Environmental auditing: the case of Ecuadorian industry

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The opinions stated in this document are the exclusive responsibility of the author and do not necessarily reflect the official opinion of the participant and funding organizations. Due to a confidentiality agreement signed between participant organizations and consultants, the names of audited companies have not been revealed.

ABSTRACT

As part of the Programme of Competitiveness, the Ecuadorian Chamber of Industry included the Competitiveness and Environment Project, with the objective of assessing the environmental issues of industrial activity and recommending policies and action plans for improving its management and performance. An auditing process was performed, focusing on three basic aspects:

- knowledge of, and conformance with, environmental regulations;
- environmental impacts definition; and
- environmental management.

During March and April of 1998, fifteen cases were studied in the three most industrialized cities of Ecuador: Quito, Guayaquil, and Cuenca. These industries, which adhered voluntarily to the project, are of different sizes and dedicated to a variety of production fields. The results show a high heterogeneity in the magnitude and intensity of their environmental impacts; however, the most critical aspect was related to wastewater discharges, where most prevention or control action has been taken. Additionally, it can be determined that environmental management is still a practice not adopted by the industrial sector in Ecuador.

INTRODUCTION

In January of 1998, the Ecuadorian Ministry of International Trade delegated to the National Federation of Industry's Chambers the responsibility for developing a programme designed to formulate a strategy for competitiveness within Ecuadorian industry as well as in the framework of global economy and the open market. One of the components of the programme was the Competitiveness and Environment Project, to identifying current conditions and opportunities for implementing

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Implementation and follow up

environmental management practices within Ecuadorian industry. This Project had the financial support of the Embassy of the Netherlands and was developed between February and May of 1998. An independent multidisciplinary team was formed to perform the tasks involved in the Project.

This report summarizes the main findings of the Project, as well as the background context, the procedures and approaches taken, and the perspectives derived from this experience.

NATURE AND SCOPE OF ISSUES

Environmental degradation due to industrial pollution has been recognized as one of the main problems presently confronting Ecuador. In fact, national and local governments have been trying to create new alternatives for introducing environmental responsibility in the industrial sector, without compromising its growth.

At present there are environmental laws and regulations for controlling industrial air emissions, water discharges, toxic solid waste generation and disposal, and noise levels for new and existing facilities, and also mandatory environmental impact assessment studies prior to new developments. However, despite the fact that those legal requirements have been in place for at least ten years, results are very poor and only quite a small group of enterprises have implemented environmental protection practices in their operations.

There are many different causes for this state of affairs. These can be summarized as:

- Inadequacy of the legal framework, since this basically is a transposition of other countries' laws.
- Political and technical weakness of national and local agencies in enforcing environmental regulations.
- Few developments or little experience in environmental engineering, especially in the field of industrial pollution control.
- Lack of sensibility of the industrial sector to environmental issues.
- Limited knowledge in the industrial sector about modern environmental management tools, such as pollution prevention techniques and environmental management systems.

On the other hand, these last ten years have seen the growth of public awareness about environmental degradation, which has meant an increase in the pressure from ecological and citizens' organizations for more stringent

control by authorities of pollutant activities, especially in the most industrialized cities.

As a response to that new movement, the Ecuadorian industrial sector has developed a strategic plan with the objective of promoting clean production and environmental consciousness among its members and the whole society. Additionally, government agencies, the scientific community, NGOs, and the industrial sector itself are interested in both reforming current environmental laws for incorporating more realistic performance standards on the basis of local conditions, and implementing modern tools of environmental management in industry, including economic incentives and managerial practices. Unfortunately, the outlook does not seem optimistic, as other more critical factors have forced environmental concerns to take second place to emphasis on economic survival.

PROCESS AND PROCEDURAL CONTEXT

The focus of the Competitiveness and Environment Project was an environmental audit of a number of industries, with the purpose of determining the level of implementation of environmental management practices and the most important environmental impacts derived from their activities. The established process was as follows:

Selection of participant industries

Representatives of the industrial sector and the Director of the Programme selected fifteen industries which had responded to an open invitation formulated by the Programme. That participation was voluntary and a confidentiality agreement was signed between the industries and the consultants. These industries are located in the Quito, Guayaquil, and Cuenca influence areas and are of different sizes and activities (meat products, food processing, wood products, pulp and paper, plastic products, dyes and paints fabrication, clay products, metallic products, flower and rice plantations, and animal food production). The selection criteria took into account the need to have diversity among participants and the willingness of industries to allow and facilitate auditing.

Formation of auditing team

A multidisciplinary team of economists and environmental engineers, with experience in environmental impact assessment was assembled. Additionally, laboratories were selected for sampling analysis of air emissions and water discharges.

Definition of an auditing procedure

Due to the objectives of the Programme, three basic aspects were established as targets to be evaluated:

- environmental regulations knowledge and conformance;

- environmental impacts; and,
- environmental management practices.

The team defined the auditing protocols for the initial interview, site inspection, and sampling of air emissions and wastewater effluents.

Performing the environmental audits

Audits were performed in March and April of 1998. They were undertaken with a manager from each of the selected firms. Audits consisted of an initial interview to explain the scope of the exercise and collect background environmental information, a site inspection of the facility, and a sampling activity of air emissions and wastewater effluents and measurement of noise levels, where appropriate. The interview and inspection were performed the same day. Sampling was done according to plant operation schedules.

Individual reports preparation

Audits were reported in individual files addressed to the top management of the participant organizations. Those reports contained not only the results and findings of the audit, according to the established protocols, but also some recommendations for improving environmental management and control practices in that industry.

General report preparation

The audit team also prepared a final report where general conclusions and recommendations are summarized. The structure of that report was according to the targets mentioned above and also describes the procedures and methodologies used in the Project.

Workshops for discussion of the reports

As a final part of the Project, three workshops, one in each city, were organized to discuss the general results. Besides industrial representatives, there were invited members of the national (Ministry of Environment and National Agency of Planning) and local governments (Municipalities of Quito, Guayaquil, and Cuenca), financial institutions (National Financial Corporation), and NGOs related to the project activities. The lectures at the workshops are published and available to the public.

APPROACHES TAKEN

Environmental regulations, knowledge and conformance

During interviews, the auditing team evaluated knowledge of both the existence and the most important requirements included in national, local, and special environmental regulations related to specific activities (i.e. pesticides use or hazardous materials handling). A grade scale was defined

as follows: (A) complete knowledge; (B) partial knowledge; and (C) poor knowledge.

For grading the level of conformity, proof such as independent characterization analysis and/or official certifications was required. The categories used were: (A) conforming with most of the requirements; (B) conforming with some requirements; and (C) no conformance at all.

Environmental impacts

A cause-effect matrix was used for assessing environmental impacts, in order to identify which activities have the most critical effects on the environment, and also, the elements of the environment most affected by those activities. The basis for this determination was the results of laboratory analysis and in situ measurements which were contrasted with the limits and other requirements established in current national laws.

Since the audited facilities were located in urban areas, biotic elements of the environment were not considered. Rather, physical environment (water, air, and soil quality), as well as workers safety and community disturbances, was the main focus of the assessment.

Interactions were identified and graded in a numerical scale with a maximum of 100 points for the most critical impact. That numerical value was an aggregate of several parameters: intensity, extension, occurrence, persistence, reversibility, synergy, accumulative effects, relationship cause-effect, periodicity, and mitigation. Each of those parameters had its own categories with specific numerical scales.

After this exercise, impacts were grouped in three categories: (A) low impact (from 0 to 33 points); (B) medium impact (from 34 to 66); and (C) high impact (from 67 to 100).

Environmental management practices

A set of 15 aspects was evaluated in order to determine the level of integration of environmental management practices inside the participant organizations. Those aspects are related to the requirements of the ISO 14001 standard for environmental management systems, although they are not strictly the same. The aspects evaluated were:

- priority of environmental issues for the organization;
- integration of environmental practices into general practices of the organization;
- willingness to improve its environmental management;
- definition of an environmental policy;
- awareness of environmental impacts derived from its activities;
- definition of environmental objectives and goals;

- definition of an organizational structure and responsibilities associated with an environmental management programme;
- training programmes on environmental issues;
- consumers advice about products and services;
- definition of environmental requirements for subcontractors and suppliers;
- information to neighbourhood communities about environmental impacts and risks associated with its activities;
- implementations of process changes (pollution prevention or control measures) due to improve environmental performance;
- emergency preparedness;
- monitoring programmes and protocols; and
- Environmental documentation and records control.

Each aspect was graded from 1 (no action taken, poor condition, etc.) to 5 (actions has been evaluated and maintained desired condition, etc.). A final aggregate figure, in percentage, was assigned for every industry.

RESULTS AND IMPLICATIONS

The most important results obtained from the Project are briefly presented below:

- There is partial knowledge about environmental law among participant industries. Most of them know of the existence of national and local regulations, but very few were aware of the contents or the requirements that those regulations imply. Besides, the understanding of the scope and purpose of those requirements was still confusing for the industrial sector.

- Most of the studied cases may be categorized in the B group, that is, conformance with some requirements. There were, however, a couple of industries with a very good environmental performance. In general, much more attention has been paid to wastewater discharges than to air emissions or other sources of pollution.

- Due to the size of the audited organizations, most of the environmental impacts were identified as low or medium. In order of importance, the main problems detected by the auditing were: discharges of untreated wastewater effluents, excessive levels of noise inside the facilities, lack of training about handling of hazardous materials, uncontrolled air emissions, and solid waste generation and disposal.

- Environmental management practices are still uncommon inside

participant industries. Most of the evaluated aspects were graded with 1 or 2, which indicates that some action has been taken in response to environmental issues. In the cases of Quito and Cuenca, where the local governments have had a more active role in environmental control, with more adequate local regulations, the average grading of the industries was higher than in Guayaquil which was characterized by a weak control. Finally, it is important to point out that all of the organizations showed a willingness to improve their environmental management practices.

LESSONS LEARNED

This project constituted one of the few in our country related to environmental management in the industrial sector and the results show the necessity of new efforts oriented to promote good practices in pollution prevention inside the Ecuadorian industry. In that perspective, it would be important to consider the following conclusions:

- The mere fact of having a law does not imply a better level of environmental performance. It is necessary to promote that regulation among involved parties, discuss its scope and purpose, and, in the main strengthen agencies in charge of its enforcement.

- There is a serious lack of information in the industrial sector about modern tools for environmental management, and this is one of the main causes for poor environmental performance. Therefore, to create a new environmental consciousness, based on an integrated management of the environmental issues, seems to be a priority for that sector.

LIST OF RELEVANT PUBLISHED PAPERS AND OTHER SOURCE MATERIAL

González J. C. editor (1998). *Gestión Ambiental en la Industria. Sistematización de talleres.* Federación Nacional de Cámaras de Industrias (National Federation of Industry's Chambers). Quito, Ecuador.

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Social impact assessment: an interactive and participatory approach

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ABSTRACT

Current policy shifts world wide are tending towards eliminating or minimizing the continuing trends of environmental degradation. Realizing the urgent need to reconcile industry and community interests in the Delta of Nigeria which had, and continues to witness, some tensions and volatile outbursts, and to ensure that development is managed so that it is both sustainable and hence contributes to industrial and community stability, development projects can only go ahead after mandatory Environmental Assessment (EA) studies of such proposed projects.

Consideration of the social impact of project development generally – let alone of oil industry development specifically – was until comparatively recently an adjunct of EIAs. It would appear to be very much so even today in Nigeria, where more emphasis continues to be placed on the biophysical environment. Nonetheless, social impact analysis is gaining ground and momentum. But even then it poses special problems which make it far more than a methodological shadow of EIA. Social Impact Assessment (SIA) represents a novel and far more complex domain.

Social Impact Assessment (SIA) studies of three different projects in three varied socio-cultural zones of the Niger Delta have yielded better socioeconomic results, utilizing the 'participatory assessment' methodology alongside questionnaire surveys. This way, it has been possible to assess community needs and expectations, identify priorities for development activities and successfully implement project execution strategies.

INTRODUCTION

A human action such as oil exploration activities (mining) simultaneously affects both the natural and the social environment, not only displacing plants and polluting water but creating jobs and relocating people. Clearly a comprehensive assessment of mining impacts would have to consider both ecological and social effects, and the higher order cumulative effects that result from their interaction (Westman, 1985).

Yet when, in the late 1980s, environmental impact assessment studies were first being conducted, these were limited to the webwork of effects on the

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natural environment. It took a series of communal clashes, violence and the destruction of oil & gas pipelines and installations, on the platform of fights for territoriality and compensation, for the scope of impact studies to be gradually broadened to encompass a range of social and economic concerns.

Examination of the full social and ecological impacts of a proposed action requires a 'holistic' approach, in the sense that examination of the effects on natural and social systems separately will not reveal the full scope of interactive effects. Hence the generic term or approach 'integrated impact assessment' has long been proposed for the study of the full range of ecological and social consequences of the introduction of a new technology, project, or programme.

Be that as it may, the special skills required for an assessment of ecological impacts derive from a distinct, though overlapping, set of disciplines from those required for social impact assessment. And because the consideration of the social impact of project development generally – and of oil industry development on which most developing countries like Nigeria depend – was until comparatively recently an adjunct of EIAs, the methods and techniques for effective and efficient study have tended to be less developed and understood. SIA we must acknowledge poses special problems which make it far more than a methodological shadow of EIA. SIA represents a novel and far more complex domain beyond that often applied to the assessment of the bio-geophysical environment.

Over six million people live in the 70 000km^2 Niger Delta where most of Nigeria's oil is produced, providing some 80 per cent of the federal government's revenue. Exploration and production of this oil necessarily brings many of the oil companies into contact with more than 12 major ethnic groups divided into about 800 communities. These communities increasingly feel disadvantaged by a deteriorating economy, lack of job prospects, limited amenities and general development, environmental degradation and a very complex political situation.

Consideration of social impact assessment within the integrated impact assessment framework is even more complex when placed against the multi-socio-cultural-cum-political background of a developing country such as Nigeria. To ensure that development is managed so that it is both sustainable and contributes to industrial and community stability, major policy shifts have favoured the proper assessment and understanding of community interests.

It is against the foregoing background that social impact assessments have to utilize 'interactive and participatory methodology' to achieve better socio-economic results. This way, it is possible to assess communities' needs and expectations, identifying priorities for development activities and successfully executing effective project strategies.

NATURE AND SCOPE OF ISSUES

The Niger Delta of Nigeria is the richest part of the country in terms of natural resource endowment. Ironically, in spite of the Delta's endowment, its immense potential for economic growth and sustainable development, the region is, and continues to remain, in a parlous state; it is under increasing threat from rapidly deteriorating economic conditions and social tensions which have remained largely unaddressed by current and past policies as well as behaviour patterns. The degree of disaffection which the lack of development in the resource-endowed areas has generated has reached palpable heights.

By nature of its resource endowment, the major industrial activity to be found in the Niger Delta is oil related. Therefore, projects requiring environmental assessments are mainly field developments, flowstations, pipelines and flowline network installations, drilling activity etc. While the environmental assessments of these oil related activities are of recent development, their main focus until of late was basically the impact on the natural environment, with little or no regard to the communities within the immediate vicinities of these projects.

In any case, the wave of environmental awareness which has swept through the area, skewed towards oil pollution, has tended to generate very high feeling with, very often, some political undertones. While environmental assessment has become a major policy issue, the social conflicts which now frame an effective assessment include, but are not limited to, the obnoxious Landuse Act of 1978 which deprived or rendered communities landless in terms of economic rent, environmental degradation in the form of oil pollution and the attendant monetary compensations accruing from these.

Against the sociopolitical-cum-economic backgrounds of the Niger Delta, the imperative for effective social impact assessments within the framework of EIA cannot be overstressed. A well conducted SIA must find answers to communities' social well being by actively engaging the people for whom such assessments would benefit.

Perhaps in an attempt to forestall further environmental degradation in the resource-rich Niger Delta in particular and in the general Nigerian environment, an Environmental Policy was enacted. It is not as if the statutory framework for environmental protection did not exist in the country before 1988 when the regulatory framework was established with the all-encompassing empowering status. An overview of the existing Environmental Protection Laws in Nigeria will show that pre-1988 laws abound in many fragmented forms. Although most of these laws are not strictly environmental protection laws, they contain provisions which have a bearing on the preservation of the environment. However, 1988 marked a watershed with the enactment of Decrees 42 and 58, regulating harmful wastes management and establishing the Federal Environmental Protection Agency (FEPA) respectively. Several policies and laws followed

subsequently: these include in 1991 effluent limitation and pollution abatement in industries and facilities generating wastes, and Decree No. 86 of 1992 setting the framework for Environmental Assessment (EIA) as mandatory.

The FEPA EIA Decree No. 86 of 1992 made the preparation of Environmental Impact Assessments mandatory for all industry planning new projects. This involves the assessment of socioeconomic/ecological status of the project area and production of a report.

While SIA tries to find answers to the community's social well being within the framework of EIA studies, one other law is in place which severely limits its effectiveness; the Landuse Act of 1978. The most comprehensive piece of legislation ever enacted in Nigeria on land issues, it divested individuals or communities of different forms of land ownership and tenureship which existed before its enactment. This is an obnoxious law which negates communal territorial right to land, and hence adds to the tension in the Niger Delta environment.

THE STATUTORY AND INSTITUTIONAL FRAMEWORK FOR ENVIRONMENTAL ASSESSMENT IN NIGERIA.

An overview of the existing environmental protection laws in Nigeria indicate that the laws can be classified into two distinct areas: pre-1988 and the laws enacted since 1988. These laws contain specific provisions that prohibit certain activities or conduct which are detrimental to the wholesomeness and safety of the environment and impose varying sanctions for violations and non-compliance with the pertinent provisions of the respective laws.

Promulgated under the auspices of the Federal Environmental Protection Agency (the national regulatory body), the EIA Decree requires the preparation of Environmental Impact Assessments by industry undertaking new projects, in order to mitigate and ameliorate the potential adverse environmental impacts of the project activities. This too involves the assessment of socioeconomic/ecological status of the project area and the production of a report.

By the same token, the petroleum industry in particular, whose activities are concentrated in the Niger Delta, although under the same regulatory framework, is supervised directly by the Department of Petroleum Resources (DPR) of the Petroleum Ministry. The DPR *1991* Environmental Guidelines and Standards for the Petroleum Industries in Nigeria, provide detailed statutory requirements to which the oil and gas industry is supposed to adhere. Part VIII, Section A (Environmental Impact Assessment Process), Articles 1.3 and 1.6 require that EIA study be conducted before E & P operations in order to protect and prudently enhance the environmental resources for a better environment for man. Article 1.4 gives the applicable

regulations and makes the preparation of an EIA report mandatory. It is against the above statutory background and institutional framework, and the necessity to comply with the environmental laws as well as operate within the principles of sustainable development, that the EIA tool is applied by many of the E & P companies who plan new development projects.

The DPR's environmental guidelines and standards have standardized environmental abatement procedures under which the EIA process is expressly stated. As one of two tools being used to protect and preserve the Niger Delta's and Nigeria's ecosystems – the other being an Environmental Evaluation (post-impact) Report (EER) – the Environmental Impact Assessment process and Report is being vigorously pursued and implemented in Nigeria.

The systematic process to be followed in preparing the report starts with a project proponent/operator determining the preliminary assessment of impacts through a screening process before an initial report is submitted to DPR. It is only when significant impacts are identified for a project or activity that full EIA studies and report preparation is commissioned. Draft EIA reports are expected to be accepted by the regulators within 21 days. And such studies and reports are supposed to be handled by persons or parties who possess a certificate of eligibility issued by the regulators themselves. EIA reviewers are expected to be competent individuals.

The EIA process and procedure do not however end with the DPR institution (i.e. oil industry and related EIAs). The national body is also a powerful regulator and it alone has authority to present all EIAs to the public for hearings and comments. Public presentations of EIAs are usually implemented by displaying such reports in designated centres/zonal offices for a period also of 21 days for the public to make reviews and offer comments on any aspect of the EIA report. Comments of significance are to be incorporated in final EISs (Environmental Impact Statements).

The DPR documents, Environmental Guidance Standards (EGS) mentioned earlier, have provisions for procedures to be followed in collecting and analyzing samples and regulating parameters of interest. Unfortunately there are no comparable guidelines for socioeconomic (social impact assessment) studies.

By necessity, social impact assessments are conducted simultaneously with EIAs. However, few companies have determined explicit guidelines for conducting SIAs, and as a result the majority of industry social assessments provide only a limited description of potential impacts and the range of alternative management practices available to a company. While it is widely acknowledged today that 'social analysis' must be an integral part of integrated project planning, the process of devising appropriate techniques for social analysis is still ongoing, although the SIA Guidelines/Manual of

the SIEP released in 1996 tries to streamline methodologies for conducting SIAs in the oil and gas industries.

While some of the lessons of EIA are applicable, others are not, and SIA in particular represents a novel and far more complex domain. Specifically, while SIA must be concerned with the potential consequences of a project for a given human population and its way of life, it is necessarily concerned as much with the possible implications of that social environment for the success of the project itself. For unlike the natural landscape, human behaviour does not conform to simple rules (Ross, 1994).

ASSESSMENT METHODS AND APPROACHES

Environmental systems are functionally and structurally complex. This is especially true of deltas which integrate land and water systems. Not only is the Niger Delta complex but, as numerous researchers have pointed out, it is not well understood (Bourn, 1992). More importantly, the intricate social systems of the hundreds of riverine communities are equally poorly known. General policies that ignore complex details, while often appropriate at the central planning levels, should by necessity be adapted to local conditions before implementation (Ascher, 1990). By implication, it can be pointed out that ignoring this complexity, policies are frequently poorly matched to the communities and ecosystems they are intended to benefit or modify. A cascade of unanticipated side effects usually result.

On a project level, social and environmental impact assessments can provide the necessary information to maximize the net benefits from policy decisions. Social impact assessments within the general framework of environmental assessments of E & P operations, if properly conducted, are expected, to become necessary for ensuring that activities in the Delta consider the complex interrelationships that constitute the Niger Delta.

THE INTERACTIVE AND PARTICIPATORY APPROACH TO SIA STUDIES: The Niger Delta examples

Two field development plans/projects of oil and gas were planned in two different ecological zones but essentially the same social cultural setting of present day Bayelsa State in the Niger Delta. The third case study involved a seismic lines rehabilitation/revegetation project, again in a very volatile sector of Delta State. The economy of the study areas is mainly agrarian, with farming as the occupation of over 75 per cent of the population and a third involved in subsistent fishing. Personal incomes, however, are very low in all of the study communities with a population of over 6000 people; over 50 per cent earn less than N25,000 (US$300) annually. At the other FDP, communities nearby earn even less; slightly over 21 per cent earn anything over N24,000 (US$282).

In one of the three case studies which involved seismic lines revegetation, the project schedule unfortunately coincided with a time when there were serious communal clashes.

Armed personnel were of necessity strategically located in the most visible and larger communities. However, socioeconomic data gathering was seriously hampered as tempers were hot and strangers were looked at suspiciously. The level of aggression was so high that in one of the communities consultants were almost lynched, being mistaken for an enemy.

Against the above background, representative communities and people were selected. Instead of the more generally accepted method of questionnaire surveys aided by video and photographic coverage, the interactive approach alone was used and a selected group of community representatives were contacted and information sought. Consultants were warned that they should not even walk around communities, and should not become involved in household interaction.

Realizing the logistical problems imposed by the terrain, poor information and education and the very high sensitivity of the people occasioned by the feelings of long years of neglect, strategies were planned so as to take advantage of the knowledge at hand.

Since the integration of social impact assessments in environmental assessment, project developers have come to realize that an SIA properly executed could be a strong and powerful PR strategy for soft entry/landing into the project sites. While SIAs are conducted simultaneously with EIAs, the EIA practice would be to send the SIA consultants in advance so as to soften the mood of the locals before others could come in.

The SIA process includes the following steps:

- A reconnaissance survey of the project area is initiated, using the project developers' representative/supervisor, a community liaison officer in charge of the area (CLO), the EIA team leader and the SIA consultant. At such visits, all settlements, permanent and temporary (camps) within the project area are identified.

- The traditional/cultural hierarchy is also identified and a formal request for a community forum comprising the elders, chiefs, youth and women leaders, as well as other opinion formers, is initiated for a scheduled date and time.

- Recognizing the socio-cultural heritage of the people of the Niger Delta where kola nuts and drinks are a traditional part of such occasions, adequate provision for these is made at the community's scheduled meeting.

- At the meeting, community representatives are given details of the proposed project and study, citing the necessary statutory backing. While the SIA consultant acts both as company's PRO and community/socio-economics studies consultant, a community's spokesperson is at hand to interpret all that is said.

- While permission for work is being sought, peaceful coexistence and cooperation is solicited.

- At these meetings, knotty issues such as number of workers to be employed from the community, the wages to be paid etc. are reconciled. This also includes the community development/assistance project(s) to be embarked upon by contractors or major client depending on the magnitude of the project proposed. At this stage of the SIA study however, the main tools are the video and photographic cameras which are used for documentation.

- It is only after permission is granted by the community that the SIA enters its second stage. Here interviewing and questionnaire survey methods are employed to gather the necessary information. Utilizing traditional knowledge, groups of members of the community who have been identified to be knowledgeable enough about the community's affairs are regarded as the key informants. At less formal group discussions group opinions are tapped to enrich the SIA objectives.

- Questionnaire surveys are also undertaken as the last tier of the SIA information gathering hierarchy process. Well structured open ended and closed ended questionnaires are administered to households, assisted by well trained/instructed personnel from outside and within the communities. The major drawbacks of this technique in the field are logistical (transport) and socio-cultural problems. Communities which are not contiguous are difficult to reach while people were suspicious of personnel and questionnaires. Above everything else, the low level of educational awareness compounds the situation. However, attempts are made to conduct the surveys in the most comfortable manner, choosing a representative fraction/sample which ensures that the views of important categories of the population are gathered, especially those relating to household data. Individual responses reflecting knowledge and attitudes towards the proposed projects and their impacts, including how they feel, and how the perceived negative impacts associated with the project should be handled are collected.

RESULTS AND IMPLICATIONS

Educational attainment of the inhabitants is usually less than encouraging. At Okoroba community, for example 31 per cent of the people had no formal education, over 40 per cent primary education and about 24 per cent had attained secondary education. At Diebu FDP however, with over five main communities spread within 25 km of the project site, 40 per cent of the people had attained primary school education, and about 34 per cent secondary, with some 20 per cent having no formal educational training. Against the foregoing background, one can conclude that unless a proper and much more interactive participatory approach is undertaken, attempts to improve community participation in development activities are easily hampered by poor information and education. Participation quickly becomes limited to the most articulate and well connected individuals. The divide and rule tactics or attitudes of most project developers (and especially the oil companies in the Niger Delta) have tended to increase friction between them and the rural people.

All too often, environmental surveys/assessments get trapped in the mechanical acquisition and calibration of data because they lack a clear focus on the social meaning of the exercise and a sense of its political context. Concern for people and their fate which ought to form the chief interest of all technical endeavours unfortunately is relegated to the background. In its place diagrams and equations are elevated.

Rising indignation and social unrest/tension engendered by the realization of continuing neglect in the face of abundant resources by the rural people in most part of the world, and the Niger Delta of Nigeria in particular, has brought to the fore the necessity for detailed community/socioeconomic understanding within the general framework of environmental assessments.

Sustainable development, as it is being espoused, encompasses all social, economic and political activities aimed at improving the quality of human life within the self regenerative capacity of the supporting ecological system. It implies community control over the natural resources of the community. This much the local people are clamouring for.

It is in the understanding of the above requirements that the participatory and interactive approach was considered most appropriate in the social impact assessment studies of E & P field development plans/projects and other related activities. The results obtained were very satisfactory and statistically appropriate for the projects needs.

In the first place, an understanding of the social and natural environment was established. With full interaction and participation of the community's members, all interests were seen to be respected, and differing shades of opinion were sifted for better data collection, analysis and policy consideration.

It was also discovered that when communities are actively involved in the data gathering, interpretation and subsequent usage, an openness is displayed, better quality information is obtained and minimum time is expended in the process. The confidence placed in those chosen for group discussion and considered repositories of local knowledge bolstered morale and locals are always very ready to make available any information on hand. Unlike most assessments based on literature and conjecture, quality data based on facts are easily gathered and informed analyses carried out.

Aware of the documentation process (video and photographic coverage), community members are more careful about the truth since they could be called upon to defend whatever they have proffered in the way of information or advice.

The use of local people in questionnaire administration (mostly teachers) also enhances the data gathering process. The capacity building potential of this methodology is obvious. Local knowledge is utilized to facilitate the impact assessment process.

Communities also fare better when this open system is adopted. The cause of social tensions in some of these communities is usually the charge of impropriety against the so called community leaders by the youth. The attitude of most project developers whereby a select few of the articulate and politically conscious are patronized, and in most cases bribed, to the total neglect of the community, is considered most unwholesome. So, to be seen to be consulting with the majority of community members is much more representative of opinions of how the communities feel about their situation.

CONCLUSIONS AND RECOMMENDATIONS

There is abundant evidence that a project has little chance of success if it runs counter to, or ignores, the traditions, values, and social organization of the intended beneficiaries, or if its objectives are too abstract to be understood by them or too remote from their everyday concerns. While social analysis now forms an integral part of integrated project planning, appropriate techniques have to be devised for thorough understanding.

SIA is a novel and far more complex domain. Unlike the environmental assessment of the biophysical environment, SIA, concerned with the potential consequences of a project for a given human population and its way of life, appears much more demanding. The fact is that the range of considerations is potentially vast. And when placed against an even more complex ecological system as the Niger Delta with is vast socio-cultural and environmental systems, then the tasks would appear more than daunting. Difficult as it may be to develop a satisfactory methodology for SIA with universal acceptance, which can provide credible predictive insight into the processes of social change, far more problematical is the task of drawing

local people into a meaningful consultative process. While the temptation is always to regard this as a form of social management, the fact remains that it is by far the most important dimension of SIA, the aspect that is most likely to provide the needed facts and data which would inform governments and companies about local sensitivities and needs. In the words of the World Bank, credible impact assessment must be based upon 'participatory assessment'.

Good environmental assessment practice requires meticulous handling of the socioeconomic dimensions of the study to be able to make meaningful decisions which can be cost-effective and sustainable for the companies as well as the host communities of project sites/areas. Undertaking social impact assessment in the Niger Delta must take cognisance of the politico-economic and social contexts and factors which may mar or make accurate studies.

By necessity a reconnaissance visit must be made to the project sites at the planning of environmental assessment studies to identify communities within the area. At such times too, minimal contact is made with the inhabitants, but enough to identify in the process the cultural-traditional hierarchies.

Interaction at these three levels is also useful – first at the community level where elders, youths and women leaders are consulted on a village-wide issues, and secondly at a group discussion level, involving key informants, to tap relevant group opinions and knowledge.

At the third level of interaction is the household which will be involved in questionnaire survey. Questions must be simple enough – closed and open ended formats preferred – to allow for individual opinions. Content analysis of a well structured questionnaires can be made easier if local personnel, well instructed, are used so that interpretation of questions and filling in of answers is enhanced.

In summary, attempts have been made for sometime now to integrate social impact assessments in the general environmental assessment framework. Until recently however, it can hardly be said that a systematic methodology or approach has been devised to undertake such studies. Several SIA techniques have been suggested. The present study tries to reinforce the notion that far more successful socioeconomic data and impact prediction can be generated and made by a combined interactive and participatory approach. By examining the prevailing environmental assessment regime, E & P operations can be more effectively executed if social analysis is undertaken with regard to the relative socioeconomic importance of an area, characterizing the diverse population as a consequence and involving the people in the study process itself.

A general recommendation in the execution of environmental assessment processes is, therefore, not to emphasize and strive for biophysical data

collection alone but to establish a well integrated, interactive and participatory assessment, self-sustaining structure founded on local involvement, for the sake of gathering more accurate socioeconomic data and SIA predictions.

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New concepts for environmental impact assessment in Syria

Imad Mahayri

Case Study 23

The opinions and proposals in this report are the sole responsibility of the author. They do not necessarily represent the official view of the Syrian Ministry of Environment or the General Commission for Environmental Affairs.

ABSTRACT

Syria is in a phase of transition, which involves major economic activities and change. At the same time, the environmental resources in Syria are being continuously degraded.

In this paper, the current situation of EIA in Syria (in 1999) is briefly reviewed. The main shortcomings identified relate to: the absence of binding EIA related legislation; weak environmental institutions and weak environmental authorities; lack of awareness and experience; lack of environmental data; lack of coordination and cooperation; the weak role of the private sector and the public in EIA.

The analyses showed that an integrated solution could be developed that would aim at:

- securing high level political will and support for the environment;
- enhancing the existing legal base and bringing it into force;
- maintaining effective communication, coordination and cooperation;
- improving information flow and management; establishing a national Geographic Information Systems data centre;
- reforming the administrative structure; and
- carrying out continuous training and raising awareness programmes.

Also, strategic environmental assessment (SEA) should play a major role by steering and controlling high level planning to promote sustainable development. Indeed implementing effective EIA and SEA would be a major element and potentially powerful tool that supports the national environmental strategy outlined in the National Environmental Action Plan (NEAP).

As a result of the review, a number of major recommendations are made. These would involve: seeking a high level political will and support for the environment in Syria; strengthening SEA implementation; strengthening communication, coordination and cooperation between the different actors

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involved; strengthening the environmental capacity in the public and private sectors; and introducing new fields of science to Syria, such as environmental economics.

INTRODUCTION

During the past few years, the Arab Republic of Syria has witnessed many changes, *inter alia*, in the economic situation. For 1995, however, a real economic growth of approximately 4 per cent has been estimated.

Reform of economic policy in Syria is gradually shifting the country's economy from a centrally planned socialist economy to a market based one which would involve more private sector economic and industrial activities.

Investment Law No. 10, introduced in 1991 to encourage private investment, is a key player in this area. This law provides incentives, including special investor tax and duty rates and facilitates the investments of Syrians abroad as well as other Arabs and foreigners in Syria. During the years 1991-1996, Investment Law No. 10 contributed 1494 projects at a cost of approximately US$ 7.3 billion, which is a significant investment in the Syria economy (Arabicnews 19 November 1997).

However, it is crucial that this economic development must be paralleled by developments in other sectors. For the long term, environmental considerations stand out as a priority for sustainable progress.

According to 1996 estimates, the Syrian population is 15 608 648 (The World Factbook 1998b). However, with an annual growth rate of 3.4 per cent, it is estimated that this number will reach 20 million by the year 2005 (ERM 1998). Moreover, the rate of urbanization is very high, caused by a similar high rate of rural-urban migration. In 1996, 51 per cent of the total population was living in the major cities of Syria. Illegal settlement areas have increased significantly and currently accommodate an estimated 10 per cent of the total population. This situation is a cause of significant degradation of living and environmental conditions. It has also contributed to an increasing uneven income distribution (ERM 1998).

The Syrian environmental situation is being continuously degraded. Surface and ground water resources are almost completely exploited. Water resources face another problem. Discharges of domestic and industrial waste water is causing severe water pollution especially near big cities (ERM 1998).

Land degradation affects more than 50 per cent of the currently productive agricultural land. Erosion, desertification or salination are crucial factors. In addition, increasing urbanization is taking out green areas surrounding cities and converting them into domestic, industrial or waste disposal sites. The country's rich genetic and biological diversity is currently depleted and endangered. Also, dumping collected waste, estimated at 5 000 tonnes per day, near to the edge of towns and cities with no segregation or treatment is causing

acute environmental problems of groundwater pollution, while waste burning is causing air pollution. Moreover, air pollution caused by traffic and industry is severe. The air quality in major cities is poor and, sometimes, is five fold World Health Organization (WHO) standards (ERM 1998).

The Ministry of Environment (MSE) has two executive agencies: the General Commission for Environmental Affairs (GCEA), the technical arm; and the Scientific and Environmental Research Centre (SERC), the research arm. EIA is the responsibility of GCEA which contains the EIA Unit. GCEA has no enforcement powers, as the Environmental Protection Act (EPA) and the EIA Decree are not yet in force. Thus, the GCEA lacks legislative authority. Furthermore, other Ministries see activities of GCEA as interfering with their authority and are anxious that environmental concerns might slow down economic growth.

THE CURRENT PRACTICE OF EIA

Currently EIAs are carried out by the EIA Unit itself as Syria lacks environmental consultancies and the EIA related law is not endorsed.

According to an unattributable source, 741 EIAs were carried out in the period 1994-1996. Given the human resources available in the EIA Unit and the current circumstances that prevail, this rate of EIA performance seems to be unrealistically high. Unfortunately, the author has no access to any of the EISs produced in order to assess the validity of this statement. On the other hand, ERM (1998) indicated that only three EIAs were performed in 1996, while in 1997 no EIAs were produced at all. Probably, this means that the 741 EIAs were performed without producing Environmental Impact Statements (EISs) and only three EIAs in 1996 led to the production of EISs. It also means that in 1997 no EIAs led to an EIS.

While working for approximately one year (during 1996) in GCEA, the author observed that most EIAs do not follow the full procedures and generally EIA were carried out without an EIS being produced and with the assessment completed in just one day.

It is generally the case that proponents from the private sector who have small-sized projects will be informed by another Ministry (the permitting authority) that, in order to proceed with the authorization of their project, they will need a signature from GCEA. The proponent will then apply to the EIA Unit. Afterwards, the proponent will have some discussions with the EIA Unit about the project and be given some advice and recommendations together with the required permit. In some cases, a short visit to the location is conducted by the staff of the EIA Unit.

Thus, it appears that, in reality, the number 741 does not indicate the number of EIAs conducted, but rather the number of permits applied to the EIA Unit by proponents. The vast majority of these permits, therefore, are processed and given permission without a proper EIA study having been conducted.

A very brief overview of the theoretical stages is summarized below with appropriate comments and issues included. However, the actual current practice may deviate significantly as there is yet no binding legislation.

EIA stages

First, the relationship between the EIA process and project authorization and implementation should be clarified. Permits needed for a project, before its authorization, are sectoral from the relevant Ministry and administrative from the relevant Governorate.

After receiving the sectoral permit, which is generally the first permit to be obtained, the proponent can begin construction work. However, production cannot begin until the administrative permit is obtained. The administrative permit, however, cannot be issued until the proponent has an environmental permit from the Governorate's environmental department. Recently, the EIA Unit has been involved on the basis of an informal agreement between the two governmental bodies, given the lack of legislation or formal procedures. This equates to the screening process.

More than 50 per cent of the applications submitted for permits to the EIA Unit are for projects which are already in operation and which have significant environmental impacts. Ahmad (1996) identified two possible decisions taken by the EIA Unit when this is the case. In the first situation, if mitigation measures can be undertaken, the permit will be given. Nevertheless, the enforcement of these mitigation measures is not in the hands of GCEA, but rather based on informal arrangements with the permitting authority (the Governorate) who may not necessarily act. In the second situation, when mitigation measures are not feasible, the decision will also be to issue the permit, but with a condition requiring the closure of the establishment or its relocation to a less sensitive area. Also in this case, action is in the hands of the Governorate.

Scoping is the next stage, where an EIA programme should be prepared. However, alternatives are not taken into consideration and the programme is developed by the EIA Unit itself. The public should be informed by the State Gazette. However, currently, only announcements on notice-boards in the Governorate in which the activity should be registered are used.

The next stage, according to the EIA Decree, is to implement the EIA programme. This includes the preparation and submission of an EIS. DHV *et al*. (1995a) indicated that the results of the scoping and the impact areas identified will be reported in the EIS. Also, it indicates that the aim of the assessment is to produce information that will help the authority to assess an impact's significance.

Non technical summary for decision makers
Institutional requirements and conditions with which the project should comply
A project description defining its objectives, site, design and size. etc.
Baseline study for the situation before the project
Identification and assessment of environmental impacts likely to result
Alternatives and their analysis
Detailed mitigation plan
Environmental management plan that deals with the mitigation measures
Monitoring plan
References used in preparation of the EIS

Table 1: The ten items representing the contents of an EIS

The current practice in preparing EISs is limited to a description of the project, a baseline description and a prediction of likely impacts (Ahmad 1996). This situation is justified by the absence of binding legislation and by the fact that the people who prepare an EIS will also, at a later stage, be responsible for its review and for recommending a decision about it (the EIA Unit). This also reduces the objectivity of the current process.

The next step mentioned in the EIA Decree is a review of the EIA report by the EIA Unit. The European Commission review criteria were suggested by DHV *et al*. (1995a and b) as a review package. However, the current practice is that reviewing of EISs (if any), is performed by the same people who prepare them (the EIA Unit staff). This action lacks the required objectivity.

Subsequently, a decision statement, clarifying the results of the review, should be produced by the EIA Unit. In the statement, recommendations on the preferred alternative and the mitigation measures for a project that is to be approved, or the decision to reject the project, should be clarified.

Ahmad (1996) indicates that the decision is heavily influenced by political considerations. The EIA Unit prefers not to ruin good relations with other permitting authorities by rejecting important projects. A negative decision from the Unit might result in other governmental bodies ignoring environmental permits and EIA altogether in their future projects. However, Ahmad (1996) considers environmental protection is achieved by ensuring the implementation of good mitigation measures. Consequently, it could be argued that the EIA Unit, knowing that a decision must be positive in most cases, would support almost all developments without proper EIAs.

The EIA Decree mentions very briefly that appeals can be made to the Ministry of Environment against the decision statement. Also, the EPA gives proponents the right to appeal against the licensing authority at a later stage. So, an appeal could be made in two stages!

Monitoring is not mentioned in the EIA Decree, but is tackled in the EPA and other relevant documents by DHV *et al*. (1995a and b). Nevertheless, there are no details regarding what to monitor, where and when.

Violations and compliance are also tackled. It is the responsibility of GCEA to check compliance in cooperation with other governmental bodies. Nevertheless, the action is in the hands of the licensing authority, which is not identified in the EPA.

PROBLEMS AND WEAKNESSES OF THE EIA SITUATION IN SYRIA

The major point is the absence of binding legislation, accompanied by a confusion over the distribution of EIA related tasks and procedures amongst different governmental bodies. The enforcement powers were assigned in the EPA and the EIA Decree to the licensing or permitting authority. The expression 'licensing authority' is used in the EPA, while the expression used in the EIA Decree is the 'permitting authority'. This authority is not identified in the EPA and could be understood as being GCEA. On the other hand, it is stated in the EIA Decree that this authority is not GCEA but the Governorate. However, generally, it is the Governorate that enforces the regulations when requested to do so by the EIA Unit.

This means that, even after bringing relevant legislation into force, the Act will always be in the hands of other agencies and the likelihood of the EIA Unit acting independently is small. This might create bureaucratic problems, as more procedures have to be followed when action is needed. Even the final decision will always be in the hands of the other agencies, as they have the authority which is, in effect, the most powerful tool. Therefore, a dilemma could arise when the other governmental body has another opinion about the matter. Basically, the environment will be the loser.

Initialling the EIA to decision making

According to Ahmad (1996), there are two authorization permits – sectoral and administrative. Construction can start after receipt of the sectoral permit, leaving production to be dealt with by the administrative permit, which involves EIA. Thus, the proponent will begin the construction works and maybe even finish them, before hearing whether an EIA will be required.

This delay means that, even if the project is rejected before production begins, the impacts of the construction phase will have already occurred. Moreover, supposing that proponents know about the need for an EIA at an early stage, they will seek to finish construction before dealing with the other permission, hoping that they will find a solution later for the additional bureaucratic procedure. Furthermore, a project is unlikely to be rejected after considerable resources have been invested in construction.

Ahmad (1996) commented upon the position of EIA in saying that it may come at various stages, sometimes during the first stage and often very late when the establishment is already in existence.

Some attention should focus on the scoping process which enable 741 EIAs to be carried out in two years by fewer than five people, the staff of the EIA Unit. No doubt many essential topics are missed.

Article 4 (a) of the EIA Decree indicates that Terms of Reference (ToRs) for EIAs should follow the general guidelines. However, the Decree also seems to indicate that the results of scoping should form the basis for the EIS. This is related to the fact that the Decree (excluding the definition of EIA), does not mention predicting and assessing significance of impacts. Also, it does not contain any EIS structure, although both are mentioned in the guidelines.

The guidelines will never be binding. The GCEA is already weak and in a weak position. So, it is difficult to see how it could enforce non-binding guidelines, which were, very briefly, referred to in the Decree. This might cause a problem in the future in enforcing the missing EIA stages that are not mentioned directly in the Decree and also in deciding when and how they are to be conducted.

It is worth noting that EIA expertise in the governmental sector is lacking. Those people who cooperate in the process will do the required analysis without having a sense of the reasoning behind it. This lack of understanding of the EIA framework might also influence its results or presentation. On the other hand, private environmental consultancies, as known in Europe for example, do not exist in Syria. Syrian EIA experts are very few. Therefore, the situation where EIAs are produced by proponents and their consultants will put great pressure on those experts who do exist. There are certainly not enough of them to perform all of the required work. Therefore, if EIA were to become a legal requirement for development projects and the current circumstances remained the same, EIA would be ineffective. Because EIA experts are limited in number, non-specialized people would become involved in producing the huge number of legally required EIAs. This also might encourage EIA to be seen as an unnecessary bureaucratic procedure.

Information flow in Syria does not run easily. If official information exchange procedures and high-level signatures do not exist, difficulties are faced in obtaining information, even among different governmental bodies. However, personal relations play a role in facilitating this aspect. Additionally, some information from governmental bodies is not compatible and some information just does not exist. Therefore, the private sector and its EIA consultants will face severe difficulties in obtaining the required data about a site in order to conduct a baseline study or impact prediction.

RECOMMENDED DECISION AND APPEALS

A crucial point in the whole process involves political pressure on the decision statement produced by the EIA Unit. Currently, decisions might

not reflect the merit of the case from an environmental perspective, just simply expedience. Therefore, harmful projects may be authorized.

Ahmad (1996) indicated that the EIA Unit seeks to ensure good mitigation measures in such cases. However, currently, there is no legally binding provision to implement these measures. Furthermore, even after enactment of the EIA Decree, the author predicts difficulties in their enforcement. On the other hand, supposing that mitigation measures are implemented, they often will not have the potential effectiveness hoped for, especially when the project has significant impacts and should have been rejected originally.

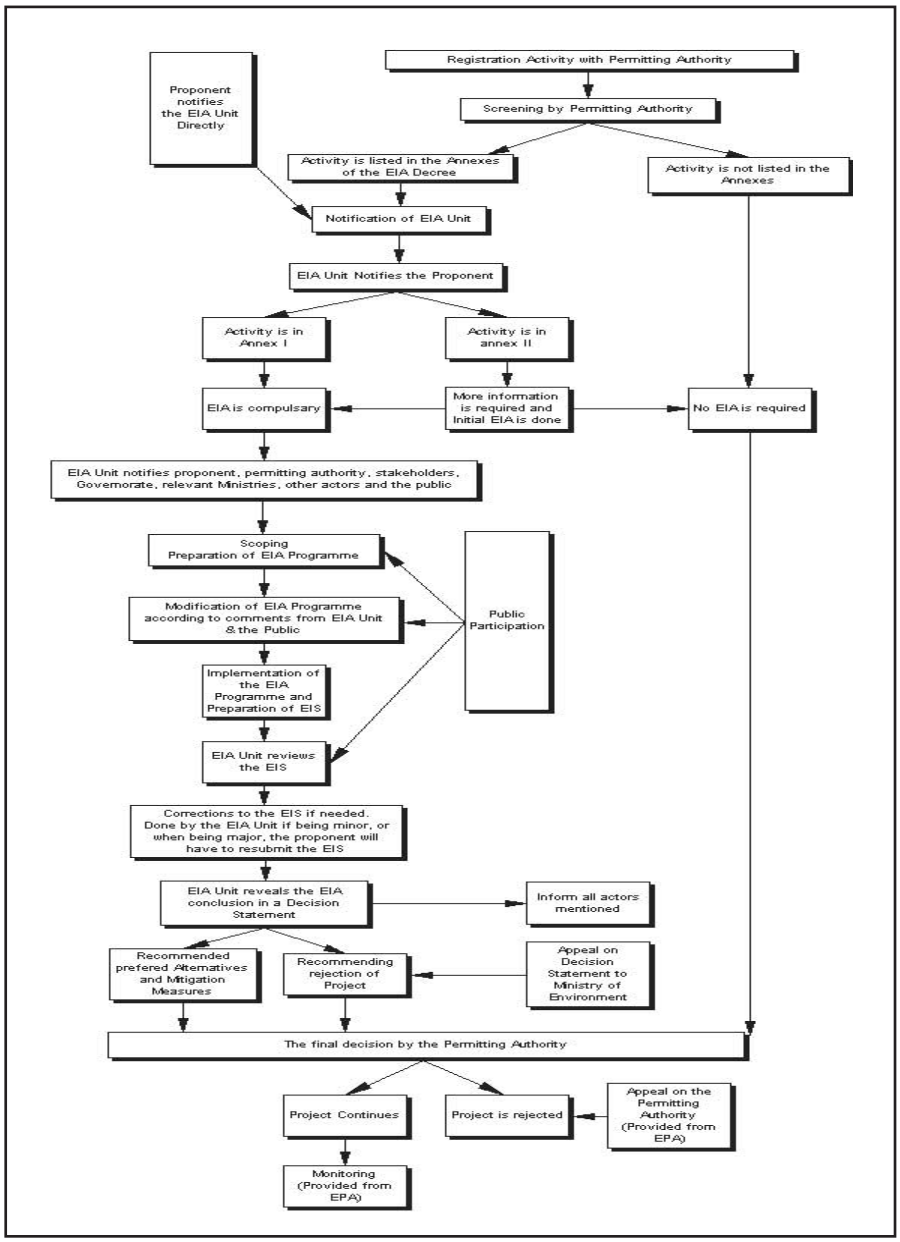

Figure 2: The proposed EIA procedures according to the drafts of theAEIA Decree and EPA

Therefore, it can be foreseen that EIA will be effective and binding only for the small private sector projects. Governmental projects and the big private sector actors, who can influence the situation, might manage to find solutions that lead to their projects being authorized. It could be argued that having two opportunities for appeal is a device that can be used to ensure that rejected projects are authorized. Thus, if a proponent failed to win the case against GCEA, there would still be another opportunity of appeal against the licensing authority (which is not defined in the EPA).

In addition to the above, the current situation of the EIA Unit and GCEA in general is not comfortable. Space, staff and resources are lacking. Also, there is a lack of updated information. Recently, government departments were provided with access to the Internet. Nevertheless, it is presently unavailable to the private sector and general public, although they may be given access in the future.

CONDITIONS FOR EFFECTIVE EIA IN SYRIA

The conditions necessary for an effective Syrian EIA are identified in a set of six comprehensive but integrated proposals (Mahayri, 1998). First comes the need to enhance the existing legal base. The second is a key factor vital for all the other conditions, namely support in the form of high level political will. Third is the need to enforce relevant legislation. Fourth comes effective communication, coordination and cooperation. Fifth is the need for good information flow and management, which would be resolved by establishing a national GIS data centre. Then, to accommodate these conditions, the sixth proposal is for administrative reform. Other conditions, such as enhancing the relation between governmental, private sectors and the public are also important.

The implementation of these proposals is not supposed to be sequential. Rather, achieving these conditions should be sought simultaneously. This is especially true for administrative reform, which, for example, would be a basic requirement when implementing not only an enhanced legal base but also coordination in administrative processes. Some changes would be necessary to guarantee the efficacy of this reform. Awareness comes at the top of the list as it is severely lacking at present. Training and capacity building in all governmental sectors is needed. Lee (1988) discussed some training types, *inter alia*, 'on-the-job training'. Specialized 'on-the-job training' is necessary, as Syria lacks experienced, well qualified personnel.

Other parameters should be taken into consideration such as enhancing public participation; facilitating and encouraging the private sector to establish environmental consultancies; and establishing an effective Syrian Non-Governmental Organization (NGO) sector.

STRATEGIC ENVIRONMENTAL ASSESSMENT

The EIA Decree is supposed to be a base for implementing Strategic Environmental Assessment (SEA). However, the Decree does not satisfy the procedural and legal requirements of SEA. A cornerstone requirement is the need for a separate SEA Decree. Some conditions identified earlier for EIA, such as high-level political will and support, information management and co-ordination, would also serve the development of SEA in Syria.

EIA AND THE ENVIRONMENTAL STRATEGY OF NEAP

The National Environmental Action Plan (NEAP) for Syria was developed in June 1998. In NEAP, priority problems and priority actions were defined. On the other hand, 'enabling factors' to stop environmental degradation were discussed.

NEAP identified five strategic priority areas. The first, strengthening environmental management capacity within different governmental bodies, was considered a limiting factor for implementation of NEAP itself. Secondly came the need to review the policies encouraging the current misuse of land and water resources. The third priority was applying management systems, treatment facilities, environmental standards, emission limits, product standards and training that would protect human health against current pollution. The fourth strategic priority was the need for rural development and enforcement of urban planning norms in order to remedy the impacts of degraded urban environments caused by the increased urbanization. Lastly, the fifth priority dealt with protecting the degraded priceless Syrian cultural heritage, being one of the oldest human heritages (ERM 1998).

The overall goal of NEAP cannot be achieved without EIA. Effective EIA would minimize pressure factors and promote better planning and management of resources. It would ensure environmental factors were taken into consideration during the development and planning process. EIA would contribute in the internalization of environmental costs from an environmental economics viewpoint. The conditions identified for effective EIA in its crucial role of strengthening environmental management and capacity would be to improve the environmental planning and management institutions and complete the environmental legislation. At the same time, EIA would play a major role in coordination amongst different sectoral bodies and in raising awareness.

Notwithstanding, SEA is a key factor for the overall process. As a higher level of EIA, it would ensure that policies are environmentally friendly before dealing with the lower level of planning represented by projects. SEA plays the role of a framework for planning, which steers the general orientation of the development process leaving the details to be dealt with at the project level within EIA. An interactive integration of SEA and EIA

should be sought in order to accommodate the implementation of NEAP in Syria and to achieve better sustainable development.

CONCLUSIONS

Syria is in a phase of transition, which involves major economic activities and change. At the same time, the environmental resources in Syria are being continuously degraded. EIA, including SEA, is a tool that would promote the sustainability of the current economic progress by ensuring consideration of environmental factors at an early stage in planning and decision making. However, the current situation with respect to EIA in Syria has many shortcomings. These are mainly a lack of: binding environmental legislation; enforced procedural framework; communication, coordination and cooperation; awareness; experience; resources; and information. This is leading to inefficient EIA. Indeed, there are even specific shortcomings in the draft legislation. The lack of authority given to personnel responsible of EIA has originated from many causes, mainly the absence of binding law, and is considered a key element contributing to the current unsatisfactory situation with respect to EIA.

There is a need to enhance the current legal base and to bring it into effect. High level political will and support is considered to be the ultimate element that would resolve the existent hindrances. This element will ensure that the legislation is brought into force; establish a more efficient communication, coordination and cooperation between all stakeholders involved in the EIA process; speed the information flow; and promote the conditions required to accommodate all the other proposals, namely, administrative reform. Some improvements such as: national coordination and cooperation; promotion of the private sector; enhancing information management; the national GIS information centre; awareness and training programmes, would not only provide for an efficient future EIA, but for the general development of the country.

The cornerstone of sustainable development in Syria in the future is likely to be NEAP. However, the goals and priorities of NEAP will not be achieved without an effective and integrative implementation of EIA and SEA in Syria.

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Comprehensive planning for Naissaar Island, Estonia

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INTRODUCTION

The Nature of the pilot project of comprehensive planning and environmental assessment

In accordance with the Act on Planning and Building, approved on July 14, 1995, comprehensive planning should be established with the aim of setting the framework of territorial and economic development of each municipality in Estonia. This Act provides the basis for a planning reinforcement authority to require environmental assessment of the planning.

With Regulation of the Estonian Government No. 314 (1992), the requirement to conduct EA concerning both planning, programmes and development plans was established. The regulation includes stipulations concerning the procedure for conducting EIA for single subjects. However, it does not include concrete procedural rules for conducting EIA for strategic documents. At the time of passing the Regulation, the methodology for performing EIA in the course of developing planning, programmes and plans was not developed. Relevant experience was also missing at that time.

In order to fill in this gap, a special pilot project was initiated in the framework of cooperation agreement between the Finnish and Estonian Ministries of the Environment in the end of 1995. The objective was to conduct Strategic Environmental Assessment during the development of comprehensive planning for a selected municipality. The Finnish guidelines for organization of environmental assessment for comprehensive planning were used as a basis and the experience of Finnish experts in this area were drawn upon. The above also explains why not all rules for conducting EIA as defined in the above Regulation were punctually followed in the course of the pilot project.

The aim of the pilot project was to use the experience obtained throughout the EA process for development of a strategic environmental assessment methodology suitable for Estonian conditions.

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The focus and objectives of the planning project

The subject of the SEA to be conducted via the pilot project was to be Naissaar, an island located off the north coast of Estonia which belongs to the Viimsi commune (municipality). The reasons for this included the following considerations:

- No comprehensive planning had been developed for the island so far.
- The whole territory of the island belongs to the Nature Park (a protected area with recreational objectives) which was established in 1995 with Governmental Regulation No. 150–this sets certain restrictions to planning the nature management and human settlement of the island.
- For the last 50 years before Estonia's regaining of independence, the island was occupied by a Soviet army base–as a consequence, a number of areas have been severely polluted (with oil products and heavy metals).
- There was no civil population in the island. However, reprivatization of illegally seized land to former owners had already been begun; the highest value of the island is the natural environment itself with its virgin character and relative purity: 80% of the island is covered with forest, and numerous dunes, mire landscapes and species-rich plant communities are found.

The objectives of the pilot project included:

- focusing on environmental impact assessment of the developed comprehensive planning in practice;
- training of Estonian experts, authorities, planners and public in SEA;
- management of comprehensive planning process and the parallel conducting of SEA;
- promotion of the need to consider environmental aspects in the decision-making process;
- promotion of public awareness as an important aspect of SEA.

The objectives of Strategic Environmental Assessment included:

- consideration of environmental conditions in the planning process;
- promotion of the need to consider environmental aspects in the planning process;
- providing the public with a possibility to participate in the planning process;
- providing of environmental assessment to planning solutions;
- improvement of the quality of planning.

The key components of the SEA

In the environmental assessment of the planning, an attempt was made to cover all stages of theoretical strategic environmental assessment.

The first stage concerned determination of the aim and objective of the planning as well as of SEA. This included collecting available source data, mapping the existing conditions and development of the preliminary overview of environmental conditions. On this basis, the alternatives were defined, and identification of potential impacts and scoping was performed.

In the next stage, prediction was made of the scope and significance of the potential impacts, as well as of the assessment of the impacts. The process was continued with comparison of the alternatives, taking into consideration the unwished/negative environmental impacts of applying the alternatives in practice, and comparison of the options for mitigation of those impacts.

As a result of this comparison of alternatives, the optimum solution was determined which was developed into a planning proposal. As the planning proposal was developed, more specific EA was conducted and recommendations were developed for monitoring the state of the environment. In the end of this process, the final SEA report was compiled. This included the interim reports developed through the SEA stages as well as other relevant materials concerning the planning and SEA process.

Emphasis throughout the process was on public involvement and participation, with provision for public participation as well as public hearings. Public meetings were organised and group seminars held for interested parties.

NATURE AND SCOPE OF ISSUES

The main players of the SEA process

Through the different stages of the process, the planning initiator, competent authority, planning organisation together with environmental experts, decision-maker, and members of the public all participated in the activities.

The initiator in this case was the local municipality which in accordance with the Estonian Planning and Building Act is also the decision-maker (as concerns the context of EIA). Interests of the municipality were related to strategic land use planning and planning of the natural as well as cultural environment, taking into consideration criteria of sustainable development and the development objectives of the municipality. The municipality was also interested in considering the environmental conditions with the aim of preserving most of the island in its natural state, as well as in finding the optimum solutions to potential conflicts of interest between the different parties (i.e. state, municipality, future land-owners and other parties).

The objective of the local municipality as the decision-maker was the approval of comprehensive planning which would meet all legal requirements as well as everyone's interests.

An important role in the conducting of the SEA was played by EIA experts–in this case, environmental experts from Finland and Estonia. These experts conducted the environmental inventory and analysis of the planning territory, determined the factors of impact and assessed the potential impacts of the different activities. Their task was to cooperate with planning experts, manage the SEA process, cover all stages of SEA, and draw up the final report.

The competent authority in this SEA process was the county (regional) government which is supervisory body for the comprehensive planning. Its task was to review the final SEA report (together with comments on it from the public), determine that the planning meets valid requirements, supervise the consideration of national interests, and find solutions to conflicts arising in the course of the process in case this is not otherwise stipulated. The county government was also responsible for setting requirements for the putting into practice of activities following the comprehensive planning process, as well as for monitoring of the state of the environment.

The largest group participating in the SEA process was undoubtedly the public–interested persons or persons potentially affected by the planning. These included future land-owners, associations of scientists, entrepreneurs, professional societies/unions, movements, and other private or legal persons. The aim of participation in the process was to represent interests related to development of the planning territory, assisting in specification of the problems coming up in the process, and making sure that their interests would be duly considered at decision-making.

PROCESS AND PROCEDURAL CONTEXT

As stated above, the project was carried out in cooperation with the Finnish Ministry of the Environment and with a clear training component. Therefore the process was conducted following the methodology used in Finland for SEA of comprehensive planning.

The EIA system in which SEA took place

The procedure for conducting EIA in Estonia was established with Governmental Regulation No. 314 of November 13, 1992, which stipulates the terminology to be used in this area, the procedure for collection and distribution of materials, the procedure for conducting EIA concerning a single project, and the rights and responsibilities of different parties, as well as the options for solution of conflicts arising in the process of EIA.

Depending on the specifics, location and scope of the EIA object/project, EIA projects of the national and regional level are distinguished between.

Lists of activities which are subject to national and regional EIA, respectively, are given in the Appendix of the Regulation.

In the case of all projects of national importance as well as of projects of first rank regional importance, the conducting of EIA is mandatory.

The requirement for conducting EIA concerns not only new (planned) activities but also projects for which reconstruction, liquidation or change of ownership is planned.

With Regulation of the Minister of the Environment No.8 of March 14, 1994, 'Methodological guidelines for conduction EIA in Estonia' were approved. In this document questions not stipulated in the above Governmental Regulation are settled. Some stipulations are further specified; guidelines concerning data to be submitted by the proponent to the competent authority are given. The regulation also includes guidelines for EIA experts (or expert groups) for drawing up an EIA report.

In accordance with the Act on Sustainable Development, EIA is mandatory assessment of planned activities such as projects, programmes, planning, in order to judge whether they meet environmental requirements and the main principles of sustainable development, with the aim of finding the optimum alternative. The objective of EIA is to conduct the assessment of information concerning the potential environmental impacts related to the project, as well as concerning the feasibility of the planned use of natural resources and the efficiency of preventive and mitigation measures.

Key principles of EIA according to the Governmental Regulation

As each new project needs to be approved by environmental authorities, the local government (municipality) in its role of decision-maker submits data and materials received from the proponent to the environmental department of the county government which then decides on the necessity for conducting an EIA.

The Governmental Regulation concerning the EIA procedure defines lists of areas of activity which are likely to cause significant environmental impacts, for the environmental approval of which the conduct of an EIA at the national of regional level is required.

For regional level EIA projects, the conducting of EIA is organised by the district environmental department. In the case of a project subject to national level assessment, the materials are forwarded to the Ministry of the Environment for conduct of a national level EIA.

After taking a decision concerning the necessity for conducting an EIA, the competent authority (at the regional level–district government, at the national level–Ministry of the Environment) informs the proponent and publicly announces the decision to conduct an EIA. The competent authority either decides on the EA experts or announces public tender to find experts.

The experts conducting the EA have to be licensed for this by the Ministry of the Environment and have a valid license. The competent authority together with the experts decide on the areas of EA and draw up the EA programme.

The experts conduct the EIA, in the course of which the following main stages of the process need to be covered:

- processing and analysis of source data;
- analysis of public reactions and opinion;
- investigation and description of potential impacts of the development on the environment ;
- presentation of alternative solutions;
- identification of key impacts and scoping;
- prediction and assessment of impacts' magnitude and significance (including those on the social and cultural environment as well as on public health);
- analysis of the scope and effectiveness of mitigation measures;
- comparison of alternatives and selection of the optimum alternative.

After completing these stages, the EIA report for which a guideline has been approved with the ministerial regulation is compiled. The competent authority submits the draft version of the EA report for comments to the public and to interested parties. After receiving the comments from the public, the competent authority analyses these and appends them to the EIA report.

The competent authority submits to the decision-maker its opinion and the requirements based on the EIA report. It is also entitled to require that the proponent conduct environmental monitoring after the completion of the project at the proponent's own expense.

The decision-maker takes a decision based on the EIA concerning the implementation of the project, issues a construction permit, and informs the public about its decision.

The conduct of the EIA is financed by the proponent. The conclusions of the EIA are considered valid for two years. The environmental restrictions and requirements set by the competent authority on the basis of EIA are mandatory for the proponent.

Interrelations between EIA and the permitting and decision-making process

The need to conduct an EA may be brought about by a desire to start a planned activity for which the proponent needs to apply to the local government for a construction permit. Later, permits concerning use of natural resources might also be necessary. These are issued by the environmental department of the county government. Thus, EIA precedes

the process of issuing permits (designing permit, building permit and utilisation permit of natural environment and resources, and permits for emitting pollutants and disposing of wastes into the environment).

Conclusions drawn on the basis of the EIA results are in the form of recommendations to the decision maker. If the decision-maker cannot consider the EA conclusions in making its decision, it needs to justify this and take into consideration the possibility that interested parties not satisfied with the decision have the right to take legal action.

Environmental assessment of strategic documents.

The EIA Regulation stipulated that national concepts, programmes and development plans of areas related to nature management as well as land use planning are subject to SEA. For acts, regulations and strategies approved by the Riigikogu (Parliament of Estonia) and governmental regulations, the conduct of SEA is currently not legally required.

Based on the Act on Sustainable Development, interrelations between programmes, development plans and planning drawn up for development of economic activity and for balancing economic activities with the state of the environment and nature management can be pointed out. These programmes include:

- National programmes of areas of most significant threat to life and natural environment
- Development plans for an environmentally highly threatened region
- County Planning
- Comprehensive planning for municipalities
- Detailed planning in municipalities (which prepares building activities for the nearest upcoming years)
- Building projects

In the development of all the above mentioned strategic documents, the state of the environment needs to be considered; environmental analysis has to be conducted and environmental impacts need to be assessed.

Decision-making process in which the SEA took place

The EA conducted in the course of the planning process (of the pilot project) was managed by a planning working group (which included environmental experts) in cooperation with representatives of the local government. The county government in its responsibility for supervision concerning the planning was regularly informed about the progress. The county government was also responsible for reviewing and approving the SEA report. The local government considered the EA results both at making the

intermediate decision–selection of the suitable alternative–and at making the final decision–approving the planning.

It should be emphasized that the conclusions drawn by experts are not binding to the decision-maker. The EA report provides the decision maker with objective data facilitating decision making. It is up to the decision-maker to use this information or not. If the decision maker decides to ignore the conclusion made by experts, such a decision should be justified well enough to convince the public.

In accordance with the Act on Planning and Building, comprehensive planning of a municipality or town defines the main functions for use of the territory as well as the requirements concerning use of land and water areas and restrictions to building/construction activities. Thus, comprehensive planning is not directly related to building/construction activities and does not provide bases for issuing of construction permits not permits for use of natural resources. However, requirements concerning use of landscapes and natural communities are established with comprehensive planning and, if necessary, recommendations concerning the taking of land areas and single objects into protection or making of amendments in their protection rules can be made.

CASE ANALYSIS

In the process of development of the comprehensive planning environmental assessment was divided into stages.

Both the mentioned processes were carried out in parallel and were closely connected, contributing to and having influence on each other.

The stages of the planning and EA process

Planning	Environmental Assessment	Public Participation
0. Preparatory activities, development of work schedule	0.Preparatory activities, development of work schedule	Information on the initiated planning
1. Development strategy Source data and investigations Development objectives	1. Environmental aspects of the strategy Environmental investigations Environmental objectives	Public discussion
2. Proposing of development alternatives (planning alternatives)	2. Programme for environmental assessment Scoping	Public discussion

	Prognosis of magnitude and significance of impacts for relevant alternatives Additional investigations	
3. Draft planning proposal	3. Preparation of SEA report on preferred alternative (draft planning proposal)	Public discussion
4. Planning proposal	4. SEA report	Public display and consideration of the results of the public display
5. Implementation of the planning in practice, monitoring	5. Implementation of mitigation measures Monitoring and post-auditing	

First stage

The first stage of the process proved to be very effective thanks to the involvement of representatives of district and commune authorities, land-owners of the area and representatives of other interested parties. With their participation the first public meeting was held where SWOT analysis (strengths, weaknesses, opportunities, threats) was conducted among the participants. At the meeting, the initial opinion of the different parties was defined, and problems of the island and development possibilities of the territory were identified.

Second stage

The second stage of the planning process was also successful. It was begun with planning the development alternatives. In parallel to this, the state of the environment of the island was further investigated on the basis of available data and site visits with the aim of identification of influencing factors and scoping the topics to be considered at the conducting of the EA. Four development alternatives were drawn up by the planning and EA working group; the fifth alternative was added later from outside this group. The proposed development alternatives for Naissaar were the following:

Alternative 0-	The island is left by itself, without any concrete action plan developed (No-action alternative)
Alternative 0+	Necessary cleaning up is performed in the island, small-scale building activities and use of the island is possible
Alternative 1	Increase of local population as well as tourism and recreation activities, development of the service sector and construction activities
Alternative 2	Considerable increase of local population as well as tourism and recreation activities, construction of new roads in the island, varied service sector, regulated movement
Alternative 3	A theoretical alternative based on the principle that activities are concentrated in the very south and north end of the island. The extreme option for this alternative foresees the settlement of tens of thousands of people in the island

For identification and assessment of environmental impacts, the matrix analysis method was used. Environmental components, at which impacts arising from implementation of the planning would be directed, were presented in horizontal lines:

- nature and landscape (ground and surface water; weather; fauna; biological diversity; etc.);
- structure of population and man-made environment (buildings; facilities; infrastructure; historical heritage; etc.);
- man and society (living; working; service; health; safety; private property, etc.);
- activities bringing about the impacts (presented in vertical columns);
- activities causing the impacts: short-term activities (construction; risks; dangerous situations; etc.) and continuous or long-term activities (living; tourism; recreational activities; traffic; economic activities; etc.);
- description of the impacts (frequency; scope; strength; etc.);
- the significance of the impacts; and
- possibilities for avoiding or mitigating the impacts.

The identified factors of influence were assessed in broad categories so as to facilitate easier understanding of the differences between alternatives as concerns their environmental impact. As a result of this matrix analysis, activities causing significant negative impact were identified as well as environmental components which would suffer the most from those activities.

At the second public meeting, the planning process and EA process were introduced, development alternatives of the comprehensive planning were described and their potential environmental impacts were commented upon. Representatives of the interested parties participated in conducting the matrix analysis, as a result of which the vision of the public concerning the environmental impacts of the alternatives was presented. The positions of the working groups differed mostly in their emphases, however, some conclusions could be drawn on the basis of those.

Environmental experts of the working group continued working more thoroughly on the significant environmental impacts as identified with participation of the public.

Special attention was paid to landscapes, coastal plant cover, sand dunes and mire areas. Ground water quality was analysed and factors influencing the diversity of fauna, flora and landscapes were investigated. Impacts on the social environment, especially on security, structure of the society, recreational activity, quality of the living environment and land use were also considered to be of high importance. In the assessment process, potential risks associated with development of the transport system and tourism, forest (timber) processing and waste management were analysed. In parallel with assessment of the impacts, analysis of their mitigation measures and the efficiency of those was conducted.

In this stage of the planning process, comparison was made between the environmental impacts of the alternatives considering the opinion of both the environmental experts, the public, interested parties and officials. As the interests and wishes of all participants in the process coincided in this case, the selection of the optimum alternative proved to be easy.

It was decided that development alternative No.1 would be taken as the basis for drawing up of comprehensive planning as this was most easy to be merged with environmental requirements and would still enable settlement and recreational activities on a modest scale.

On the basis of alternatives presented in the planning as well as SEA results, the municipality also decided to take development alternative No.1 as a basis for drawing up the planning proposal.

Third stage

In the third stage of the planning process, work was continued with developing a planning proposal based on the selected alternative, in the course of which attention was focused on the characteristic features of this option and on the finding of planning solution. In parallel to this, the potential environmental impacts were further specified and final assessment was given to those together with recommendations concerning measures for prevention or mitigation of environmental damage.

The third public meeting was held, at which the draft version of the planning proposal was introduced to participants. Both positive and negative environmental impacts and their mitigation measures were described. Comments and proposals of representatives of the public concerning mitigation measures were presented and discussed.

Documentation of the SEA process and SEA report

Documentation of the more important topics as well as of positions influencing the progress and decision-making throughout the process facilitated the compilation of the final EA report. At the development of the report, earlier interim reports were made use of and more detailed assessments concerning the environmental impacts of the planning proposal were added. The report also included recommendations concerning the mitigation measures to be implemented while applying the comprehensive planning in practice. The necessity for monitoring was discussed and guidelines for organisation of monitoring of environmental components in the island were given.

Before presenting the planning to the public, the county government (competent authority) reviewed the planning proposal and draft SEA report and made its decision concerning the necessity of additional approval of these documents.

After that comprehensive planning was introduced to, and officially approved by, the neighbouring municipalities and all relevant authorities. In accordance with the Act on Planning and Building the proposal was put on public display for four weeks, together with the EIA report. During this time, it was possible to submit comments concerning the planning. The views presented during the public display period were analysed and incorporated into the planning.

Supervision of the Planning and EA report

After public display of the documents, the county government verified whether:

- the planning met the requirements of sustainable development and all valid legal requirements;
- environmental objectives were duly taken into account and measures for solving environmental problems were foreseen;
- conditions necessary for maintaining environmental quality were met;
- the conducted environmental assessment was sufficient and the report included all necessary data;
- the conditions for participation of the public in the process had been sufficient.

Public opinion and comments were considered at the making of decision.

The whole process of development of the comprehensive planning for Naissaar took 17 months having started in December 1995, and being completed in April 1997, with the approval of the comprehensive planning.

Evaluation of the SEA process

SEA conducted in parallel to the development of comprehensive planning resulted in directing the planning process already in its course towards environmentally sound solutions, while taking into account the interests of different interested parties related to the planning territory. As a consequence, no considerable problems or seriously differing opinions arose in the final stage of the planning–the implementation stage.

One of the most important and successful stages of the process was public involvement and participation. Timely and early informing of the public enabled the avoidance of conflicts, finding new creative solutions and receiving information concerning the preferences of interested parties and inhabitants. Good organisation of the public involvement process made it possible to avoid the situation in which changes would need to be made in the planning implementation stage.

The effectiveness of the process was also enhanced by the division of the planning and EA process into stages. Thus, it was easier to scope the topics to be considered, focus attention on the key problems and recommend alternative solutions to those. In the course of the intermediate stages it was possible to obtain varied information for solution of the identified problems and to analyse the potential impacts of decisions made in the course of the process.

More important facts were documented during each stage, and identified problems together with the assessments and recommended solutions as well as interim decisions were presented in written form.

The opinion of the competent authority concerning the effectiveness of the process was positive. The implemented pilot project proved that the integration of EA into the very process of development of planning is the only way to reach a solution optimum from the viewpoint of both the natural environment and the society while using the minimum of resources.

Officials of the local government considered the process of development of the planning highly useful and informative and they were also impressed by the rational use of both time and material resources throughout the process. The fact that environmental impact assessment was carried out in parallel to the development of the planning considerably facilitated the process of approval of the planning and decision-making.

The weakest aspects of the process were the following:

- Source data concerning the state of some environmental components of the island were partly lacking. Gaps and partial insufficiency were

identified in data concerning biological (mainly faunistic) and geological (especially concerning the genesis) and geomorphological information. Consequently, the identification of environmental impacts in these areas proved to need further investigation.

- While considering development alternatives, the possibilities for making changes among the areas reserved for different types of activities were not well enough considered.
- The role of the decision-maker (the municipality) appeared to be relatively modest since the municipality could not adopt intermediate decisions sufficiently fast. The main deficiency was the lack of experience in planning and EIA, and some ignorance in environmental law and regulations.

Enforcement of the planning

The comprehensive planning approach was adopted by the municipality in April, 1997. The comprehensive planning has to be followed by detailed planning for dense settlements and for building and land use in dispersed settlements. Since the process of land and property restitution is still under way and permanent transport connections as well as an energy supply network are lacking, implementation of the comprehensive planning is in its initial stage as yet. Thus, it is currently not possible to emphasize specific results nor evaluate the effectiveness of implementation and the validity of the predicted environmental impacts. As of today, there is also no feasible need and possibility of establishing a monitoring system on the island.

NOTE

The objective of the pilot project was development of a landuse plan for a municipality. The main aim of decision-making concerning land use within the selected planning territory was the maintenance of a Nature Park together with development of recreational activities and restricted residential building.

The stages of SEA as covered during project implementation are given in the 'Case Analysis' part of this case study.

Key words

comprehensive planning

public participation

Strategic Environmental Assessment

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Progress of environmental impact assessment and its methods in Colombia

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ABSTRACT

The following paper is developed in two parts, the first of which is an overview of the history of environmental impact assessment in Colombia, from its beginnings in 1974 to the present. The second part is a critical review of nine Environmental Statements produced in Colombia between 1997 and 1999, focusing on the following new elements of analysis: Environmental Risk Assessment (ERA); Regional Development Environmental Impact Assessment (RDEIA); and Social Impact Assessment (SIA). Additionally, a search was carried out to locate studies on Strategic Environmental Assessment (SEA).

EIA HISTORY IN COLOMBIA

Colombia has a 25 year experience in applying environmental assessments to development proposals which are potentially harmful to the environment. It became the first country in Latin America to face the environmental movement of the 70s by issuing, in 1974, the Law 2811/1974: 'Code for the Renewable Natural Resources and Environmental Protection'.

Among many other things, this Law, with its 340 Articles, established basic concepts about the environment as a common property of society, established an environmental policy, defined regulations for the management of all natural renewable resources and established what was called the *Declaration of Environmental Effect*. This Declaration implied that investment projects should be subjected to an ecological and environmental study, which included economic and social aspects, in order to be awarded a Licence that would allow their final development.

Although the approval of this law was very important for the country, some major restrictions affected the EIA implementation process. Three of the most important obstacles were:

- the lack of well-trained professionals in the new area of expertise;
- the generalized social belief that environmental matters were not important; and
- the fact that Inderena, the decentralized institution responsible for environmental matters and the implementation of the new law, was

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nevertheless a dependant branch of the Ministry of Agriculture and thus limited in its sphere of action. This means that important sectors of the national economy such as health, infrastructure, industry, oil, mining, urban problems, etc., all independent ministries, would often question Inderena's authority and undermine the impact of the its actions.

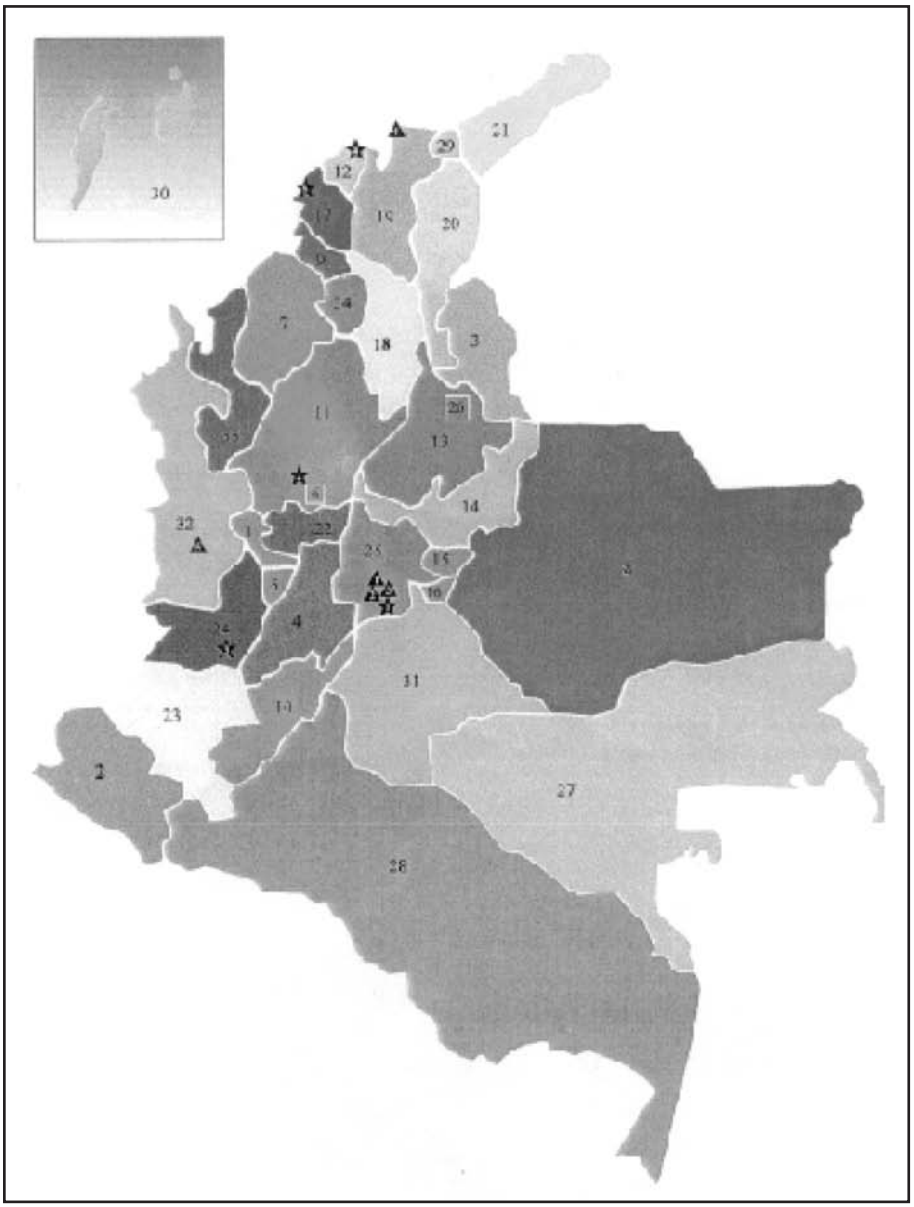

Figure 1: Colombia – Regional Autonomous Corporations

After several years of discussions, consultations and political debate, and with pressure originating in the results of 'The Earth Summit', Rio 1991, the

Ministry of the Environment of Colombia was created through Law 99 of 1993, with sustainable development as the fundamental basis for the new environmental legislation.

Beside the many different aspects of sustainable development, environmental processes and public involvement, the Law clearly defined the EIA process, the requirements for obtaining the environmental license to build and operate projects and, if so required, the submission of an environmental alternatives analysis of the proposed project.

This Law defined 31 geographical areas called Regional Autonomous Corporations (see Figure 1) and established that the administration of the environment and the natural renewable resources in the national territory will be managed by these Corporations. At the same time, the Law defined the type of projects that, due to their characteristics and magnitude, must carry out all formalities required to obtain the environmental license directly with the Ministry and those who must do it with the Regional Autonomous Corporations.

EIA-RELATED ACTIVITIES OF THE MINISTRY

As has been described, many different – and independent – authorities take part in the EIA decision-making process in Colombia. For this reason, one of the principal fields of action of the Ministry has been the preparation of procedures, guidelines, handbooks, and even ToR's for some specific types of projects. Consultation with private sector has been used to produce most of the new norms, a positive feature since the developers themselves have been active participants in defining the compromises to which they will comply later on. Other fields of action of the Ministry have been the training of Corporation personnel and the design of guidelines for their EIA work.

From January 1994, when it began activities, to March 1999, the Ministry has received 1536 environmental statements for analysis and consideration for awarding of Environmental Licences, distributed by sectors as follows:

Infrastructure	493
Hydrocarbons	753
Agrochemicals	104
Mining	49
Electrical	137

There are no statistics about the number of Environmental Statements received by the Regional Autonomous Corporations.

One crucial issue in the working relationship between Ministry and Corporations has to do with quality control of the EIA process. The Ministry has enough experts in different areas to integrate teams for the review and evaluation of Statements, to determine whether or not these were adequate

and whether or not the quality and quantity of information is sufficient. This does not happen in most of the Corporations, largely due to the permanent budget problems that cause a lack of proper personnel, both in number and in training.

CRITICAL REVIEW OF RECENT ENVIRONMENTAL STATEMENTS

Taking into account that environmental assessment practice and theory keeps growing and new methodologies are proposed and implemented in the process, it was decided to specifically review how and to what extent the following techniques are being introduced in Colombia's environmental assessment studies:

- Environmental risk assessment (ERA)
- Regional development environmental impact assessment (RDEIA)
- Social impact assessment (SIA)
- Strategic environmental assessment (SEA).

Nine recent (January 1997 - February 1999) environmental assessment studies presented to the Ministry of the Environment were reviewed, all of which correspond to major projects in Colombia: oil exploration (3); mining (2); electrical sector (2); roads (2).

The Environmental Statement Review packag*e* (Lee and Colley, 1990), with some adjustments, was used as a guideline to carry out this exercise. Four review areas were included:

- Description of the development, local environment and base line conditions
- Social impact assessment
- Environmental risk assessment
- Regional development environmental impact assessment.

The assessment symbols used were:

A. Relevant tasks well performed, no important tasks left incomplete

B. Generally satisfactory and complete, only minor omissions

C. Just satisfactory despite omissions and /or inadequacies

D. Parts are well attempted but must, as a whole be considered unsatisfactory because of omissions and/or inadequacies

E. Not satisfactory, significant omissions or inadequacies

F. Very unsatisfactory, important tasks poorly done or not attempted

NA Not applicable– the review topic is not included in the context of this statement.

Assessment	*Review Areas*			
	1	*2*	*3*	*4*
A	1	0	3	NA
B	7	0	2	NA
C	1	0	1	NA
D	0	9	2	NA
E	0	0	0	NA
F	0	0	1	NA
Total	9	9	9	9

The overall assessment of the quality of the nine statements in relation to the four review areas is shown in the table above. The findings clearly show that enough expertise is available to describe the development, purposes and objectives, its size and appearance within the receiving environment, the site description, types and quantities of residuals and/or waste matter, the geographical extent of the affected environment and its description, and baseline conditions.

A social component was included in all statements in a descriptive way presenting general and specific data, but without developing a process of identification of impacts and effects of the proposed project on individuals and the social system around the area of direct influence of the project. For this reason, no analysis oriented towards identification and evaluation of key impacts and alternatives and mitigation measures was undertaken.

Risk assessments were found to be quite satisfactory, developed with clear methodologies and reaching conclusions that afforded good recommendations for the environmental management plan, a component that all studies should present to the Ministry of the Environment.

Regarding the fourth review area, Regional Development Environmental Impact Assessment, it is a source of some concern that none of the statements even try to make a general presentation of this topic in relation to the project. As practice has proven, the project-based methods of EIA alone cannot meet the requirement of controlling the total amount of pollutants and rational industrial location; furthermore, the project-based approach cannot deal effectively with the cumulative effects induced by the interaction between projects.

The last element evaluated was the Strategic Environmental Assessment. Knowing that strategies and policies are essential for economic growth and environmental protection, and that ineffective public policies could contribute to environmental pollution and deficient levels of sustainable development, studies, guidelines or standards were ineffectively sought. Although it is clear that the Ministry recognizes the importance and urgency of establishing this new type of environmental assessment, it has not defined an immediate course of action toward this goal.

CONCLUSIONS

Important advances are continually being carried out in Colombia under the leadership of the Ministry of the Environment, the availability of guidelines

and procedures by sectors and for specific projects, being the fundamental tool for the consolidation of an efficient EIA process.

The environmental administrative structure, with over 30 autonomous environmental authorities, requires continuing efforts on the part of the Ministry of the Environment to promote and maintain the quality of the EIA process.

Environmental Risk Assessment is methodologically well handled within the environmental statements in the larger projects under the direct control of the Ministry. It is necessary that the Ministry divulge these experiences to the Corporations.

Social Impact Assessment is not being addressed. As its name would indicate; the topic is always touched upon in the Statements, but merely in a descriptive way and without developing a process of identification of impacts and effects. The Ministry should prepare and distribute detailed guidelines and train EIA practitioners on this matter, using the vast amount of information already available on this topic.

Except some general comments found in one of the reviewed Statements, the topic of Regional Development Environmental Assessment is not developed in the studies. The Ministry must carry out similar actions as those suggested for SIA.

Finally, although the importance and advances in the field of Strategic Environmental Assessment are recognized, it is necessary that the environmental authority begins as soon as possible to train practitioners and from there begins a process of preparation of procedures and guidelines on the subject.

LIST OF RELEVANT PUBLISHED PAPERS AND OTHER SOURCE MATERIAL

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Key words

strategic environmental assessment

EIA **quality**

EIA **progress**

Advancing the EIA system in the Philippines

Maya Gabriela Villaluz

THE PRESENT SYSTEM

The Philippine Environmental Impact Assessment (EIA) System was formally established in 1978 with the enactment of Presidential Decree no. 1586. The institutionalizing of its implementing rules and regulations was completed four years later. A number of laws have been passed through the years aimed at strengthening, expanding and refining the existing systems and procedures. The Department of Environment and Natural Resources was given the task of administering the EIA system through the Environmental Management Bureau and its regional offices. Projects with potentially significant environmental impacts were categorized either as environmentally critical or located in environmentally critical areas. Projects under the first category had to undergo full-scale EIA studies while those in the latter category were submitted to Initial Environmental Examinations. Government entities were given mandates to establish their own environmental units, integrate environmental concerns in their planning and project cycles and assist in expediting the review process.

A detailed procedural manual issued in 1992 discussed the step-by-step procedure in the preparation and review of Environmental Impact Statements. The manual contained guidelines for (among other things):

- the form and content of the documentation requirements;
- the conduct of consultations to show proof of social acceptability;
- the composition of the external Review Committee;
- the allocations in an Environmental Guarantee Fund; and
- the creation of a multi-partite Monitoring Team.

The second edition of the manual provided a detailed discussion of the guidelines in the conduct of the following:

- scoping
- the procedural and substantive review
- Environmental Risk Assessment
- Environmental Management Plans
- public hearings and consultations.

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A window for an accelerated processing of applications was opened to proponents who chose to contribute to an Environmental Review Fund that was set up to defray the cost of pooling a dedicated team of external experts to review and process the applications. The accelerated processing time should be no more than 120 days. An average contribution would be around half a million pesos (13,160 USD) per project. A breakdown of the cost of review is also provided in the manual.

In spite of its strengthened features, there is a mounting concern that the EIA system, even in combination with existing environmental legislation, is still not enough to combat the escalating deterioration of the environment. In response to this concern, the government is implementing a number of projects aimed at pilot-testing the integration of different strategies and frameworks in environmental management.

ISSUES AND CONCERNS

Intent and timing of the EIA process

The EIA system has been largely perceived as catering only to the needs of the industrial sector. The predominant practice is to subject to an EIA study specific projects in pre-determined locations rather than analyze the environmental impacts of a mix of projects and locations. In many cases, a major stumbling block to the EIA process is the lack of a deliberate move from all sectors to embark on the process right at the beginning of the project cycle. This dilemma is compounded by the seemingly lack of political will to ensure earlier assessment.

Institutional capacity of the implementing agency

Devolving the task to the regional offices to issue and monitor environmental clearances covering the whole range of projects is taking a long time to implement, due to the lack of both competent government personnel and readily available expertise and resources at the national and local levels. The law itself did not create permanent career positions for EIA professionals in the government service.

The regulations do not prescribe the methodologies to be used during the conduct of the study; neither do the reviewers verify it during in their review of the EIS. There still remains a large gap in the procedural guidelines of the review. The monitoring capability of government needs a lot of strengthening. There are no programmes in place, no equipment available, and there are not enough trained staff or accredited laboratories to analyze the samples.

Due to the absence of baseline environmental data, consultants generally have to gather baseline information for every EIA study they conduct, or collect secondary data generated by similar studies, which in many cases are

scanty and unreliable. More often than not, the period of sampling is shortened and does not capture the varying conditions attributable to the changing seasons and other natural or man-made phenomena. There is no central repository of environmental data that can be easily accessed by the consultants or stakeholders nor is there a database of the baseline information contained in the various EIA studies submitted.

There is also an apparent lack of coordination and an overlapping of functions between the government agencies making the process more circuitous, time-consuming and ineffective.

For the most part, public hearings and public consultations are haphazardly conducted and poorly presented due to time constraints and the lack of skills within government to handle social issues. Documents are not freely accessible to the public due to fear, uncertainty and a lack of experience in handling seemingly contentious matters.

RECOMMENDATIONS

The Government should strengthen the use of the EIA system as a planning and monitoring tool rather than a command and control instrument in order to optimize scarce resources and effectively implement the system. The government needs to rationalize its present structure in order to provide opportunities for growth and satisfaction to its personnel. Training and career opportunities should also be provided to keep experienced and competent staff from leaving the government service.

The methodologies used in the preparation of environmental assessment studies, the conduct of reviews and the monitoring of compliance should be apparent to the stakeholders. Systems should be put in place so as to raise confidence among the stakeholders involved in the decision-making process. It is of the utmost importance that transparency in the conduct of the study should be observed in order to maintain the impartiality of the entire process. The accreditation of the consultants and the reviewers should be strictly enforced in order to maintain the integrity and the professionalism of the process.

There should be a dedicated commitment from the government to strengthen the laws, rules and guidelines pertaining to the EIA system. There is a growing need to integrate the different environmental regulations into one coherent law so as to make the entire process more effective and consistent. Legislation should reflect the present aspirations of society and should not delay in addressing those needs. The public should be given the right to participate in, and be informed of, the decisions made in matters concerning the environment so as to increase their awareness and participation in a process that greatly determines their well-being and their entire future.

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Key words

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EIA of the proposed midlands dam project: Mauritius

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ABSTRACT

The Midlands Dam project will, upon completion, constitute the largest reservoir in Mauritius, transferring water from a relatively wetter region to the drier northern districts. Four hundred and thirty eight hectares of predominantly forest/scrub land will be lost and about 250 squatter-residents will have to be relocated. In view of its wide ranging environmental impacts, both on-site and off-site, an impact assessment was prepared to enhance project acceptability and identify measures aimed at mitigating the negative impacts. The full EIA followed an earlier scoping exercise that identified the significant impacts. However, in the absence of reliable environmental baseline data, the assessment adopted a 'best professional judgment' approach. This paper highlights the main features of the project and the procedural context within which the EIA was prepared, and discusses some of the main issues that need to be addressed to improve the whole EIA process.

INTRODUCTION

The Midlands Dam project involves the construction of a 42 Mm3 reservoir in two phases (25 Mm^3 + 17 Mm^3) to enable the transfer of water from the relatively wetter central part of the country to the drier northern districts. As legislative requirements provide for the preparation of an environmental impact assessment for projects that may have adverse effects upon the environment, the proposed development was subjected to the statutory EIA process. The main objective was to provide for a formal mechanism to ensure that the proposed development is environmentally sound and sustainable and that the concerns of all affected parties were thoroughly addressed. It aimed at enhancing project acceptability by maximizing the benefits while minimizing adverse impacts. The process was also encouraged by aid donor agencies and countries as they are increasingly relying on ElAs to arrive at better informed decisions.

The reservoir project was initiated in response to the growing demand for water in the northern districts of the island. This region has in fact witnessed an above national average rate of urbanization over the past two decades and present water storage capacity needs to be increased to satisfy future

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water demand for residential, irrigation and industrial purposes. The dam will upon completion be the largest in Mauritius and will involve the construction of an embankment-type earth fill dam founded on natural ground, a spillway structure, an outlet canal, and a new road to replace those feeder roads that would be flooded. The project will also entail significant quarrying activities close by to provide for aggregates.

NATURE AND SCOPE OF ISSUES

The dam and reservoir sites involved represent little ecological interest, except as the last known natural habitat for an endemic plant, the *Crinum Mauritianum*, which has been the focus of research in cancer treatment. The sites also support the last few remaining natural populations of the rush (*Juncus Bulbosus*) in Mauritius. Water quality issues were, however, considered more significant taking into account national physical development planning proposals to allow urbanization of sections of the reservoir's catchment area. In terms of land conversion, the project was considered to be in line with government policy to convert land presently under tea to more profitable uses. Of the 438 hectares of land that would have to be flooded, 410 hectares are forest/scrub land. With adequate mitigatory measures, environmental protection policies would be largely satisfied. The most sensitive issue, however, related to the relocation of about 240 people, all squatters on an abandoned tea village that would be flooded. The off-site impacts were also considered to be significant enough to warrant investigation. Such impacts related to reduced water flows downstream, increased sewage volumes as a result of improved sanitary facilities, and increased agricultural production following increased availability of irrigation water.

PROCESS AND PROCEDURAL CONTEXT

After nearly two decades of unparalleled and sustained high rates of economic growth, there has been growing concern that the fragile environment of the island may have been severely degraded and that, if corrective actions are not introduced immediately, future economic development may be jeopardized. In the late eighties, the Government adopted an environmental action plan thereby committing itself to sustainable development. Such commitment was further stressed at international meetings and by actively participating in a number of international programmes. The Government's aims are, specifically, to:

- increase efforts to mitigate the adverse effects of environmental degradation;
- monitor environmental performance of industries, commercial concerns and the agricultural sector; take strong and pro-active action on emerging environmental issues facing the nation;

- build partnerships with community groups, non-governmental organizations, business and industries; and
- facilitate public awareness and provide educational opportunities for people to learn about conservation and sustainable human development.

The enactment of the Environment Protection Act (EPA) in 1991 was another milestone in the country's effort towards sustainable development. In line with provisions contained in Section 13 of the Act (as amended in 1993), ElAs are therefore being increasingly introduced into the national decision-making process and are basically aimed at alerting the decision-makers to the consequences of the proposed development for the environment. The process is also applied with regard to more vigorous policies enunciated by international funding agencies and aid donor countries who want to ensure that development projects they are funding do not conflict with local environmental protection objectives. This follows Principle 2 of the Rio Declaration on Environment and Development which stresses the responsibility of nations to avoid causing damage to the environments of other nations.

The impact assessment carried out in connection with the project under reference is furthermore structured along several internationally accepted principles which emphasize preventive, holistic, strategic approaches to environmental protection. It is thus guided basically by four principles laid down in the EU Programmes on the environment, namely:

- prevention is better than remedial measures;
- environmental damage should be rectified at the source;
- the polluter should pay the cost of measures taken to protect the environment; and
- environmental policies should form a component of other policies.

EC Directive 85/337 contains information on the methods used in environmental impact assessment. The guidelines laid down by the World Bank have also been extensively utilized to determine the significance of potential impacts of development projects. Finally the principles laid down by local regulations have been adhered to.

APPROACH TAKEN

The impact assessment followed a scoping stage undertaken by a different consultant. Though the findings of the scoping team enabled the EIA team to focus their attention on a certain number of issues, GIBB Environmental (UK) decided to carry out a full project screening exercise. Sessions were arranged with almost all interested parties, which included government departments, NGOs, individual scientists and other consulting firms. A report summarizing the meetings and the findings was produced and

circulated among a restricted group of interested parties. Once the Consultant was certain that no significant element was missing, the full EIA was prepared and a draft report produced. The Client was required to submit comments and once feedback was obtained, the report was finalized. As required by law, the final report was submitted to the Department of the Environment for approval. This process included a 21-day public consultation and comment period.

In preparing the report, the Consultant made use of a couple of local consulting firms. This is in line with recommendations of organizations like the World Bank which try to encourage greater participation of local expertise in major projects with a view to enhancing local capabilities. Other foreign teams were pulled in to constitute a multi-disciplinary team with varying experience and skills. As Mauritius does not have an established and easily accessible environmental base line data bank, the approach adopted was based on the 'best professional judgment' methodology. Such an approach makes the best use of each team member's experience and develops appropriate mitigatory measures to reduce any potentially significant impacts on the environment.

The project does not seem to have generated much controversy and approval was fairly easy to secure. More interestingly, somehow dams and reservoirs are not included in the scheduled list of undertakings requiring full fledged ElAs when the necessary legislation was prepared. Technically this project should not have gone through the EIA process and the Department of Environment was therefore rather confused in dealing with the report. It nevertheless decided to pass the report given that the funding agencies were expecting such an approval before giving their final OK.

RESULTS AND IMPLICATIONS

The EIA study concluded that the project was not in serious conflict with any major national physical or environmental protection policy. The on-site or off-site impacts identified were of varying significance and these could be adequately mitigated to reduce any threat to the environment. The three main areas of potential conflict that were identified are: protection of agricultural land against threat from other uses, protection of vulnerable habitats and rare species, and national physical planning policies that provide for urbanization of sections of the proposed catchment area of the reservoir.

The environmental management plan developed in the assessment specifically called for greater coordination among interested parties to try to monitor certain impacts. Deeper investigation was required to determine how the plant species that has an international importance and that is threatened can best be protected. The report assumes that the plant can be transferred to identical sites elsewhere and returned to the original site once the project is completed. But there is a chance that this procedure fails, in

which case the whole reservoir project may be jeopardized. This issue was not dealt with at the EIA stage and it appears that it was conveniently assumed that the plant can be easily propagated.

This is typical of many ElAs prepared worldwide. In fact, many surveys have gathered evidence to show that a large majority of environmental assessments are unsatisfactory. There are numerous explanations for this, but the main argument relies on the premise that the environment is so complex that it is virtually impossible to predict all the impacts of a project. Impacts, in fact, have four main characteristics: they can be on-site (affecting the site where they are generated), off-site (affecting sites away from source), intertemporal (manifesting themselves at a future time) or be a combination of all three. The paucity of data complicates matters and in the absence of reliable data on a number of environmental issues, it is difficult to use most of the methodologies developed so far in environmental impact assessment studies. Of all the environmental impact assessment methods developed so far, the matrix remains the most effective way of determining the significance of the impacts a project may have on the physical and socioeconomic environment.

The analysis of impacts is made with the help of a matrix including on one axis the actions which cause environmental impact and on the other existing environmental conditions that might be affected. This provides a format for comprehensive review to remind the investigators of the variety of interactions that might be involved. It also helps in the identification of alternatives which might lessen impact. Two aspects of each action come into play:

- the magnitude (degree, intensiveness, or scale) of the impact upon specific sectors of the environment; and
- the significance (weight) of the particular action on the environmental factor under analysis.

While the magnitude of an impact can be evaluated on the basis of facts, evaluation of the significance of impact will be based more on value judgments.

Assessments based on matrices therefore remain at best very subjective. In fact, significance has to be determined against accepted norms and standards. This implies the definition of a threshold, which unfortunately in Mauritius is yet to be precisely determined.

Furthermore the EIA relies on coordination and comprehensive decision making styles for its success. But one has to bear in mind that comprehensive decision-making is faced with two main sets of impediments: one is made up of constraints imposed by existing institutions and attitudes, while the second concerns limits imposed by the way decisions are made in both the government and private sectors. Current institutional biases and thinking run counter to principles of comprehensive

decision-making. Integrated environmental management is a multi-disciplinary exercise requiring inputs from a whole range of departments and experts.

Expertise means narrow and specialized expertise. A multi-disciplinary team of experts does not, therefore necessarily provide a comprehensive view of an issue. Only a few persons, by training, experience and predilection can engage and promote comprehensive environmental decision-making. The other problems concern the fragmented way in which individual policies evolve. Incremental decision making is considered a more pragmatic approach because of no clear evidence of man's capability for objective rationality. Problems are dealt with one at a time, through trial and error. Other government agencies/departments/ministries are trying hard to retain their independence to make individual decisions.

LESSONS LEARNED

The whole EIA process with the scoping exercise has proven to be rather inadequate in dealing with broader environmental management issues. The introduction of strategic impact assessment in the process would go a long way to providing the appropriate framework for project-specific assessments to be carried out. Issues related to cumulative effects, greenhouse policies and sustainable development are probably better addressed at the SEA level. The project-specific EIA is also unable to deal with matters such as the cumulative effects of a number of projects of different types. Since the inter-temporal nature of impacts is difficult to comprehend within the EIA of a single project, the introduction of regional environmental plans (REPs) can significantly contribute towards a better coordinated action in environmental management of a region. Such a REP process can also help establish a solid data base by coordinating the collection, storage and the dissemination of data, the paucity of which hinders the proper assessment of impacts due to the absence of an adequate environmental baseline.

Furthermore the local consultants should be more involved in the development of the methodology and the assessment of impacts as a whole. As it is, local expertise is used in marginal tasks only (as in data collection). Such an involvement does not contribute towards local capability development and this is contrary to accepted international principles.

LIST OF RELEVANT PUBLISHED PAPERS OR OTHER SOURCE MATERIALS

The Environment Protection Act (and its amendment of 1993).

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Key words

sustainability strategic environmental assessment

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Environmental management of the Bagmati River Basin

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ABSTRACT

The Bagmati River is the principal river of the Bagmati Basin (ca. 3640km^2) in central Nepal. The river, fed by springs and monsoon rainfall, originates in the north of Kathmandu Valley (the capital of Nepal) and drains across the Mahabharat Range to the Gangetic plain. The Basin transacts three distinct latitudinal physiographic zones (Mountain, Siwalik and Terai) of the Nepal Himalayas. Hard rock geological formations at the Basin headwaters stand out as a resistant ridge complex compared to the weak and fragile rock formations at the middle stretches of the Basin.

The Bagmati Basin currently faces a number of serious environmental and ecological challenges. Urbanization and industrialization of the Basin headwaters at Kathmandu contributed to water quality deterioration with regional consequences on the aquatic ecosystem and on the health of the downstream sub-basin's user groups. Increasing population pressure on the fragile mountain slopes has also resulted in the rapid degradation of the natural resources. As a consequence, deforestation, soil erosion, landslides, siltation etc. are occurring in the upper and middle sections whereas sedimentation and flooding is frequent in the lower stretches of the watershed. This synergetic effect is of concern for the sustainable use of the resources and infrastructures.

The overall damage caused by the 1993 flood in the Basin has provided impetus to Nepalese planners, engineers, environmentalists, policy makers and stakeholders to think on the Basin-wide environmental perspectives for the overall sustainability of the project. This paper deals with the various facets of environmental management and monitoring of the watershed for its sustainable development.

INTRODUCTION

The Bagmati River originates just below the summit of Shivapuri Hill and is fed by springs and monsoon rainfall and a number of tributaries as it flows down from the Kathmandu valley floor and passes through the valley at Chovar. The river is fed by a number of tributaries originating at Mahabharat and in the Chure Range before it reaches the Terai at Karmaiya. The Bagmati River Basin, based on morphology, land-use etc., can be

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divided into different sub-basins *viz*. Upper Bagmati, Upper Middle Bagmati, Lower Middle (Terai) Bagmati and the Lower Bagmati (Terai) sub-basin. The total area of the Basin within Nepalese territory is about 3638km^2.

In the 1991 census, the total Basin population was given as 1.6 million of which 61.5 per cent inhabit the Upper Bagmati sub-basin, where the capital city of the Kingdom of Nepal, along with other four municipalities including a number of village development committees, are situated. It is also reported that a total of 2174 out of 4271 water polluting industries operating in the country are now in operation in the Upper Bagmati sub-basin.

Increasing degradation of the Bagmati Basin has been evident in recent years due to rapid population growth and expansion of the urban areas within the upper Bagmati sub-basin. Uncontrolled disposal of untreated wastewater (domestic, industrial, solid waste leachate, agricultural runoff etc.) in the rivers has far surpassed the assimilative capacity of the river. Likewise, deforestation, soil erosion and landslides have been causal factors of Basin degradation which is being increasingly threatened by damage to the infrastructure of reservoir, barrage, canals, bridges and roads from debris, tree and logs carried by the river during the monsoon season.

A comprehensive environmental study of the Bagmati River Basin was carried out by the Water and Energy Commission Secretariat using a team of experts to formulate concrete proposals for mitigation measures for:

- pollution abatement and improvement of the river water of the river thereby enhancing its assimilative capacity;
- decreasing suspended solids and siltation in river beds, canals and irrigated fields; and to
- minimizing threats to the stability of infrastructures.

The concept of Basin-wide planning for sustainable development is still new to Nepal. A development programme based on, and implemented by, administrative units could not handle and foresee the environmental impacts in the surrounding vicinity. A basin is a land unit defined by the natural barriers and the natural resources within such boundaries have intricate relationships. Exploitation of one resource has a direct impact on the other. The study was intended to evaluate the environmental conditions of the existing Bagmati River Basin in order to help in the appropriate selection of development projects for the Basin development in a sustainable manner.

NATURE AND SCOPE OF ISSUES

The Bagmati River Basin currently faces a number of serious environmental and ecological challenges. Uncontrolled discharge of untreated wastewater and solid waste into the Bagmati River in the upper sub-basin has degraded the quality of surface water beyond acceptable limits. The impacts of water

quality deterioration have regional consequences on the aquatic eco-system and on the health and cultural, religious and aesthetic values of the downstream sub-basin user groups. Similarly, the increased population pressure on the fragile mountain slopes has resulted in the conversion of marginal land into agricultural land, enhancing the rapid degradation in the quality of the natural resources. Deforestation, soil erosion, landslides, siltation etc., the results of excessive resource exploitation in the head reaches of the Basin, have posed serious threats to the stability and sustainable use of downstream infrastructures – the Bagmati barrage of the Bagmati Irrigation Project and the Kulekhani reservoir of the Kulekhani Hydroelectric Project.

Issues relating to the physical, biological, socio-economic and cultural environment within the River Basin were reviewed and studied. The specific issues considered during the study were to:

- assess environmental conditions of the Bagmati River Basin;
- conduct a comprehensive environmental analysis of the sub-Basin of the Bagmati River Basin;
- make concrete recommendations for the mitigation of river pollution, solid waste disposal and management, ill effects arising from the extreme use of river water for drinking water and sewerage problems in the Bagmati river Basin; and
- investigate the perceived threat to the Bagmati Barrage at Karmaiya due to accumulation of debris and floating trees by landslides upstream to the barrage and to propose concrete measures to avert the threat.

PROCESS AND PROCEDURAL CONTEXT

Environmental assessment study of development projects has been introduced very recently in Nepal. After the preparation and approval of the National Environmental Impact Assessment Guidelines, 1993, by His Majesty's Government, environmental impact assessment studies of the larger projects have taken place. After the promulgation and enforcement of the Environmental Protection Act, 2053, and Environmental Conservation Regulations, 2054, in 1997 EIA has been mandatory. Since the scope of this study differs from the project specific activities, the study processes did not exactly follow the provisions made in the Act, Regulations and the Guideline. The following study processes were adopted to accomplish the task by the team of experts:

Approval of scope of work

The proponent, using the available information and literature, finalised the scope of the work and prepared draft Terms of Reference. Based on the draft

Terms of Reference the consultants prepared and submitted the technical and financial proposals to the proponent and the agreement was reached between the parties.

Scoping finalisation

The consultants prepared an inception report identifying issues related to the Basin and submitted it to the proponent for finalisation. A scoping seminar was then arranged representing experts and stakeholders. The environmental issues were presented, discussed and then finalised for the study.

Field study

The field study was undertaken by the team of experts in order to collect first hand the information on socioeconomic conditions, existing environmental conditions, present activities in the Basin and collection and analyses of river water samples at different stretches of the Bagmati River and its tributaries. The information collected from secondary sources was also verified during this period. Public hearings and discussions at different locations within the sub-basin were conducted to get people's perceptions about the existing Basin environment and mitigation measures.

Report preparation and submission

Data concerning the sub-basin area was collected from different sources and compiled, analyzed and interpreted. A report was prepared and submitted to the client for review and comment. A seminar was conducted to present the study findings at the central level. Detailed discussions were held on the environmental issues and mitigation measures suggested for Basin-wide planning. Based on the comments and suggestions made during the presentation seminar, the consultants finalized the environmental study report and submitted it to the client.

APPROACH TAKEN

The study approach was initiated through the collection of secondary information. The collected information was reviewed, analyzed, interpreted and evaluated in a meaningful way to meet the study objectives. Most of the secondary information available in the limits of political boundaries was transformed into the Basin context. As the study emphasizes river pollution and the effects of erosion and sedimentation at the Karmaiya barrage site, the field study was mainly focused on these issues. However, other environmental issues were also dealt with, to some extent, with the objective of assessing their effects in terms of the sub-basins. In order to collect baseline data and information about the state of the existing environment in the Basin, separate matrices on baseline conditions and problems concerning natural resources and environment were developed and used for this

purpose. The matrix on baseline conditions and problems definition regarding natural resources was designed to incorporate information about the importance, extent of current use, availability of resources for future economic development, likely future demand, conflicts and availability of alternative resources. Likewise, the matrix to collect data on baseline conditions regarding the environment included the significance, extent and trends of environment degradation, effectiveness of current control measures, extent of environmental degradation with new protection measures and the need for new environmental protection measures. A checklist on the status of data availability on the Basin was also developed and used to facilitate the study objectives.

Study approaches taken in order to accomplish the task were the following:

Physical Resources

Maps collection, analysis and interpretation

Land use, land system, land capability and geological maps of the Basin were collected and analyzed. Based on these maps, different thematic maps on land stability, hazards and soil erosion potentials were prepared and used to qualify the existing environmental conditions of the Basin. Similarly, topographic maps and meteorological maps were collected to prepare drainage and elevation and physiographic maps.

Water quality

Water quality data available were transformed into the Basin river stretches to qualify the river water quality status in the Basin. For this purpose, river water pollution from both point and non-point sources based on population, livestock, agricultural inputs etc., was evaluated in the Basin in order to assess the river water quality of the Bagmati River system. In addition river water samples at different locations were collected and analyzed to monitor the present status of source pollution indicative parameters.

Hydrology and meteorology

Hydrological assessment of runoff from the Bagmati River Basin was carried out on the basis of the available hydrological data. Frequency analysis was carried out on the annual extreme series on annual extreme flows of streams. Computation of average rainfall over the Basin and rainfall characteristics such as monthly mean and the maximum daily rainfall were also computed. Frequency analysis was carried out on the annual extreme series of daily rainfall. Based on the rainfall data a relationship between monthly precipitation and monthly runoff was established and was used for the purpose.

Sediment transport

Suspended sediment data collected from secondary sources was analyzed and a relationship between sediment load and river discharge was determined using suspended sediment data with river flows and Basin rainfall.

Soil erosion

The Basin conditions with respect to soil erosion were evaluated using available secondary information. Information on soil types, vegetation cover, landslide inventory maps, land utilization maps, settlement patterns, human & livestock activities and soil erosion potential and hazard maps was collected and verified with limited field observations in the Bagmati Basin.

Biological resources

Available information on vegetation, flora and fauna, land-use pattern, maps, and other publications were reviewed to analyze the status of bio-diversity. A limited field survey was conducted to fill the data gaps on aspects of the terrestrial biological. Similarly, a limited field survey using structured and unstructured questionnaire formats for the local fishermen was conducted to analyze the status of aquatic bio-diversity, listing of rare and endangered species, identification of critical river stretches and relationship between water quality and aquatic life.

Socioeconomic resources

Information on population, health and education, water supply, sanitation and solid waste management, economic activities, professional status, agriculture and industries was collected and analyzed. Different techniques and tools were used to verify the information during the field survey period.

Cultural resources

Secondary information on the ethnic composition of the people residing in the Basin was utilized to broadly categories the cultural traditions and their interrelationship with the environment. Places of archeological significance and their state of conservation were discussed, based on secondary information with verification during the field survey.

Major environmental issues were first identified and analyzed for their environmental implications in terms of extent and magnitude in the Basin area.

RESULTS AND IMPLICATIONS

The extent and magnitude of the impacts of the issues concerning the Basin environment and their implications vary greatly in different parts of the Bagmati River Basin. The environmental impacts of the following issues were considered to be the major ones in the Basin.

Water quality of the Bagmati River

Several studies have been carried out over the last decade to assess the Bagmati River water quality. However, these studies are considered within the Upper Bagmati sub-basin (Kathmandu valley river stretch) only. Apart from the study conducted by the Department of Hydrology and Meteorology for a period of four years (1992 -1995), other studies do not provide time series data on the river quality for all seasons of the year. All the studies have reported that the water quality of the Bagmati River in the Kathmandu valley is of very poor quality, chemically and bacteriologically, and unsuitable for any freshwater fauna and flora for most of the dry season. However, in the rainy season (June - September), water quality improves considerably due to the increase in the assimilative capacity of the river. River water quality in the upper Bagmati River stretch is rapidly declining so much that the river is merely a sewer in the dry season. Stanley *et al.*, 1994 have mentioned that the Bagmati River water within the Kathmandu valley is not fit for drinking water, recreation and irrigation purposes.

Paudel *et al.*, 1995 have estimated that the daily BOD_5 generation in the Kathmandu valley from industries and people is about 42 tons. In the dry season the Bagmati drains only 40 per cent of the daily BOD_5 generation and the remaining is retained in the valley itself which is becoming a major source of land and ground water pollution.

S.No	Location	Distance (km) Bagdwar = 0	pH	Con (µmos/cm)	TDS (mg/l)	DO (mg/l)	COD (mg/l)	NH_3 (mg/l)
1	Gokarna		7.6	70	56	6.7	21.6	0.16
2	Gaurighat		6.5	360	288	<0.5	273.6	16.8
3	Shankhamul	26.875	7.1	410	328	<0.5	90	18.6
4	Sundarighat	32.875	7.1	740	592	<0.5	378	42.8
5	Chovar		7.1	720	576	<0.5	367	38.8
6	Khokana	39.375	7.4	600	480	<0.5	108	36.0
7	Kulekhani dovan before		7.9	440	352	6.4	80	19.7
8	Kulekhani dovan after		6.9	600	480	5.6	-	-
9	Khokojar Taldhunge		8.0	220	176	7.3	10.3	ND
10	Banchare, kayan khola	136.625	8.5	180	144	8.0	19	0.04
11	Karmaiya	144.2	8.3	200	160	7.2	6.5	0.02
12	Bramhapuri		8.2	230	184	8.4	66.0	0.21

Source : WECS/NESS, 1997.

Table 1: Water quality along the Bagmati River

From water quality analyses results, it is found that the water quality of tributaries of the Bagmati River outside the valley is found to be good and can be used for a variety of purposes. River water quality at different sections of the Bagmati River is presented in Table 1 above and Figures 2-4.

River water quality analysis data shows that the river water within the valley is bad but as the River passes through the valley the quality of water improves slowly. After mixing with Kulekhani River water, Bagmati River water quality improves considerably. This situation continues after mixing with other tributaries originating in the hills and Chure as well. Water quality along the Bagmati River outside the valley seems to be improved till it passes through Karmaiya. However, the river water quality seems to deteriorate at Bramhapuri due to the disposal of partially treated industrial effluent from a Sugar Mill. WECS/NESS 1997 has mentioned that the sugar mill has already started the construction of an effluent treatment plant and by the time this is completed the main pollution source will be controlled in the region.

The deterioration of water quality in the upper Bagmati sub-basin has far reaching implications for the entire Bagmati river stretches because of the location of the sub-basin at the Bagmati headwaters.

It is reported that the decline in the river water quality has a direct detrimental impact on the health of the water user groups downstream of the Bagmati Basin. Incidents of diarrhoea, typhoid, jaundice, cholera and skin diseases are of common occurrence among the user groups. However, there are no specific surveys with regard to this. The riverside inhabitants complain of the occurrence of such diseases in the dry season when they have no option other than using the river water to meet daily demand. Livestock toll is even higher in the dry months due to water related diseases.

The polluted river water has seriously impaired the aquatic ecology and bio-diversity along the Bagmati River. Fresh water fish have been completely wiped out from their habitats in the upper sub-basin and are declining in the river stretches of the upper middle and lower middle sub-basins.

The river is losing its religious and spiritual significance. The sacred river water for Hindu devotees has now become filthy and unsuitable for use on religious and cultural grounds.

Sedimentation and flooding

Sedimentation and flooding in the Bagmati Barrage and Kulekhani Reservoir have been identified as one of the major environmental issues in the Basin posing serious threats to the sustainability and the effective use of the infrastructures. Excessive erosion in the upland mountains and flooding and sedimentation in the plains and valleys are envisaged to be the common features in years to come. In other words the Bagmati Barrage & Kulekhani Reservoir will be under a constant threat of floods with a high concentration

of sediment load. The environmental implications for such structures, in the event of floods, are well exemplified by the flood of July 1993. Sediment deposits in front of the barrage at Karmaiya caused wide-spread floods in the Sarlahi and Rautahat districts. The damage to human lives and property was immense. Similarly, it has been estimated that over 7.71 million m^3 of sediments were deposited in the Kulekhani reservoir in three days of rainfall in July 1993, which is very high compared to 1.18 million m^3 of sediment deposited per year during the last 15 years.

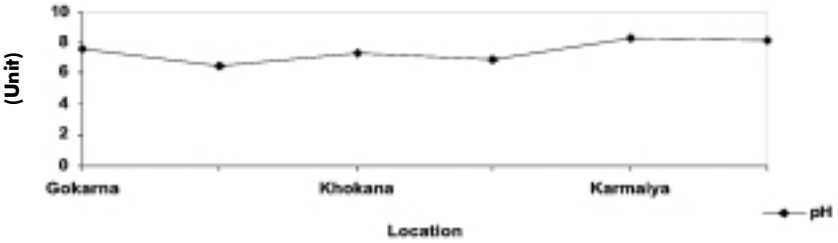

Figure 2: pH variation along the Bagmati River

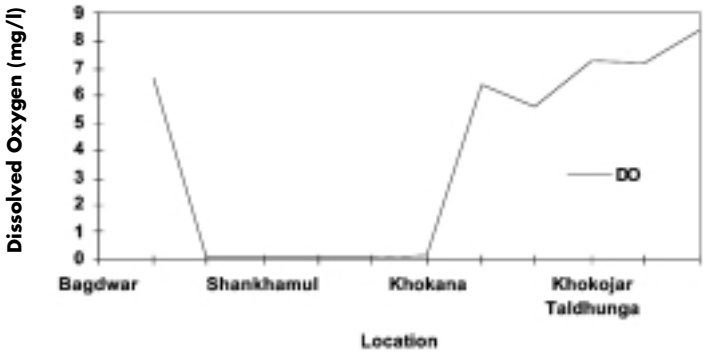

Figure 3: DO variation along the Bagmati River

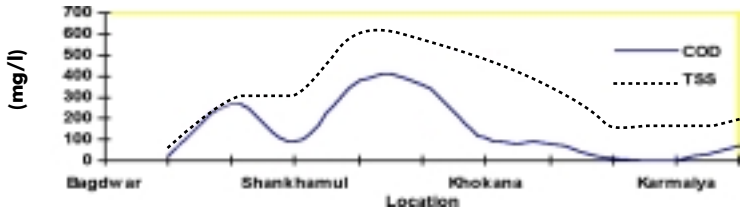

Figure 4: COD and TES variation along the Bagmati River

Mitigation measures

Mitigation measures were formulated with the objective of minimizing the negative impacts on river water and erosion and sedimentation in the Basin.

The mitigation measures for river pollution include:

- setting of effluent standards;
- setting of ambient river quality standard;
- construction of wastewater treatment plants in the Kathmandu Valley;
- on-site sanitation;
- effective solid waste management;
- ban on river bed sand mining in the upper Bagmati sub-basin; and
- increase assimilative capacity of the river in the upper Bagmati sub-basin.

The mitigation measures for erosion control and sediment transport at the Bagmati Barrage and Kulekhani Hydroelectric Power Reservoir include:

Short term measure

- physical intervention

Long term measures

- land stabilization and erosion control;
- conservation of forest resources;
- reforestation of degraded forest;
- discouraging conversion of forest into agricultural land; and
- discouraging traditional agriculture practice on sloping or unleveled surfaces.

In view of the present institutional arrangements, availability of information and management, establishment of a National Water Resources Research and Information Centre has been suggested.

LESSONS LEARNED

The concept of Basin-wide planning for sustainable development is still new to Nepal. The present practice of planning and implementation programmes, based on administration boundaries i.e. districts and village development committees irrespective of the Basin, has serious environmental implications in the balanced natural environment in Nepal. The environmental constraints posed by the natural boundaries of the ecosystems are very important in sharing the fruits of development on an equitable and sustainable basis. Exploitation of one resource has a direct impact on the other. But this factor was never considered in most of the earlier development initiatives in Nepal vis-à-vis the development effort which could not achieve the goal of poverty alleviation of the Nepalese people. Development activities thus implemented have resulted in serious

negative impacts on adjacent areas due to the creation of imbalances in the existing environment.

Uncontrolled disposal of raw sewage and industrial effluents in the Bagmati River system has created serious health concerns for the downstream water user groups. Likewise deforestation, agricultural malpractice in the uplands and excessive exploitation of natural resources has increased the rate of erosion, and mass wasting and sedimentation in downstream areas has posed serious and constant threats to the overall stability of infrastructures.

In view of the experiences and the lessons learnt from the past, the concept of Basin-wide planning has been felt necessary for sustainable development in Nepal. Mitigation measures have been formulated, based on the present environmental conditions and study recommendations, with regard to river water pollution and short term and long term measures to curb the present rate of erosion and sedimentation are envisaged to be effective for the Basin environmental management.

LIST OF RELEVANT PUBLISHED PAPERS OR OTHER SOURCE MATERIAL

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Assessed impacts of the proposed Bodhghat Hydroelectric project

Asha Rajvanshi

INTRODUCTION

The purpose of this paper is to present a select Indian case of environmental appraisal of a hydro-power development project. An attempt has been made to focus on the implications of the Bodhghat Hydroelectric project for the wilderness values of the project area. The paper also presents an account of how public pressure, legislative framework and EIA procedures and practices have been effective in arresting a major ecological disaster even when EIA was not a mandatory requirement in India for determining the project feasibility. This case represents a situation that is unique in the way in which the development projects are generally pursued in developing countries, India included. In most cases, once a project is conceived, there is generally no looking back. At the most, what is really attempted is the mitigation of the impacts. The mitigation planning rarely takes into consideration the formulation of strategies that can be effective in mitigating all of the social and ecological impacts that are considered to be significant. These assessments which ignore the socioeconomic concerns and biodiversity impacts of the project often fail to produce a timely decision on the project implementation. For such projects, attempts are made to compensate for the delays in environmental clearance by advancing construction work and other preparatory activities in anticipation of the clearance which then tends to become the overriding justification for the clearance of the projects. This project has been an exception to the approach that is adopted in the case of many water projects. This project has been amongst those few projects in the country that was abandoned even after the project had made a sufficient headway on the grounds that the environmental appraisal failed to justify its recommendation.

See Topic15

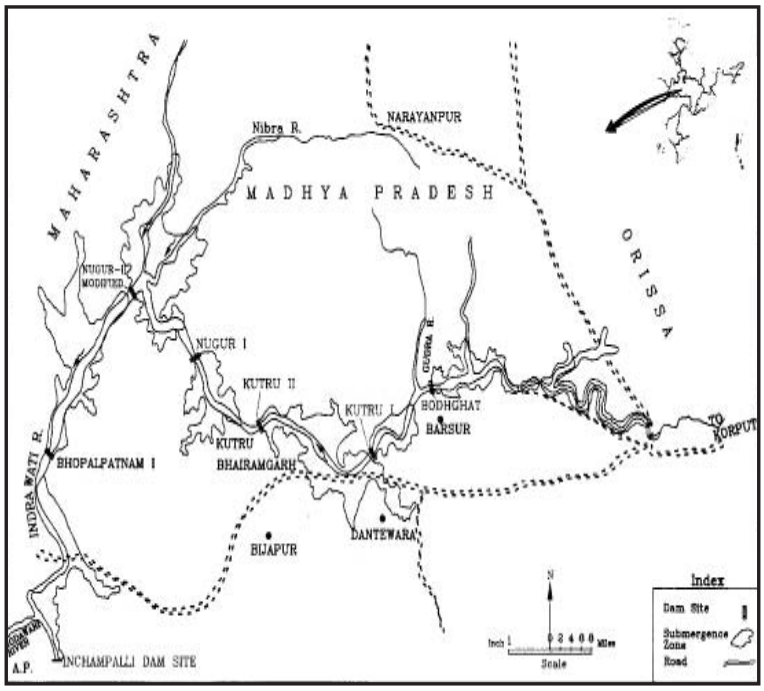
UNEP EIA Training Resource Manual

Future directions

PROJECT BACKGROUND

The Bodhghat project is a river valley project, involving the construction of a major dam on the Indravati River in Bastar district. This project, conceived as a precursor to a series of dams, (Kutru I and II, Nugur I and II, Bhopalpatnam and Inchampalli) was planned on the Indravati River near Barsoor a village (19°12′ latitude and 81°24′ longitude) situated about 100 km from Jagdalpur, the headquarters of the Bastar district (Figure 1).

Figure 1: Bodhghat and other proposed dams on the Indravati River



The project involved the construction of the following :

- A composite dam of a total length of 1720 m at the dam top level consisting of a 855 m long and 90 m high concrete gravity dam and fill dams of 500 m and 365 m lengths on the left and right flanks respectively.
- A 3 km long (with 12.5 m diameter) head race tunnel.
- A 5 km long tail race canal.
- A surface powerhouse to support 4 generating units, each of 125 MW.

This project was designed as a peaking station with an installed capacity of 500 MW (4 units of 125 MW) to provide a large peaking potential to the power station of M.P. State. The total land requirement for the project was 13 783 147 ha of which 5 704 332 ha comprised of forest land. The forest area was made up of areas under Reserved Forest, Protected Forest and Undemarcated Forest (also referred to as Orange Areas). The project involved the displacement of nearly 10 000 tribal people from 42 villages.

NATURE AND SCOPE OF ISSUES

- The Bodhghat Dam was particularly regarded as environmentally damaging because its functional effectiveness was directly linked to the projects proposed downstream. Together, these projects could

impose a great stress on the ecology of the Indravati Tiger Reserve, Bhairamgarh Wild Buffalo Sanctuary and other surrounding habitats of Indian wild buffalo (*Bubalis bubalis*).

- The dam would result in the forced displacement of some 10 000 tribal people whose sustainable way of life based on a mixed economy of agriculture, herding, fishing and forest use would be entirely destroyed.

- The project would also lead to the inundation of a large area of forest, a resource fundamental to tribal people and whose dependency on the resources from forest is almost total and complete. The consequential movement of people into the forest interiors that are currently free from biotic disturbance would pose the major threat to the relatively undisturbed tracts of the forest and the wildlife habitat.

- The project would result in a total loss of 20 000 hectare of wildlife habitats.

- The non availability of cultivable land and the wood lots for meeting the resource needs of people for fuel wood, timber, food and fodder would have adverse effects on people driven from the project area.

- The entire project area, which provides an ideal setting for designation as a '*Biosphere Reserve*' owing to its biological richness and its pristine nature, would become open to ecological destruction.

- The Bodhghat project would inevitably lead to the justification and the imposition of Bhopalpatnam, Inchampalli and the other projects located downstream.

PROCESS AND PROCEDURAL CONTEXT

At the time of development of the proposed project, legislation for mandatory EIA did not exist in India. The environmental appraisal of projects till the late seventies was based on a formalized scrutiny of proposals generally conducted by the Department of Environment (DOE). With the promulgation of the Forest Conservation Act in 1980 and the formulation of Environmental Guidelines by DOE for River Valley projects in 1984, and the enforcement of the Environmental Protection Act in 1986, the environmental appraisal of the river valley projects became a more focused effort to ensure the adherence of the developmental planning to the legislative framework that gradually emerged.

This project with an estimated cost of Rs.209.3 *crores* (equivalent to US$50 million approximately) was accorded investment approval in the year 1979

by the Planning Commission, Government of India. The project was subsequently granted clearance by the Department of Environment (DOE), Government of India, in 1979. The project was to be completed within a period of six years from the date of its approval by the Government of India but could not progress due to the paucity of funds. The Government of India subsequently decided to submit the project for financial assistance from the World Bank and accordingly a revised project report was submitted to the World Bank in April 1983 with revised cost estimates. In 1984, the World Bank approved the loans totalling US$300.4 million to the project after a brief appraisal mission had evaluated the financial and technical aspects of the dam. The project in its revised form was again submitted to the Government of India for clearance from the environmental angle. With the Promulgation of the Forest Conservation Act (FCA) in 1980, the project was also required to obtain clearance under the FCA. On the insistence of the Department of Forest, the DOE constituted a working group, which visited the site in 1985 for the environmental appraisal of the project. Subsequently, the DOE granted conditional clearance to the project with the provision that the project should be submitted to a professional agency for an independent evaluation of its impacts on the floral and faunal values that are critical for conservation.

In the mean time, the project also came to the limelight in the wake of belated concerns about the ecological balance voiced at the national level in different forums particularly after the controversy over the Silent Valley. The project also led to widespread discontentment amongst the people of the area because of the rehabilitation package that was visualized. Resentment against the dam also started building among the NGOs, the environmental lobbies, welfare societies and individuals who forwarded their representations for stopping the project to the Prime Minister of India. As a result, the Government of India (GOI) was forced to consider all the representations received by the Prime Minister's Office from different agencies/organizations. A special committee was constituted in 1987 under the then Secretary for Environment & Forests, Government of India, to re-look at the environmental and social issues related to the project.

At the same time DOE, Government of India, directed the Wildlife Institute of India (WII) to undertake the environmental impact assessment of the project with a view to provide an independent assessment of the impacts on the wildlife and forests. The study was initiated in October 1989 and was completed in April 1990.

APPROACHES TAKEN

Besides adherence and compliance with environmental regulations and guidelines, proactive and participatory methodology on and off field was adopted. For the preparation of EIA report, primary and secondary data and

information were generated through systematic field studies. The field studies primarily focused on:

- assessment of the impacts of the project on biophysical environment;
- assessment of the status of wildlife habitats with special reference to wild buffalo habitat;
- assessment of the human dependencies on natural resources of the project area;
- review of the impacts of the project on wildlife values and the socio-economic status of the resource dependent community; and
- review of the rehabilitation policy for project-affected people.

Field investigations were made at all sites likely to be impacted by the construction of the proposed dam. These included areas under submergence, downstream areas of the dam, and the sites of powerhouse location and the access roads and areas outside the submergence zone, which could ultimately become the receiving area for displaced wildlife and human population.

Consultation with local and national agencies, both governmental and non-governmental, was used as an aid to supplement the field based data and information.

RESULTS AND IMPLICATIONS

This section highlights the significant findings of ecological assessment and socioeconomic surveys conducted by the team of the Wildlife Institute of India.

Conservation values of the project area

Forests of Bastar fall under 'Southern moist tropical deciduous' and 'Southern tropical dry deciduous' forest types (Champion & Seth, 1968). Bastar forests are unique in the country where sal (*Shorea robusta*) & teak (*Tectona grandis*) mixed with bamboo forests occur together on an easy terrain with favourable growing conditions. The forests of the project area are predominantly composed of miscellaneous forests. The upper canopy is distinctly composed of *Anogeissus latifolia, Buchanania lanzan, Lagerstroemia parviflora, Garuga pinnata, Chloroxylon swietenia and Cassia fistula*. The average height of the forest ranges between 18 to 20 metres and the average tree density is 695 per ha. The dense forests on the slopes and valleys and riparian forests and grasslands along the Indravati and its tributaries form excellent habitats for diverse wildlife.

The forests of the project area are home to a wide variety of wild animals. The area offers an excellent habitat for the carnivores such as tiger (*Panthera tigris*), leopard (*Panthera pardus*), hyena (*Hyaena hyaena*), and jackal (*Canis*

aureus) and the herbivores such as spotted deer (*Axis axis*), four horned antelope (*Tetracerus quadricornis*), barking deer (*Muntiacus muntjak*), Indian bison or Gaur (*Bos gaurus*) and the critically endangered wild buffalo (*Bubalis bubalis*). Some of the other mammalian species of conservation importance occurring in the project area include the giant squirrel (*Ratuffa indica*) and the smooth Indian otter (*Lutra perspicillata*).

The Indian wild buffalo is an endangered species listed in Red Data Book (IUCN 1994). Its numbers have dwindled dramatically since the early forties in the Central India. Today, four relict populations are known from Bastar district. Of these, two populations occur in the Protected Areas located in the vicinity of Bodhghat and other projects proposed downstream. The largest is in the Indravati National Park with a little less than 100 individuals recorded in 1988. A second population is 60 km upstream on the Indravati river at Bhairamgarh Wildlife Sanctuary comprising of about 10-20 individuals (Divekar & Bhushan, 1988). The wild buffaloes of Bastar are considered to be the purest wild genetic stock and their conservation is therefore critical.

Ecological issues

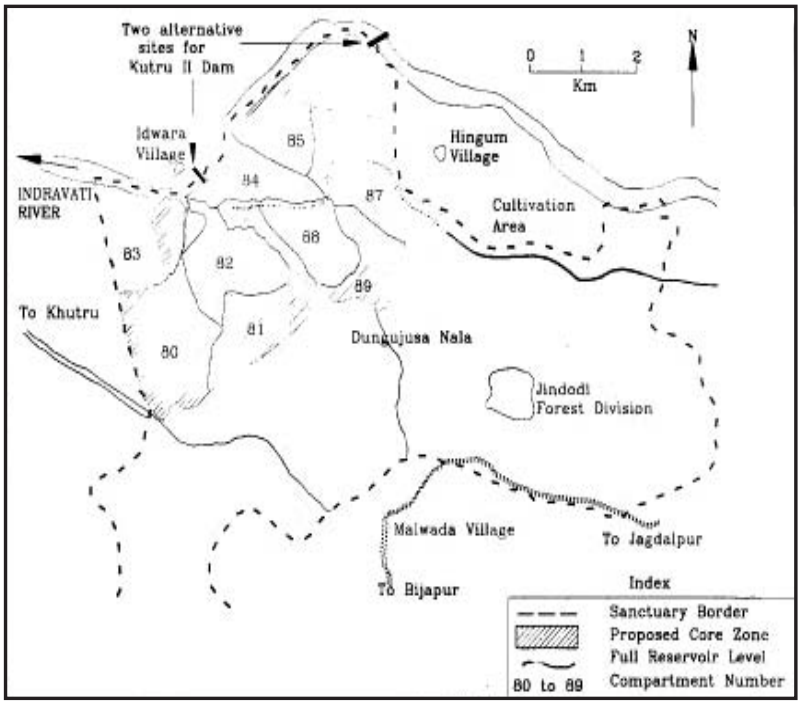


Figure 2: Submergence of the wild buffalo habitat within the Bhairamgarh Wildlife Sanctuary would be an immediate consequence of the Kutru 11 project

Bodhghat Hydroelectric project is expected to cater to the peaking power requirements in the evening. All the four turbines will operate together during the evening hours resulting in heavy discharges that would be many

times the rate of normal lean summer discharge. This sudden increase in water discharge would result in the flooding of the grassland habitats within Bhairamgarh Wildlife Sanctuary located 60 km downstream of the project location. Based on daily schedules of the turbine operations and discharges into the river, it is anticipated that the grasslands in Bhairamgarh Sanctuary would be flooded between 8 pm and 11 pm. This would coincide with the main foraging time of wild buffalo in summer, when such river bed grasslands are their critical food resource. The changed water discharge regime due to the project will thus severely jeopardize wild buffalo habitat in Bhairamgarh Sanctuary. This is particularly so because, out of the total areas of the Sanctuary the prime wild buffalo habitat is only about a fourth of this area falling in compartment numbers 80 to 85 and 87 to 89 (Figure 2).

The enormous quantity of water held here in the reservoir of Bodhghat project will naturally be the justification for more downstream hydroelectric projects. It is also a known fact that five hydroelectric projects (Kutru I, Kutru II, Nugur I, Nugur II and Bhopalpatnam) are planned on the stretch of Indravati that is upstream of the proposed major multi purpose project at Inchampalli on the Godavari near its confluence with the Indravati (Refer Fig. 1). From the preliminary details that were made available for these proposed projects (Anon, 1988), it is seen that if Kutru II Dam were constructed at the site proposed near village Idwara, it would almost entirely submerge the prime wild buffalo grassland habitat along the river in the compartments numbered 84 and 85 (Figure 2).

Further, all these five projects are so planned that the discharge level from the tail race of the upstream project would be nearly at the same level as the Full Reservoir Level (FRL) of the immediately succeeding downstream project (Fig. 3). This would mean that almost the entire length of the Indravati River from the location of Kutru 1 project to Bhopalpatnam Dam would no longer remain natural. The series of reservoirs that would be constructed would completely isolate the areas to the north and west of the Indravati River from those on its south and east. Moreover, almost the entire stretch of the rich riparian wildlife habitat would be submerged. Thus, both from the point of view of the prime habitat loss and the disintegration of movement corridors, this series of dams would cause irreparable damage to the ecology of the area and to the wildlife buffalo in particular.

Socioeconomic issues

The Tribes of Bastar, as any other hill tribes, have an affinity to the forests in which they live. Their sustenance is closely inter-woven with the forests. Over 90 per cent of the people inhabiting the watershed belong to the tribal community that comprises the Bison Horn Maria, Jhoria Muria and Raj Muria Tribes. These tribes inhabiting the project area predominantly derive sustenance from forest resources. A calendar of the activities of the people of the project area establishes the intricate relationship that the people of the project area have with the forest in their immediate surrounds (Table 1).

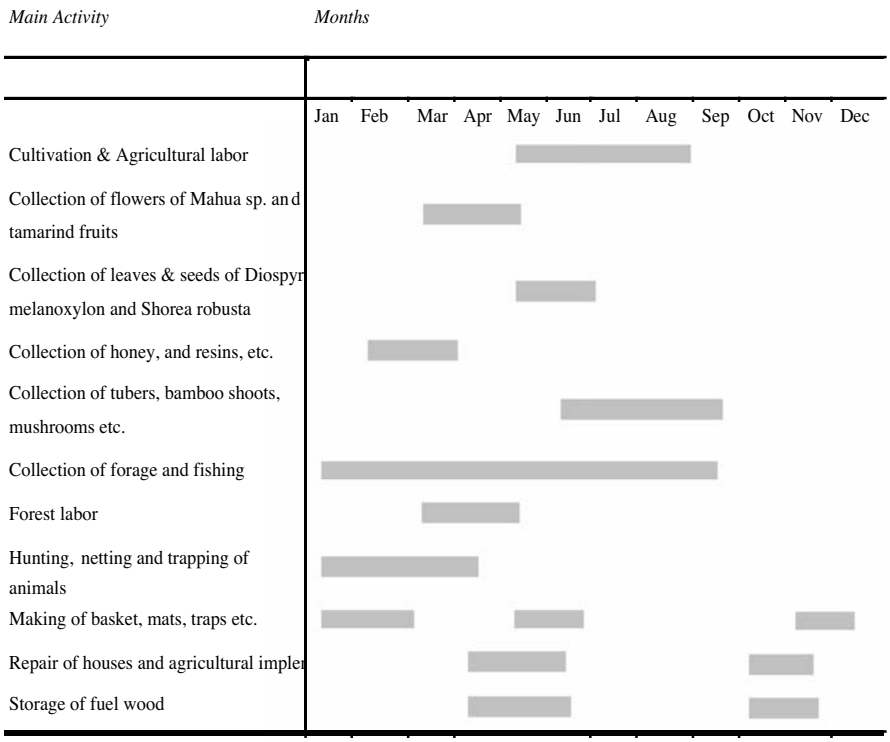


Table 1: Seasonal calendar of the activities of the people in the project area

The results of the socio-economic surveys further indicate that agriculture provides only about 50 per cent of the sustenance. The remaining 50 per cent of sustenance is based on consumption of forest resources and on goods and services provided by the common property resources (Figure 4).

The combined income from the sale of Minor Forest Produce (MFP) and products like baskets, mats, ropes and plates made out of the raw material collected from the forest is insignificant and is variable among the villages located in the forest interiors and the distant villages.

The resources of prime importance for consumption are the fuel wood and the forest food (Figure 5). Fish and meat obtained from hunting gathering lifestyle and also through the traditional practice of community hunting (locally referred to as '*Parad*') additionally supplements the food resources from the forest.

Dependence on the forest for livestock grazing is almost complete as the total livestock population belonging to the villagers of the project area graze in the forests of the proposed submergence zone. Although estimation of fodder in terms of quantities removed from the forest was not made during the course of our study, fodder beyond doubt constitutes the single largest forest resource on which the people who own the livestock heavily depend.

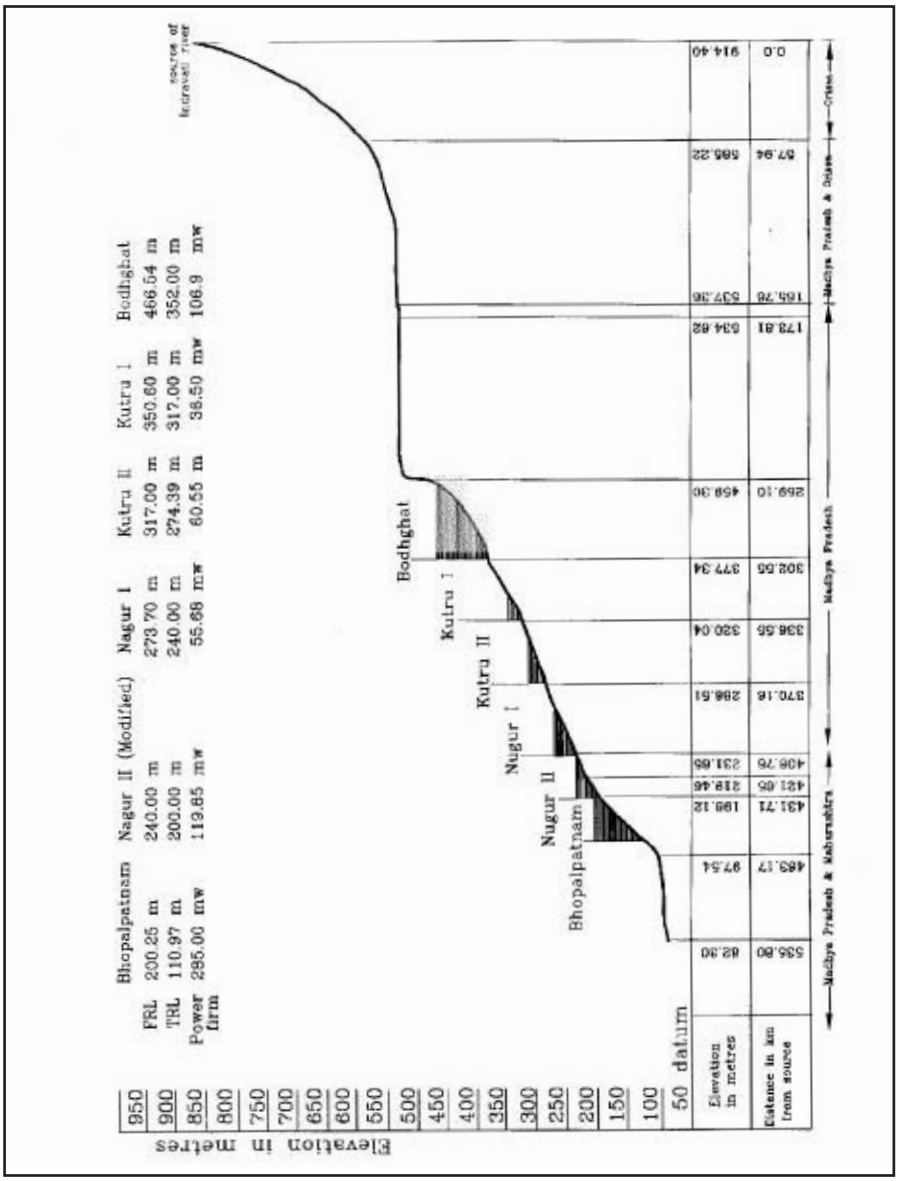


Figure 3: Proposed hydroelectric projects on the Indravati River

Since the economic well being of the people of the project area is dependent on the sustenance driven demands from the forest resources, the implementation of the Bodhghat Hydroelectric project would inevitably threaten the existing and intricate relationship of the people with the forest.

The fact that Bodhghat project does not have an irrigation component failed to evince any special interest among the people of the area who would have seen the project in the different light if it would have offered to them

irrigation possibilities in its command areas. The obvious scenario that would emerge in the event of the project being implemented is the generation of the power at the project site for transmission to northern industrial districts of M.P. that are completely removed from the project-induced impacts and the ground realities. While these northern districts would reap the economic benefits of power-driven industrial expansion, the people of the project would suffer from underdevelopment resulting from the lack of the political will to promote village development programmes in areas likely to be submerged in the event of the project's implementation.

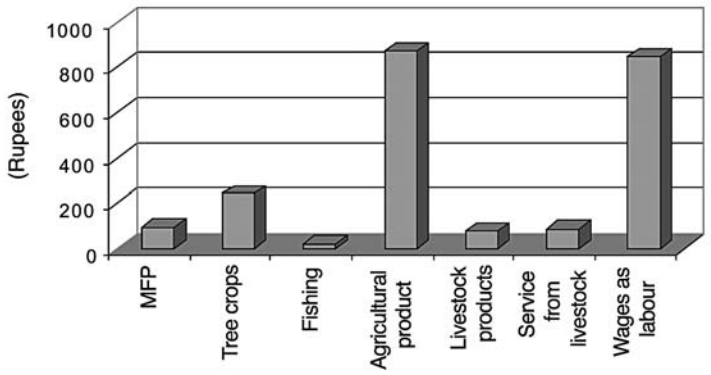


Figure 4: Average income of the people of the project area from different sources

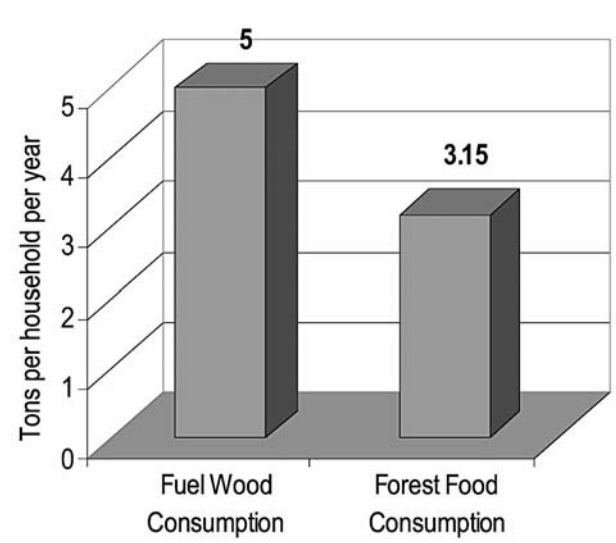


Figure 5: Consumption of major forest resources by the tribal population of the project area

The review of the rehabilitation policy provides another distressing picture because there appears to be a repetition of the blunders that in the past have

caused most rehabilitation programmes to suffer from inherent failure to promote productivity of land. The rehabilitation sites for people displaced by the project have been carved out by scarifying the existing areas under the village commons. This would obviously place greater demands for resources on remaining areas under the commons leading to the decline in the productivity of land. This would also lead to a fall in the per capita share of goods and services from common property resources as a larger number of people would be forced to share a much reduced area due to appropriation for rehabilitation.

The smaller agricultural holdings at the new sites would not be able to sustain the people in the long run. This is obvious as the agricultural income from still smaller parcels of land may not suffice to meet other resource needs (MFPs, fodder for livestock, timber for housing and forest food) of the people who would require financial investment in the changed scenario.

Common knowledge and experience of other projects suggest that stressed man-to-land ratio at the rehabilitation sites and resource crises would force people to encroach upon forest interiors that would inevitably become open to biotic pressures (Rajvanshi 1994). The direct impacts of submergence of wildlife habitats and the degradation of remnant habitats due to the sudden influx of people should be considered to be the most obvious implication of the project and one that would severely threaten the integrity of the wildlife habitats and the viability of the populations of some of the highly endangered species of central Indian fauna.

KEY CONCLUSIONS AND IMPLICATIONS

From the EIA studies conducted by the Wildlife Institute of India, it could be concluded that the ecological and social impacts of the Bodhghat project far outweigh its economic benefits. In view of the findings of the ecological and socioeconomic assessment undertaken by the WII team and the independent observations of the Special Committee of the Government of India that visited the project site in 1987, the project could not be granted clearance under the Forest Conservation Act (1980). As a result, even the environmental clearance that was granted on the condition that the project would have to first obtain clearance under the FCA (1980) was revoked in 1994.

The rejection of the project came in 1994 after a substantial progress was made in the construction activities at the proposed site in the anticipation of the forest clearance coming through. The construction work that was completed prior to the rejection of the project included the construction of storage facilities, township and residential colony, health and educational centre for the staff, downstream bridge across the Indravati River, approach channels to intake structures up to the head race and the two additional tunnels to the head race tunnel. The excavation works that were completed

prior to the decision on clearance of the project included powerhouse excavation and the dam foundation.

LESSONS LEARNED

- The importance of economic and engineering paradigms in development alone can not lead to sustainable development and economic prosperity. A better understanding of the interplay between development and the natural environment in which development takes place is necessary at the time of project planning to ensure environmental security and economic prosperity.

- The environmental impact assessment process highlights the need for paying greater attention to cumulative and synergistic impacts viewed from the standpoint of the ecosystem and the fact that the project will be a precursor to several similar projects in the area.

- The habitat trade-off analysis can be a significant issue in decision making.

- Sustainability principles need to be included in the methodological guidelines for the conduct of EIA and adequate significance needs to be given to biodiversity impact issues.

- Good EIA requires careful handling of the socioeconomic dimension particularly if these are linked to resources that are expected to be diverted to the project.

- The project has little chance of success if it runs counter to, or ignores, the traditions, values and social organizations of the intended beneficiaries or if its objective is too removed from fulfilling their every day needs.

- Public pressure can often help environmental conservation especially if political will is wanting or found wavering.

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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

UNEP EIA Training Resource Manual

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.

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