EIA as applied in the case of the 402 MW Arun-III Hydroelectric project

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ABSTRACT

Arun III Hydroelectric project was Nepal's biggest project which was due for implementation in 1994 with the World Bank as the major financing agency. Besides meeting the domestic power needs, the project was expected to open the possibility of exporting electricity and thus provide a new dimension in the economic development of Nepal. The project, however, came under criticism by local, and some western, NGOs and individuals as being risky, costly and liable to bring about severe environmental and social impacts. Consequently the project was dropped on institutional, national, economic and financial grounds. Although environmental impact assessment (EIA) was carried out for the project it did not appear to have addressed all relevant issues in a comprehensive manner.

INTRODUCTION

The Arun-III Hydroelectric project was an attempt to tap 402 MW electricity from the huge water resource potential of Nepal. Besides meeting the domestic power needs, the project was expected to open the possibility of exporting electricity. It was to be built in the snow fed River Arun in the eastern Nepal. Of the three projects deemed feasible in the river (1995 study), Arun III was the first project considered for implementation. The other two projects are the Upper (335 MW) and the Lower (308 MW) Arun Hydroelectric projects that are located respectively upstream and downstream of the Arun III project.

The project was to be financed by a number of agencies including the World Bank and was Nepal's biggest development project. The construction was to begin in 1994 and the power generation to be started from 2001. In August 1995 the World Bank decided not to fund the project. As a result, despite all the planning and design exercises, the future of Arun III is uncertain. It was a run-of-the-river project, to be run by the normal flow of the river. A small artificial lake of 50 hectares was, however, to be created by building a 155m long and 68m high dam in the river. Water from the reservoir was to be conveyed by two 11.5km long tunnels to an underground power house for generation of electricity. The flow coming out of the power house was then to be returned to the parent river.

See Topic 15

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Future directions

The project site is located in a remote area that is accessible by foot trail only. Thus for the construction and operation of the project an access road of length 122km was to be built first. A 450km long, 220 kilovolt transmission line was to be constructed to transmit the power up to Kathmandu.

The social and environmental features of the project area and its surroundings represents the typical Himalayan ecosystem (Stone, 1992). Besides the huge water resources, the area is characterized by a rich biological, cultural and ethnic diversity, and specific mountain advantages – the scenic beauty, hilly landscape, tranquility, salubrious climate, and inaccessible wilderness areas. These positive aspects of the ecosystem are, however, in contrast to its natural and man made fragile nature which is marked by high seismicity; mass wasting; glacial lakes outburst floods; erosion and sedimentation; and climatic extremes. The socio-economy of its dense population is dependent primarily on forest, pasture and farmland. The increasing population pressure and the fragile nature of its ecosystem through a vicious circle are constantly depleting and degrading these primary resources, increasing human hardship and in turn degrading water and biodiversity resources.

This case study will attempt to present the procedure that was adopted in carrying out the project EIA and the extent to which the EIA has been useful as a tool in decision making and in assessing the sustainability of the project.

NATURE AND SCOPE OF ISSUES

A number of related issues were raised in connection with implementation of the project. On the basis of the areas from where these issues have been raised or their origin, it can be categorized into the following four groups.

The first category of issues were those raised against the project by some NGOs and individuals in Nepal and in the donor countries. These include:

- the high cost of the project;
- the high risk associated with depending on a single project that would generate more than half of the national production; and
- the high social and environmental costs for the valley's inhabitants (Lindeman L. et al.1997).

In the second place are those issues on the basis of which the World Bank decided against funding:

- limited capacity of institutions in Nepal;
- the danger of crowding out priority social expenditures; and
- the difficulties in firming up the financing plan in the near future (Lindeman L. et al.1997).

The third category consists of environment and development related issues in the context of Nepal and the Arun valley. Being among the least

developed countries, and given the present socio-economy in which the natural resources and human well being are both under constant degradation, the need of economic development of Nepal and advancement in the well being of its people is indisputable. Its huge water resource potential needs to be explored in this regard. However in the social and environmental context of Nepal and the project area, this development needs the following considerations:

- preservation of ecology, biodiversity, and cultural resources;
- preservation of the local people from marginalization;
- equitable distribution of benefits; and
- work force and indigenous knowledge engaged in management of the natural resources need to be protected and promoted.

Finally, it has also become necessary to discourage the global trend that is undermining any hydropower development due to the controversy associated with most of the large and conventional projects of the past and the lobbying against these.

PROCESS AND PROCEDURAL CONTEXT

Nepal did not have any specific guidelines and methodology for EIA until the early nineties. It was only in 1990 that the task of preparation of national and sectoral guidelines was undertaken by the National Planning Commission in collaboration with IUCN (the World Conservation Union). The national guidelines were endorsed and published for implementation in July 1993. Recent sectoral guidelines on forestry and industry have also been endorsed and published and those on other sectors including hydropower are still in the pipeline and nearing completion.

As at the time of the prefeasibility study of the project, which was carried out in 1987, EIA guidelines were non existent and the Arun III project was not bound by national EIA requirements. The National Conservation Strategy (1988) was the only related policy declaration. However, it only entailed the requirement of an EIA for major development projects.

The only EIA procedure relevant for, and required for, the Arun III project was that of the World Bank. According to the World Bank Operational Directive 1989 (World Bank, 1991), a project-specific EIA should normally cover:

- existing environmental baseline conditions;
- potential environmental impacts, direct and indirect, including opportunities for environmental enhancement;
- systematic environmental comparison of alternative investments, sites, technologies and design;
- preventive, mitigation, and compensatory measures, generally in the

form of an action plan;

- environmental management and training; and
- monitoring.

Involvement of affected groups and NGOs is emphasized, and regarding analysis of alternatives it is further stated that: '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'.

In addition, as with other developed procedures, the World Bank procedure also includes the crucial EIA steps of:

- initial examination;
- scoping and preparation of the terms of reference (TOR);
- EIA preparation;
- review; and
- monitoring.

In the World Bank policy, it is the borrower's responsibility to prepare the ToR and other analysis and to obtain the necessary experts to carry it out.

APPROACH TAKEN

The environmental studies and analysis carried out for the project are in a large number of reports totalling several thousand pages (NEA, 1993). These studies have been accomplished by at least five different parties in the form of the following five different categories of environmental scrutiny (NEA, 1993):

- Recommendations of a variety of independent national and international observers: at least two reports with an overview of environmental management and development ecology in the valley.

- The project design team (NEA and their national and international consultants): three major environmental impact studies, the EIA report, and input to other project reports, the engineering design and specifications, and the tender documents.

- A 'Panel of Experts' (independent specialists, including an environmentalist, engaged by NEA to review the design team's recommendations and progress): seven reports.

- A national conservation and development NGO, the King Mahendra

Trust for Nature Conservation, as a consultant to the World Bank: The Management of Basinwide Environmental Impacts Study, a major report on management of indirect and induced impacts in the Arun Valley.

- Funding agency missions.

The EIA report, Arun III Hydroelectric Project, Environmental Assessment and Management, Executive Summary (NEA, 1993), was prepared later as per the World Bank Operational Directive, OD 4.00-Annex A1 (World Bank, 1991) based on the summary of findings and recommendations of these reports.

Of the five study reports, the first one is considered as an early independent report which discussed the values at risk in the valley and emphasized the need for further analysis; the second, third and fifth were project-specific again, focused on the analysis of indirect and induced changes, including economic opportunities, and mechanisms for managing these processes. All these reports have been produced through an iterative process between the World Bank and the Nepal Electricity Authority, the proponent (Smidt, 1994).

Regarding the methodology: Some of the environmental assessment work has been undertaken with assistance from the United Nations Development Programme, the World Bank and Kreditanstalt fuer Wiederaufbau. Thus the primary source of guidance on methodology has been these institutions. However, the final stages of analysis and preparation of the EIA report have taken into account the requirements of all the agencies involved in financing the project (NEA, 1993).

The EIA report neither included, nor made mention of, a ToR that was followed during the preparation of the EIA. Involvement of local people was limited to participants as respondents in personal interviews and participatory sessions that were conducted by the study teams during their field visits. Involvement of NGOs and the public was also limited to a public hearing about the project organized by the NGOs themselves.

Regarding the project alternatives, in contrast to the need to consider the environmental and social impacts of various alternatives in the form of location, scale of hydropower exploitation, road alignment, technical structures etc., the EIA included alternatives for road alignment only. The assessment of environmental and socioeconomic impacts presented for the two alignments are not comprehensive enough to lead to a rational judgment. This is presented briefly as follows:

Alternatives of road alignments as considered in the EIA

There are two road alignments considered in the project design: the valley route and the hill route. The valley route is 122km long and it descends first

to the Arun River from the nearest road head at Hile (Dhankuta district), and follows the valley through to the intake site. The hill route is about 190km long and it goes through the hills covering major settlement of the district including the old and the new district headquarters, and it descends to the river only near the intake site. The valley route was as proposed by the 1986 feasibility study. The hill route was considered later in 1987 with a view to maximizing economic and social benefits to the region providing access to the major townships, Khandhbari and Chainpur.

Major points presented in the EIA report in favour of the valley route include:

- a shorter length and one year short construction period for the valley route; and
- in the case of the valley route project affected families (1146) and the land to be taken from them (196 hectares) are about two-thirds of those of the hill route.

Likewise points considered in favour of the hill route include:

- The hill route alignment is along a stable terrain and there is little risk of slope failure. The risk of similar slope failure is about three times more in the case of the valley route. In addition to this the valley route will be exposed to threats from floods including those due to the failure of glacial lake and landslide dam failures.
- Higher long term impacts on ecological values due to the valley route as it would provide better regional access, higher level of future economic activity and demand for forest products. This statement has been made on the basis of the few quantitative data available.

Following these discussions the selection of the valley route over the hill route was made on the basis that:

- the valley route is short and quick in access and required only a one year short construction period;
- 500 fewer families were affected in the case of the valley route; and
- it provided long term regional access.

This discussion on the selection of the valley route, however, does not seem to be rational due to the following reasons:

- The local people consider the project as important for them because of the road. As with any other remote places of Nepal, along with the accessibility and economic opportunities, these people want a road in order to get rid of their feeling of intellectual isolation and ignorance that they have due to absence of a road (Stone, 1992). Thus people in the area want the road to go through their area as its immediate benefits outweigh the cost of giving some of their land for the road.

The number of families who completely lose their land, if calculated, would probably be low and their resettlement possible without their marginalization. In this regard consideration of the number of affected families as a criteria for selection of the alignment is not complete. The situation calls for it to be based on the number of disadvantaged families and the cost for their resettlement.

- The risk of the valley route failures due to failures of slopes and those due to floods including those induced by failures of glacial lakes and land slide dams needs to be assessed and the cost and delay compared with the shorter length and short construction period.

- From the ecological and socioeconomic perspective, it was argued that the hill route has lower ecological and socioeconomic impacts as compared to valley route. These impacts will be immediate and localized to the project road alignment area of the district, whereas in the case of the valley route it will be like a trunk road from which link loads can be connected from other places of the region. It will thus encompass a longer time and a larger geographical scale and will be exposed to larger ecological consequences and socioeconomic impacts. Better accessibility will also enhance the feasibility of the upper and lower Arun hydroelectric projects which in turn will generate their own positive and negative consequences. So the analysis presented in the EIA in this regard has failed in setting the right geographical and time scale and the subsequent environmental and social targets upon which to base the assessment.

RESULTS AND IMPLICATIONS

Besides the extensive studies and analysis carried out, the EIA as applied in the case of the Arun III project has failed to give a comprehensive analysis and to meet the fundamental objective of EIA:

- as a tool in decision making; and
- as a tool in assessing the sustainability of projects.

These aspects are presented briefly in the following paragraphs.

EIA as a tool in decision making in the case of Arun III project

In comparison to large hydroelectric projects associated with large reservoirs, the Arun III project is considered to be more environmentally feasible due to the:

- high ratio of power production to area inundation;
- the fact that no resettlement of people would be required and there would be insignificant loss of agricultural land due to inundation;

- conditions would not be suitable for the development of water borne disease and water weeds;
- short retention time for water and thus less time for anaerobic condition to be created; and
- low chances of bringing significant changes in river characteristics downstream.

However, the EIA has not analyzed these positive issues or other issues that are also relevant in the case (see the section on issues above) in a systematic way so that a comparison among these different issues could have been made. It has in this regard failed in making any input in the decision that was to be taken on the project. As such, despite the carrying out of so much work, the selection of the project was based primarily on the basis of marketing analysis (Smidt, 1994) without introducing and weighing the environmental and social costs and benefits.

EIA as a tool in assessing the sustainability of projects in the case of Arun III project

The EIA as applied in the case of Arun III project has failed in assessing the sustainability of the project on the following grounds (Smidt, 1994).

Environmental sustainability

- The impact from the road to be constructed for the project could in the foreseeable future bring about direct and indirect negative impacts on the biodiversity and natural resources surpassing the geographical and time boundaries set in the EIA.
- The proposed mitigation measures against soil and ground water contamination given in the EIA seem to be inadequate. It is considered that the information given and measures mentioned in the EIA report to mitigate and remedy adverse environmental effects do not exclude the possibility of establishment of chemical dump sites without containment measures or of incineration without adequate emission control.
- Regarding the failure of the dam by earthquake or different types of floods, it is considered that the design strength of the dam as such, analysis of consequences of dam failure and flood management, hazard warning etc. should have been addressed in the EIA report.

Social sustainability

The EIA report has failed to describe different threads of the social, cultural and socio-economic mosaic such as:

- ethnic composition and organizational structure of the local community; religions and religious places;

- social coherence and leadership structures;
- means of living; poverty and the causes thereof;
- family structure; gender related work load sharing and family economy; dependency and use of local and external resources; and
- production and marketing systems and patterns.

This information, for the present as well as for the future without the project, is required for assessing the impacts of the project on the social and ethnic structure and socio-economy which are dependent on these factors.

Regarding the effects of the project on the socioeconomic situation, for a number of impacts mentioned in the EIA report, there is no evidence of in-depth quantitative analysis and, in some cases, no mitigation measures have been proposed.

Institutional sustainability

The EIA report does not give insight into the existing and required strengths of the institutions that will be responsible for project management, implementation of mitigating measures and execution of monitoring programme. The report has also been unable to give convincing evidence of staff recruitment, adequate training programmes and reservation of an adequate period of time to build up the necessary institutional strength.

LESSONS LEARNED

The theoretical hydropower potential of Nepal is estimated to be about 83,000 MW and about half of this has been identified to be economically feasible through 66 projects including 30 sites suitable for storage schemes. This is a huge potential and can play a significant role in meeting the power needs of Nepal and other countries of the region, and thus form a basis for the economic development of Nepal. However, on the basis of experience with water resource projects that have been unsuccessful and subject to criticism on the grounds of environmental and social costs associated with them, a concerted approach needs to be adopted in which sustainability is assured beforehand. This demands implementation of comprehensive EIA both at the project and planning levels.

The EIA as applied in the case of the Arun III project has failed to provide systematic information on sustainability necessary for making decisions on the project. This is partly due to the exclusion of investigations in the EIA of alternatives to the project. At the single project level also, the EIA has failed to present a comprehensive integral analysis, leading to conclusions with regard to the social, the socioeconomic and environmental costs and leading to the choice of the project as the preferred alternative (Smidt, 1994).

These shortcomings in the single project level EIA can be attributed to:

- the lack of proper consideration of the different steps of EIA particularly the step of scoping and preparation of ToR; and

- the lack of a mechanism for the consideration of interests of local people and consultations with interested people, NGOs, and the scientific community.

In the context of Nepal, where there is lack of trained and experienced manpower in the field of EIA; it seems necessary to make investigations of capabilities available in the country and to emphasize the need for external help.

Appreciation and acknowledgment of the strengths of EIA by the concerned authorities and their usefulness in the context of the socioeconomic and environmental state of Nepal, specially when hydropower development is being undermined globally, and sincere application of the EIA procedures, becomes a must.

LIST OF RELEVANT PUBLISHED PAPERS OR OTHER SOURCE MATERIAL

Lindeman L. and Schelle P. 1997, Sustainable Development of Hydropower in the Arun Valley, Nepal. Masters' Thesis, Department of Environmental Studies, University of Utrecht, Utrecht, the Netherlands.

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Key words

sustainable development

decision making

social impacts