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Appendices

1. INTRODUCTION

1.1 The initiative: Realisation of a "run off river" hydroelectric facility.

The Nepal Electricity Authority intends to implement in the Arun Valley in the Eastern part of Nepal, an activity named 'Arun III Hydroelectric project'.

The main objective of the proposed project is to produce electricity for industrialisation of Nepal itself and for export. The intended project includes a 155 m long and 68 m high dam, creating an artificial lake of 50 hectares, twin headrace tunnels of a length of 11.5 km, a power station, power transmission systems of a total length of 380-410 km, connecting the power station to the capital Kathmandu and an access road of 122 km from Hile to the dam site. The Arun III Hydroelectric project is part of a plan to exploit the energy of the Arun river over three stretches. One of these projected stretches is located upstream of the projected Arun III dam site. The other is located downstream the Arun III power station.

The Arun catchment contains natural features of recognized global significance and is until now a remote and inaccessible area where influences of modern society have hardly penetrated. Due to its natural values a substantial part of the valley is declared or proposed conservation area. The project is expected to have major impacts on the environment and on these natural values. The direct and indirect impacts on the local population of great ethnic variability and on their complex social fabric is deemed to be at least of equal importance.

Amongst other sources of finance, World Bank (WB) funding for the project is sought. Application of Environmental Impact Assessment (EIA) is part of the regular funding procedures of the World Bank. Realisation of the Environmental Impact Assessment has also been funded by the WB and the present Environmental Impact Statement (EIS) is the result of an iterative process, in which the WB has played an important role. 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 by the beginning of June 1994.

1.2 Motive for and objectives of this review advice

By letter dated 11th March 1994 the Minister for Development Cooperation in the Netherlands has invited the Dutch independent Commission for Environmental Impact Assessment to perform an advisory review of the executive summary of this EIS.

Objective of this advice is:
Review of the executive summary of the EIS by an independent authority on the basis of Dutch and international review standards

This advice, that must be regarded as an independent review of the EIS in question, has been prepared by a working group of the Commission. The composition of this working group is presented in appendix 1. The group represents the Commission and will therefore be referred to as 'the Commission'. In the Commission the following disciplines are represented: civil engineering, medical science, ecology, agriculture, rural development and its environmental aspects, socio-economy and methodology.

1.3 Handicaps experienced and approach adopted

In preparing the present 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 summary of the EIS for the Arun III project. The summary makes mention of 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 not be verified. As the detailed studies, referred to in the summary, were not available, the Commission can only review the EIS on completeness and not on accuracy of the information.
- **No site reconnaissance**
  The Commission did not visit the site and had no opportunity to discuss with parties involved. In order to cope with this problem, the Commission has made extensive use of the services of a local resource person and information furnished by reliable institutions. Moreover selection of the members of the Commission was focused on their familiarity with local circumstances in Nepal.

1.4 Justification of the approach

From personal communication with WB officials it has become clear, that the EIS has been accomplished in an iterative process in which the WB and the Nepal Electricity Authority participated. The Commission is not aware of the existence of Terms of Reference (TOR) for the EIS of Arun III hydroelectric project. This means that a review on the TOR cannot be performed. Therefore, the Commission has proceeded to formulate a review framework on the basis of Dutch and international guidelines, including those of the WB and adapted for the Nepalese energy sector (appendix 2). The Commission has reviewed the EIS on the basis of this framework. Its main findings are presented in chapter 2.

2. REVIEW FINDINGS

2.1 General remark

The Commission is impressed by the extent of performed studies and analysis, as can be derived from the EIS. To this EIS positive qualities can be attributed. However, a number of aspects remain open to questioning. For reasons of conciseness this review focuses on these aspects.

2.2 EIA as applied in the case of Arun III Hydroelectric project

Environmental Impact Assessment is an instrument to support the decision making process by making available all relevant environmental and social impacts of the alternative solutions to a specified problem. Then, weighing the financial, environmental and social pros and cons of relevant alternative solutions, a balanced and judicious decision can be made. The Environmental Assessment Sourcebook formulates in this respect: "Proposed investment design, site, technology, and operational alternatives should be compared systematically in terms of their potential environmental impacts; capital and recurrent costs; suitability under local conditions; and institutional, training, and monitoring requirements. To the extent possible, for each of the alternatives, the environmental costs and benefits should be quantified, and economic values attached where feasible" [1].

With regard to the manner in which the instrument of Environmental Impact Assessment has been applied and worked out in the case of Arun III hydroelectric project, the Commission makes the following observations:

- **!** If the project initiator and the funding agencies agree that environmental and economical costs are real costs in the economic sense of the word, then the Commission concludes that the selection of Arun III hydroelectric project has been made on a biased basis. The selection of this 'preferred' project alternative has purely been made on the basis of marketing analyses. A substantial part of the alternatives that have been considered within the framework of the project studies, has been evaluated in a study [called plan B], that was carried out in 1993. In this study 15 projects ranging from 22 MW to 660 MW were analysed. This study has not been published and has not been at the disposal of the Commission.
  In the marketing analyses executed, environmental and social costs and benefits have not been introduced and weighed.

1 Environmental Assessment Sourcebook. Volume 1. Operational Directive 4.01. Sample outline for Project-Specific EIA Report.

According to WB directives, one of the leading directives for this review, environmental and social impacts of various alternatives (alternative locations, alternative scales of hydropower exploitation, alternative routes for the road, alternative technical structures, et cetera {see appendix 3)} should have been completely worked out in the EIS.
Then, taking into account the results of economical, financial, social and environmental analyses, a sound basis for selection of the preferred (most sustainable) alternative would have been created.

- For the single main project proposal described, (the alternatives discussed in the EIS may better be considered as implementation alternatives or variants and not as project alternatives) the EIS has failed to present a comprehensive integral analysis, leading to conclusions with regard to the social, the socio-economic and the environmental costs and leading to the choice of the present project proposal as the preferred alternative.

- No clear environmental and social targets have been presented from which standards could have been deduced. The absence of targets and standards and the inadequate extent to which social and environmental effects have been detailed and quantified, inhibits performance of this integral analysis.

- The achievability of the main objective of the project, formulated as "real and lasting benefits to the people of Nepal", is not underpinned in the EIS and a cost-benefit analysis, including social and environmental costs and benefits, cannot be made on the basis of the information presented.

- Project investment by and large equals twice the annual national revenue of Nepal (US$ 760 million against US$ 300 million). Decisions on contraction of the WB loan probably will be taken at the highest level of government. In the EIS no description is given of the policy framework in which the project is embedded nor does it motivate on which grounds the Nepali Government deviates from its decision of June 1993 to develop small and medium size hydropower-installations. The EIS does not elucidate the role of the EIS in the decision-making process within Nepal.

- Environmental and social effects of the Arun III project (and other hydroelectric projects like Arun Upper and Lower hydroelectric projects) have not been placed within the framework of a long term sustainable resource management planning in the Arun catchment.

- International aspects of the exploitation of water resources have not been addressed in the EIS. It is not clear whether long term water availability for hydro power generation in the Arun catchment area is secure. According to unverified information, China is planning dam construction in the Arun Catchment in Tibet. Also the pros and cons of sale and the sales prices of electricity to India have not been addressed in the EIS.

- Local involvement in the design of the project, the scoping phase and the formulation phase of the EIS has been very limited (see appendix 4). Aside from a formal briefing in Kathmandu expatriate NGO's [2]], active in the Arun valley, have not been involved in the EIA process. Involvement of local NGO's was limited to a public hearing about the project. This hearing was organised by the NGO's themselves.

2.3 Observations on local interests and local involvement

The following observations are made with regard to these subjects raised in the EIS:

- **Balancing national and local needs**
  The EIS states on page 1 that it is important to balance local and national needs. The Commission has, however, not found convincing guarantees that presumed "real and lasting benefits" will be equally distributed over national and local levels. Upon study of the EIS, which anticipates sustained poverty in the Arun Valley, the Commission has the impression that local needs, amongst which those of women, have neither been assessed nor sufficiently addressed.
  In order to assess the balance between *national costs and benefits* and *regional costs and benefits*, a valley wide integral cost benefit analysis (including social and environmental costs), in addition to national cost-benefit analyses as have been carried out for the project (the LCGEP's), would have been of great help.

- **Public participation in project implementation**
  In the EIS no clear information has been given on the way in which the public will be involved in the various phases of implementation of the project.

2.4 Sustainability

On page 1 the EIS states: "Given the well established link between poverty and environmental degradation, the primary environmental issue is not whether infrastructure development should occur. Instead, the need is to ensure that those projects which are implemented, are sensitive to the environment and sustainable and that they bring real and lasting benefits to the people of Nepal".
Implicitly this statement implies that the EIS is the basis for assessment of the sustainability of the selected project.
With regard to this function of assessing the sustainability of the project, the Commission feels that information is lacking on the following points and for the reasons described:

2 Organisation of Netherlands Volunteers, CARE, OXFAM, Save the Children and MS (a Danish NGO).

Environmental sustainability

- **The geographical and time space covered by the EIS**
  As result of the construction of the road, access to regions upward from the dam site, along the power transmission lines, to Makalu-Barun Conservation Area and the Arun upper valley will greatly increase. Better access will in the first place enhance feasibility of the Upper and Lower Arun Hydroelectric projects. In a foreseeable future it will surely create opportunities for considerable numbers of tourists to penetrate to the lower, the middle and the high ranges of the mountains. Moreover increased access to forests resources will probably trigger their exploitation and transport to distant markets. Exploitation might penetrate deep into the forests with time, enhanced by the anticipated impoverishment of (parts of) the present population and by the increasing demand of incomers. These factors will probably have direct and indirect negative impacts on bio-diversity (amongst which highly vulnerable and scarce species and their habitats) and natural resources surpassing the geographical and time boundaries set to the present EIS.

- **Pollution and mitigating measures**
  Although a large number of actions are mentioned in the EIS to mitigate and remedy adverse environmental effects, their effectiveness cannot be evaluated because specifications of "proper disposal", "waste water treatment", "good housekeeping", "adequate health facilities", "avoidance of use of wood for cooking and heating", etc. are lacking. Possibly these specifications are contained in background documents. Also, insufficient information is given for example on measures to limit emissions from the bitumen and cement production plants. Soil and ground water contamination is not prevented by bunding (fuel) storage sites. An impermeable storage floor is required for that purpose. It is not clear how chemical waste from used materials, maintenance of equipment, waste water treatment, etc. is to be disposed. The descriptions do not exclude the possibility of establishment of chemical dump sites without containment measures or of incineration without adequate emission control. Important (potential) sources of environmental contamination will remain in that case. Some mitigating measures, like the construction of settling basins for plant waste etc. will cause soil and ground water contamination. In general, the proposed mitigating measures seem inadequate to prevent contamination of soil and ground water.

- **Risk of dam failure**
  Design procedures of dam structures take into account all possible mechanisms, including those triggered by earthquakes, which can cause a dam failure. Loads and threats by floods, due to extreme rainfall, glacial lake outburst floods or landslide dam failure floods, play a crucial role.
  The "strength" of the dam has to fulfil a required safety, determined by a probability of (dam)failure, the so called ultimate limit state. In the EIS some figures are given on floods and mention is made of a risk analyses and insurance study, carried out in 1993.

The design strength of the dam as such, analyses on consequences of a dam failure (amongst others flood routing calculations) and flood management, hazard warning etc. have not been addressed in the EIS. It may, however, be expected that a professional design, including the risk analyses study of 1993 covers the dam's safety aspects.

Social sustainability

! **Assessment of the actual social and socio-economic situation**

In order to assess the impacts of the project on the social situation and the social and ethnic structures in the valley, a detailed description of the existing situation with regard to these issues and the anticipated developments without project implementation, is deemed compulsory. Ethnic composition and organisational structure of the local community, religions and religious places, social coherence and leadership structures, 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: all these items are threads of the social and socio-economic fabric that will be subject to major changes as a result of the project.

The EIS fails in presenting a comprehensive overview of this actual social and socio-economic tissue of the Arun Valley and the developments anticipated.

! **Effects of the project on the social and socio-economic situation**

As a result of project implementation, a considerable quantity of male labour will be withdrawn from its original tasks. This will have serious impacts on the traditional economic activities in the valley and on family welfare.

Reduced terrace maintenance, traditionally done by male workers, will possibly decrease slope stability and increase sediment loads of the river. This might result in adverse effects on the environment in downstream areas like the Koshi Tappu Wildlife Reserve. Workload of women and children will probably increase. Sudden introduction of male monetary income may disrupt families and worsen the position of women and children. Subsistence food production may decrease. This may have impacts on the nutritional and health status of the people involved.

Physical project infrastructure will occupy considerable space that will be withdrawn from present uses. Families will be dislodged or will lose part of their land. Compensation is to be provided. It is not clear when compensation will be in the form of land for land (where, which quality, quantity and location) or money for land (amounts and conditions). In the last case, additional effects will be the loss of spiritual and social homes and possibly disruption of family welfare. Effects of the various options have not been described in the EIS.

Project implementation will cause a substantial (not specified) and direct influx of incomers of which a proportion may be expected to remain in the area. The existence of the road will cause another substantial (not specified) indirect influx of people.

These incomers will settle along the road and will put a major claim on natural resources (for house construction, nutrition, et cetera) and social and health infrastructure. Moreover they will increase pollution pressure in the valley. New consumption patterns and consumptive goods will probably be introduced and food will have to be imported. Luxury goods are expected to be imported. Their availability may have an impact on family budget spending. Production and marketing patterns will thoroughly change. The anticipated shift from agricultural production to livestock production may have a major impact on slope stability. The risk of occurrence of landslides might increase.
The incomers will probably introduce new diseases (e.g. sexually transmitted diseases) and increase the incidence of diseases already present. As a result of the influx of newcomers, the position of and the relation between existing social, ethnical and religious groups may be disturbed and the social coherence of the valley may change.

The EIS recognises many of the above mentioned impacts. For many of these impacts, however, evidence of in depth quantitative analyses is not found. Therefore an evaluation of the appropriateness and effectiveness of the proposed mitigating and remedial actions is not well possible. For a number of impacts no mitigating actions have been described.

Institutional sustainability

- **Institutional capacity and institutional capacity build-up**
  The EIS gives no insight in the actual and required strength of those institutions (Government, private and NGO) that will be charged with project management, implementation of mitigating measures and execution of monitoring programmes. In the EIS no convincing evidence is found of recrutement of staff, adequate training programmes and reservation of an adequate period of time to build up the necessary institutional strength.
  In the planning schedule education of officials, development of an institutional network and social activities only start at the very moment that civil works are initiated. Containment of environmental degradation can, however, only be realized when a stable social environment exists and when a well functioning institutional network can manage the effects of the project on the area. It cannot be denied that the development and maintenance of such a network requires a substantial time period and substantial funds. Information on adequate funding of institutional build up and maintenance is not contained in the EIS.

- **Dimensions and funding of mitigation programmes**
  For those mitigating measures, that have been specified in the EIS, especially the Regional Action Plan in the context of which the bulk of the proposed measures is to be implemented, no firm funding is indicated. Total costs of proposed mitigating measures amount to 2.37% of project investment. Mitigating measures with firm funding seem to cover 0.26% of project investment.