Contributing Paper

Environmental and Social Impact Assessment for Large Dams - Thematic Review from the Point of View of Developing Countries

Iara Verocai
Independent Expert, Brazil

Prepared for Thematic Review V.2:
Environmental and Social Assessment for large dams

For further information see http://www.dams.org/

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR LARGE DAMS

Thematic review from the point of view of developing countries
(First draft)

Iara Verocai

This is the first draft of a paper written as a contribution to the Thematic Review performed by Dr. Barry Sadler. It presents an overview of the theme based on the author's experience on EIA in developing countries. In many of these countries, a holistic approach has been adopted to EIA requiring the consideration of both biophysical and socioeconomic impacts. This is expressed in regulations concerning the basic EIA contents. Thus, social variables are implicit in the following items, wherever environment is mentioned.

1. Analysis of the current experience

In developing countries, environmental assessments of dams were first performed in the early 70's as a response to requests from international finance agencies, namely the World Bank and regional development banks (Sagulin in West Java, Indonesia, Mahaweli Ganga in Sri Lanka, Sobradinho, in the northwest region of Brazil and Salto Grande, a development shared by Argentina and Uruguay). Most of these assessments were not intended to be a tool for decision-making on the implementation of such dam projects, as projects themselves were already being implemented, some with strong opposition from local and foreign environmentalists and scientific groups. EIA reports were then prepared by one or a small group of experts, being limited to considerations on the direct consequences of dam building and operation, and a list of recommendations for further studies on negative impact mitigation and monitoring. As these assessments were mainly post-development, they served only to mitigate the most evident impacts.

During the last two decades, several facts have contributed to the improvement of both the awareness of governments and investors in developing countries about the principles of sustainable development and EIA technical and procedural advances. External pressure to consider environmental aspects in project planning, external financial help and technical assistance for institutional and capacity building, as well as the results of the World Commission for Environment and Development report "Our Common Future"(1987), and the agreements that culminated with UNCED 1992, have led to some sort of EIA system being created in the majority of developing countries.

In addition, the diffusion of technical and scientific material on EIA (such as the 1991 World Bank "Environmental Assessment Sourcebook", a broad manual designed to assist those involved in environmental assessment) has provided civil servants and other EIA practitioners in developing countries with a large amount of information on the main technical aspects of EIA. Gradually, while the EIA process evolves, scoping procedures and legal requirements for the assessment of dams has been extended to include a range

of environmental issues, in particular those related to impacts on social groups and directly affected communities.

The fundamental role of scoping in EIA is clear to most practitioners. The lack of appropriate scoping procedures in developing countries, however, has been reported as a major reason for poor EIA studies and deficient EIA reviews. In some countries, scoping regulations require EIA terms of reference specific for each project, including dam development, which may be devised by a consulting firm and presented by the proponent to the environmental agency (or other government agency leading the EIA process), for discussion and approval. In other cases, the environmental agency may itself provide for specific terms of reference in accordance with project dimensions and environmental characteristics of the project influence area.

However, to ensure the broadest inclusion of relevant social concerns about dams in EIA studies, there is still a need to improve scoping procedures in order to promote the sound participation of affected communities and other interest groups.

As scoping and technical quality of EIA studies evolve, the prediction of impacts on the physical environment (erosion, water quality and quantity) seems to have progressed with the use of mathematical models and other appropriate techniques. As for biological aspects, some scientific development may be recognized in the field of aquatic ecosystem dynamics and the prediction of impacts from the filling up of reservoirs, although the shortage of baseline data may have limited the use of the best methods.

On the other hand, prediction of impacts on flora and fauna has been poor, with detrimental consequences to the design of mitigation measures and impact monitoring plans. Techniques have been developed and used for determining, with an acceptable degree of precision, the percentage of flooded area to be cleared of woody vegetation in order to minimize decomposition and depletion of oxygen levels in the reservoir water, but despite this little has been achieved regarding the ability to predict and manage the loss of genetic resources, relevant species and habitats, disruption of aquatic fauna and wildlife patterns. No acceptable results have come out of animal rescue and relocation in other areas or research institutions and zoos.

Another area of knowledge with much scope for improvement is the prediction of direct and indirect negative socioeconomic impacts, and the interactions between these and the effects on the natural environment (conflicting demands for water usage, salinization of flood plains downstream of the dam, loss of land and water productivity etc). In the same way, potential positive socioeconomic impacts have been disregarded. Most EIA studies of dams have limited such issues to the identification of evident direct impacts on social groups and recommendations on the future development and implementation of management programs to mitigate them (programs for population displacement from flooded areas and resettlement, health assistance, compensation measures etc.).

Uncertainty is an issue inherent to EIA studies, especially regarding the impact assessment of dams in tropical regions where, as happens in many other ecosystems, the

shortage of primary and adequate secondary baseline data is recurrent. Moreover, as the time period from the beginning of project planning to the starting of energy production is long (from ten to fifteen years), the degree of uncertainty in environmental studies of dams is higher than in other kinds of project EIAs. In addition to unpredictable natural and socioeconomic events and changes that are bound to happen during this time, EIA of dams should deal with a number of uncertain factors inherent to the power generation sector in developing countries with highly unstable economies, such as electric energy market projections and availability of financial resources.

In developing countries, however, there is no record of EIA studies concerning uncertainty. In general, both scoping and impact prediction methods have not been flexible enough to permit periodic reviews and the incorporation of unpredicted variables. As impact monitoring and follow up are still deficient, chances are minimal for detecting unexpected impacts or impacts with higher magnitude than that that was predicted in EIA studies. In the same way, "contradictory truths" and precautionary principle have not yet been included in scoping regulations nor in EIA studies.

2. Assessment of the effectiveness of EIAs and SIAs

The main problem regarding the effectiveness of EIA of dams in developing countries is that, in the great majority of cases, project proponents still consider the EIA process as a bureaucratic requirement to be fulfilled for project approval, isolated from the project planning and implementation cycle. EIA studies are often carried out after the decision on the site of the dam has been made and engineering studies and projects have been completed. The choice of site of a dam is usually determined by economic and engineering criteria, with little or no consideration for environmental issues. As a consequence, the opportunity is lost for considering dam site alternatives with less damaging environmental and social impacts. Moreover, late EIA studies impede the contribution and exchange of information between environmental specialists and project designers regarding prevention and mitigation of negative impacts. Another issue concerning the effectiveness of EIA has to do with public participation and negotiation which are discussed in the next item.

In countries where EIA regulations require some sort of environmental permit for project implementation, the planning process of dams is rarely in harmony with EIA and permit procedures, causing delays in decision-making and project implementation, in addition to the drawback of late EIA studies mentioned above. In countries where the authority responsible for the energy development sector administers the EIA procedures, as part of the project authorization, EIA effectiveness is also threatened by conflict of interest between development interests and the implementation of the environmental mandate.

A positive example in dealing with the compatibility of both planning and EIA processes for dams (and other developments in the electric energy sector) has been experienced in Brazil, a country with a large hydroelectric generation potential. Since 1986, EIA has been used there as a complementary tool of the environmental permit process for the

approval of development projects likely to generate significant environmental impacts. The permit system is a three stage process: (i) at the project planning phase (preliminary permit); (ii) before the beginning of project implementation (construction permit); and (iii) before the beginning of project operation (operation permit).

Initiatives for introducing environmental variables into the planning process of energy generation and distribution activities, and promoting its harmonization with the environmental permit system resulted in (i) the publication of a series of normative manuals produced by Eletrobrás (the electric energy sector regulating agency at the time) to orient energy and engineering studies and project design, and (ii) the establishment of national regulations specific for the EIA process of power plants (hydro and thermal) and distribution lines, approved in 1987.

The compatibility of project planning and implementation phases with the three steps of the permit system is illustrated in Figure 1.

The normative manuals for hydropower generation and dams were issued in 1986, covering the different project planning phases, as follows:

- Hydroelectric inventory of river basins, where the hydroelectric potential of water courses are assessed and the multiple implications of the different combination of dams in the same river, before any kind of investment in project design;
- Feasibility studies, that serve to orientate the overall design of a hydroelectric facility in the dam sites selected in the previous phase, aiming at the achievement of the best technical, economical and environmental results and the best cost-benefit ratio; they include the definition of project dimensions, local and regional infrastructure works associated with the power plant, the reservoir, the definition of impact influence area, other water uses and related social and environmental issues; this phase also comprises the identification of the environmental management programs and the beginning of social interactions, with information on the study objectives to the involved communities and institutions.
- Basic project, consisting of guidelines for detailing the projects defined in the feasibility studies, construction and main equipment specifications; this phase includes the development of environmental management programs previously identified.

Considering lessons learned from experience, and the recent institutional changes brought by state reform and privatization of power generation and distribution facilities, these manuals have been reviewed to adapt original directives and guidelines to the new concession and bidding procedures of power plants and comply with recent environmental legislation.

Concerning EIA effectiveness, one of the main improvements of the reviewed manual has been the inclusion of impact assessment requirements in the river basin inventory phase, comprising the identification of relevant environmental impacts of each alternative scheme of dams on the river basin, as well as the cumulative and synergic effects of

different projects. As Brazilian regulations do not yet require the submission of river basin inventory results to be reviewed by environmental agencies, the decision on the scheme of dams to be built has usually been made without considering environmental impacts. Only in two cases have state environmental agencies requested the environmental assessment of dam siting alternatives as a condition to the issuance of a preliminary permit to hydroelectric power plants (Tibagi river basin in Paraná State and Ribeira river basin in São Paulo State). The requirements made by both environmental agencies were in response to the claims against dam construction made by local communities and environmentalist groups, and the dams are still to be built.

In spite of the regulations and the fair amount of work done by the electricity sector in Brazil, the effectiveness of dam EIA process has been relative. One reason is the already-mentioned lack of environmental considerations in the decision on the set of dams to be built in a certain river basin. Others are related to the lack of coordination among involved government institutions (among others, environmental agencies, municipalities, health and sanitation authorities), deficiencies in enforcement, the unsatisfactory performance of environmental agencies and poor commitment of power companies to implementation of environmental management plans. All the same, there have been several cases in which EIA studies have influenced project design. Machadinho power plant project in Rio Grande do Sul State was redesigned to reduce impacts from population displacement and agricultural areas to be flooded, even though this meant losing generation capacity. Two dam projects in Minas Gerais State have been scrapped, to be replaced by a single dam project with less negative environmental impacts.

In recent years, privatization policies have been implemented in developing countries, as part of the institutional reform aiming at the reduction of the role of the State and the presence of the public sector in the economy, liberalization of the economy and promotion of increased foreign investment. The role of the State has been redefined to one limited to normative and regulatory functions.

Public sectors most affected by privatization include energy and electricity, bringing new concerns to EIA effectiveness of dams. For those development project submitted to EIA now in the course of implementation, there have been doubts about the commitment of new power plant owners to the fulfillment of agreements with social groups and the implementation of environmental management plans, in special impact mitigation measures and monitoring. Most privatization contracts do not even mention environmental and social liabilities. Responsibility regarding compensation and management of social impacts caused before privatization have usually rested in the hands of government agencies affected by the shortage of human and financial resources. For example, in Peru, twelve electricity companies have been privatized since 1993 and six regional electricity companies are now in the process of privatization. Private generation companies have no responsibility for past environmental degradation and social damages, and have only been required to submit environmental management plans for their power plants concerning the changes needed to come into compliance with environmental law. While companies have made significant progress in the preparation and receipt of approval of their plans, the major investment in terms of time and

resources will be in their implementation, which, for economic reasons, may not occur for periods of up to five to ten years.

Cases of different private companies operating power plants in the same river basin are to be expected, which may bring new problems and uncertainty regarding the development of integrated programs for managing social and other environmental impacts in the basin as a whole.

EIA procedures have not yet been adapted for new power generation concession to private enterprises and the building of dams. Here, concerns are related to the social-political feasibility of new concessions, as private enterprises will certainly find it more difficult to interact and coordinate their actions with environmental and other government institutions involved in river basin management and social development.

The shrinking of the public sector has affected the environmental units in the electric energy sector as well as environmental agencies, which were left without resources to invest in the technology and administrative capacity required to increase the efficiency of the EIA process. In addition, regulatory agencies that have been created as part of the state reform and privatization programs do not seem to be sensitive to the role of EIA as a planning tool, reinforcing the project proponent feelings that EIA process is just one more bureaucratic requirement for project approval. Another drawback is the opinion, shared at least among some influential segments of developing countries, that increased support and efficiency in the planning and management of the environment, rather than improving the investment climate and contributing to sustainable development, would serve as an obstacle to national and foreign investors.

3. Assessment of the contribution of the EIA and SIA to negotiation

Before EIA requirements, electric generation developers tended to disregard social interests, leaving population displacement, health and other relevant impacts to be dealt with by government institutions in charge of social assistance, public services and natural resource protection. In developing countries, there is little doubt about the contribution of EIA to public participation and negotiation of conflicts brought by dam construction, although the increase of public environmental and social awareness and the evolution of democracy have also played a relevant role. In developing countries, it was the institution of the EIA process that opened the first formal opportunity for public participation in decision-making. However, EIA procedures have not yet proved to be efficient in terms of insuring a sound participation of affected communities and interest groups, nor in promoting fruitful negotiation, although some of the initial difficulties have already been solved.

The requirement and support from international financing agencies has met the demands of society for public participation in countries where democracy evolution is under way. However, these incentives have not been enough. Social mobilization and participation is a complex issue which involves a number of aspects that are not easily managed. For

instance, within the same country, participation procedures and models that may work well in more developed areas are not efficient in less developed ones, while different approaches have to consider the economic and cultural conditions of affected or interested social groups.

Where public involvement has been the result of external pressure, being promoted on an "ad hoc" basis, the opportunity to learn with experience has been restrained, as has happened in developing countries before legal provision are in force for disclosure of information and social interaction and negotiation between project proponents and affected communities. As EIA regulations and enforcement progress, and judicial reviews of which plaintiffs are public attorneys are made available, participation and negotiation tend to be more effective in terms of impact mitigation and social protection.

The best examples of a positive contribution of EIA to negotiation show that some conditions have to be met, the main one being the involvement of interested parties at the early stages of the dam planning and EIA processes. Some further examples are taken from Brazil, a country where a number of dams have been planned and built after the institution of the EIA process, resulting in many contentious cases during the environmental permit process:

- To solve the conflicts arising during the feasibility studies and EIA review of the hydroelectric power plant of Salto Caxias in Iguaçu river, Paraná State, a negotiation forum has been organized; the member are engineers of the electricity company (developer), municipal counselors, state deputies and community representatives (70% of total participants). Based on the EIA information, the forum discussed and approved the directives and guidelines for the development and detailing of the basic project; monthly meetings were held to follow up the design of all engineering and environmental management projects and programs. The participation process has been efficient in reducing conflicts of interest and ensuring that community concerns are taken into consideration.

- Strong opposition from local groups led the planning process of Irapé dam and power plant in Jequitinhonha river, Minas Gerais State, to include a series of more than forty meetings with community groups before the beginning of the feasibility studies, in order to spread information on the project, discuss likely impacts and monitor community demands. As a consequence, the EIA and preliminary permit application review have met with little opposition and the basic project of the power plant is now being developed in accordance with the negotiation agreements.

In these and other positive cases, population displacement policy has evolved from mere monetary compensation for the loss of housing and other goods and assets to more comprehensive social programs aimed at rebuilding family economic activities and protecting cultural values. By now, there is consensus among environmentalists and EIA practitioners that, without the disposition to promote participation from the beginning of the dam planning process and careful negotiation with affected communities, no

development project would go ahead, at least in the more developed regions of the country.

Other conditions for an effective negotiation still to be met in developing countries have been: (i) the participation of all interested parties instead of the partial involvement of directly affected communities and some qualified groups; (ii) full information disclosure from developers during all phases of the EIA process and all interest groups; and (iii) pro-active behavior from developers towards participation instead of a reactive approach to the claims of the affected communities and opposition from environmentalists.

With time, some models have been developed by social scientists and applied in countries such as Venezuela and Guatemala, for improving participation in the EIA and planning processes of dams and other types of project (roads, urbanization of shanty town etc.) involving the displacement of low income population and ethnic groups. The common element of these models is the technical habilitation of affected people to participate in the EIA and planning processes, a preparatory activity that, although time- and resource-consuming, is considered essential to the effectiveness of negotiation. Its main objective is to prepare community representatives to understand project implications and express and discuss their interests and concerns. Other important model elements are the establishment of permanent information exchange mechanisms, conflict mediation and legal and financial support for the implementation of social impact mitigation and compensation measures as well as other forms of agreement.

4. Evaluation of the performance of EIAs and SIAs as the basis for management actions

This is probably the EIA function the performance of which has been less effective. In developing countries, problems related to the implementation of environmental programs, including impact monitoring, mitigation and compensation measures, have been related to the commitment of developers as well as technical, institutional and financial aspects.

As environmental concerns are not fully incorporated in the dam project cycle, once a dam project is approved promoters tend to neglect environmental protection measures that have been identified in EIA studies and established as conditions for project implementation. Many times, the time sheets of engineering and environmental activities have not been matched, with negative and unexpected consequences. For example, there have been cases of reservoirs being filled up before the completion of population displacement and animal rescue.

Technical reasons for the poor performance of the environmental management of dam projects submitted to EIA begin with poor impact prediction in EIA studies, so that sound monitoring plans and mitigation measures can barely be identified. In fact, on account of the lack of elements related to impact nature and magnitude, a number of EIA studies of dams have failed to propose comprehensive environmental management programs for dam implementation, presenting a list of generalities in the place of appropriate

mitigation measures and monitoring plans. In this situation, such dam projects end up being approved on condition that the design and cost evaluation of environmental management actions is presented some time in the future.

The capacity of environmental agencies in developing countries is an important element in the enforcement of environmental management programs of dams, by ensuring compliance with environmental legislation, and verifying the effective application of mitigation measures and the accuracy of monitoring results. Few environmental agencies in developing countries have been able to support a qualified staff to be the technical equals of their professional counterparts in energy generation companies, and to ensure a sufficient field presence to assess if environmental management programmes are achieving their objectives. Given the lack of an adequate enforcement, only the mitigation and compensation of social impact has had some success, this success coming in proportion to the pressure applied by community groups, environmentalists and public opinion.

The absence of financial mechanisms to support the implementation of environmental management programs on self-sustaining basis has been a major cause of the poor environmental performance of dam project implementation. During the planning and construction phases, environmental costs are incorporated into, and considered as a part of, the total investment. As the costs of environmental management programs are not included in energy tariffs, once energy generation has begun few financial resources are available to honor social agreements and compensation measures and, at the same time, pay for water monitoring, rehabilitation of degraded areas, implementation of reservoir protection measures or other environmental management actions.

As mentioned previously, privatization of hydropower plants has brought new concerns over the implementation and continuance of environmental management programs of power plants already in operation. Since concessions for the building of new power plants and dams are sometimes given only after the completion of feasibility studies, environmental project review and agreement on social impact mitigation and compensation, there have also been doubts about the effective undertaking of these and other environmental protection measures by private companies that have had no participation in the EIA process.

5. Recommendations

a) EIA and SIA performance throughout the planning and project cycle on dams:

- A new approach to the planning process of dams aiming at its compatibility with the EIA process is strongly recommended, the first step of which would be to ensure that river basin studies (river basin inventory) include the following aspects: consideration of the multiple uses of water and other natural resources; identification, assessment and selection of dam scheme alternatives taking into account both the maximization of economic and energy efficiency and the minimization of environmental impacts.

- Improvement of EIA regulations and procedures for public participation and information disclosure in order to ensure sound negotiation conditions and participation of all interested parties from the beginning of dam planning and EIA processes.

b) How to ensure that EIA and SIA conclusions are followed through to implementation?

- Creation of financing mechanisms to cover environmental costs during the project operation phase; generally, electricity tariffs are set for the country as a whole, which makes it difficult to incorporate environmental costs. One of the suggestions for ensuring the provision of resources to pay for environmental management program implementation has been to establish separate accounts or funds for the financial planning and control of disbursements.

- Enhancement of enforcement through the improvement of institutional conditions of environmental and electricity sector regulating agencies in order to verify the compliance of dam developments with concession and environmental permit conditions, including the implementation of impact monitoring, mitigation and compensation measures.

c) What kind of support – financial, managerial, technical, political – is necessary to achieve this?

- Improvement of methodological approaches to EIA studies of dam projects: (i) to the development and application of more accurate techniques for the magnitude prediction of impacts on biological, social and economic subsystems; (ii) to the consideration of uncertainty through the use of appropriate methods.

- Sensitization of private developers and high level officers in regulatory agencies of the electricity sector to the benefits of integrating the EIA process and the planning and implementation of dam projects, and the importance of the sound environmental management of hydroelectric power plants.

- Development of environmental management capacity in new private electric generation companies.

- Dissemination of positive cases of dam project planning where early and broad public participation has promoted less contentious negotiation and reduced opposition to project implementation.

d) What kind of monitoring and audit systems should be put in place?

- In addition to the implementation follow-up and monitoring procedures regularly performed as a part of the EIA process, independent environmental audits in private hydropower plants and dams are recommended to verify the level of compliance with

social agreements and environmental legislation, and efficiency of impact mitigation measures.