive social impacts resulting from the construction of the road leading to the creation of job opportunities and reducing fragmentation between the local groups.

LESSONS LEARNED

- The EIA study was carried out in 1992 in Yemen. At that time, the idea of implementing an EIA study before a project was still new to decision makers. The World Bank as the donor organisation suggested and funded the EIA study for this project which is considered now as the best available for its effectiveness in modifying the initial design and alignment of the road and its findings and recommendations concerning the conservation of the archeological and prehistoric heritage of the country. This leads to the conclusion that donor Governments and organisations can play an important role in supporting the idea of EIA in developing countries, by making it a condition for funding the project and including EIA study funds in the total cost of the project, emphasising the importance of it being implemented at the feasibility study stage of any project.

- The EIA study was carried out in Yemen at a time when environmental standards and policy were still under formulation. This did not stop the implementation of the study and it was done using guideline values from existing standards in other countries.

- The approach taken needed a wide range of expertise to be involved in the preparations of the studies and field visits. The EIA was prepared making good use of the expertise of local qualified experts

who played a major role in achieving good communication and cooperation between ministries and other specialised organisations using all the existing and available resources.

- The results of the EIA study were of great importance, leading to changes in the design and alignment of the proposed route, thus protecting areas of National Heritage that could have been mishandled causing the country a great loss.

- In Yemen and in many other developing countries, many projects were implemented without undertaking an EIA study. Some of those projects had severe negative impacts on the environment. This can lead to the conclusion that the development of environmental auditing techniques to mitigate the negative impacts over a reasonable time span, can be equally important in developing countries.

LIST OF RELEVANT PUBLISHED PAPERS OR OTHER SOURCE MATERIAL

Environment Protection Council, Environmental Impact Assessment Policy For The Republic Of Yemen, June-1996, Doc. No. EPC/96/089, Euroconsult.

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