



## Impact Assessment and Project Appraisal

ISSN: 1461-5517 (Print) 1471-5465 (Online) Journal homepage: <http://www.tandfonline.com/loi/tiap20>

# Social impact assessments of large dams throughout the world: lessons learned over two decades

**Dominique Egre & Pierre Senecal**

To cite this article: Dominique Egre & Pierre Senecal (2003) Social impact assessments of large dams throughout the world: lessons learned over two decades, *Impact Assessment and Project Appraisal*, 21:3, 215-224, DOI: [10.3152/147154603781766310](https://doi.org/10.3152/147154603781766310)

To link to this article: <http://dx.doi.org/10.3152/147154603781766310>

Published online: 20 Feb  
2012.

Submit your article to this journal GF

Article views:  
1321

Citing articles: 4 View citing articles GF

Full Terms & Conditions of access and use can be found at  
<http://www.tandfonline.com/action/journalInformation?journalCode=tiap20>

# SIA of large dams

## Social impact assessments of large dams throughout the world: lessons learned over two decades

Dominique <sup>L</sup>Egre and Pierre Senecal

*The dams reviewed in this paper – Three Gorges in China, Ilisu in Turkey and Urra in Colombia – are controversial and the assessment of their social impacts represents a challenge. This paper emphasizes the complexity of the institutional setting and social impacts of these projects as well as the specific problems raised by their assessment, which result from the magnitude, intensity and visibility of these impacts. The paper draws lessons from these projects on SIA methods, impact perception, the analysis of project alternatives, the design of mitigation and compensation measures, social monitoring and follow-up, as well as ethical boundaries.*

Keywords: dams; hydroelectric projects; environmental impact assessment; resettlement issues; human impacts; social impacts

Dominique Egre is an independent consultant specializing in environment and energy. His address is 926 Saint-Maurice Street, Suite 302, Montreal, Quebec, Canada H3C 1L7; E-mail: egre-howard@sympatico.ca; Pierre Senecal, Past-President IAIA 1996-97, works for a large Canadian utility. His home address is 1021 avenue Louis-Archambault, Montreal, Quebec, Canada H2M 2J5; E-mail: p\_senecal@videotron.ca. The opinions expressed are solely those of the authors and do not necessarily reflect those of the various organizations they have been associated with in the past or work for presently. The authors would like to thank Michel Gavard, Daniel Chevrier, Alfonso Krumdieck, Konrad Deucher and Gaetan Guertin for their suggestions.

**L**ARGE DAM PROJECTS are generally controversial and the three projects discussed in this paper — Three Gorges in China, Ilisu

in Turkey and Urra in Colombia — rank among the most contentious. The media scrutinizes them and their visibility represents an important factor for the social impact assessment (SIA) practitioners involved in them. This visibility increases the stakes involved in the assessment of these projects, in addition to the very real issues raised by their impact on local populations that SIAs are trying to grasp, commanding as a result larger resources and longer timeframes than other projects.

At the same time, SIA practitioners must face the fact that, for various reasons, they must compete, generally on unequal terms, with the conclusions reached by the media or the anti-dam NGOs (nongovernmental organizations) they quote, usually more rapidly and often more decisively than the environmental impact assessments themselves. The visibility of these projects is, however, warranted in regard to the serious issues that they raise or because of the historical or symbolic importance of these projects in the evolution of many nations.

The issues generated by these projects are important and complex. On the social or human side, they include: the preservation of cultural heritage; the resettlement of large numbers of people; a fair compensation for lost assets; the creation of new communities; the health and well-being of affected populations both upstream and downstream; the economic survival and development of these populations on a long-term basis; gender; and minority rights.

Moreover, the complexity of these issues is matched by the intricacy of the institutional context in which the assessment must proceed. Many actors play a significant role in the environmental assessment of these projects and most will devote much attention to the work carried out by the SIA practitioner, because of both the importance of the social issues at stake and their potential influence on the decision-making process. Finally, the project cycle of large dams is complex, prone to unexpected twists, and often extends over decades.

This article focuses on resettlement issues<sup>1</sup> because they are largely considered the most severe form of social impact generated by dams. In many countries, the construction of dams and the creation of reservoirs often involve the resettlement of a large number of people because of the critical importance of access to the water provided by the rivers being impounded, a key contributor to high population densities. Resettlement issues are generally assessed in two different environmental impact assessment (EIA) contexts (Egre and Senecal, 1990).

1. In the impact study, the main objective is to determine as precisely as possible the total number of people who will have to be resettled and to identify the range of social issues or impacts triggered by their relocation. A precise assessment of the number of people to be displaced is vital because it will have a direct bearing on the budget allocated to resettlement, which may be of the same order of magnitude as dam construction. An underestimation of resettlement costs is one of the main factors that explain why so many resettlement programs have failed.
2. The resettlement action plan (RAP) describes all the programs and activities that must be carried out to ensure a successful relocation. They include the planning of compensation procedures, precise estimates of the number of people who wish to receive cash compensation or who prefer to be resettled with the help of government, the construction of an adequate number of houses (or other types of housing) and of other public infrastructures needed for relocatees, and the creation of enough jobs or sources of livelihoods to ensure their long-term survival and well-being. The last objective is the most difficult to achieve.

This paper draws lessons from the SIAs of the three projects reviewed, which provide a representative range of social issues triggered by large hydro projects in developing countries, from the perspective of the best practice, which has emerged over the last decade. Because they are mainly presented to draw out these lessons, the projects themselves and the social issues they raise will only be outlined in this paper, rather than described on a detailed basis.

The reader should also be reminded that the information presented here is largely based on the reports that the writers wrote in the context of these

projects and is restricted to a significant extent to the data available at the time of their involvement. Finally, these SIAs have all been carried out (as they should be) in the larger context of the human impact assessments of these projects, which were themselves fully integrated in their EIAs. These EIAs thus assessed a larger range of human impacts than those related to resettlement issues but these impacts cannot, for the sake of brevity, be presented in this article.

The authors have been involved either jointly or separately, in the assessment of the social impacts triggered by the three projects. They have been involved either in the preparation of their EIAs, RAPs or SIA follow-up. They were also involved in the follow-up of the human impacts generated by the James Bay hydroelectric project in Northern Quebec, the largest of its kind in North America (Senecal and Egre, 1999).

### **Three Gorges project (Yangtze River, China)**

The authors were involved, from 1987 to 1989, in the technical, financial, environmental and social assessments of the Three Gorges project. These assessments were sponsored by the Canadian International Development Agency (CIDA) and carried out by CIPM-Yangtze Joint Venture (CYJV), a consortium of Canadian engineering firms and government-owned utilities. The promoter of the project was the Yangtze Valley Planning Office (YVPO), based in Wuhan, a large city located downstream on the Yangtze, mid-way between the dam and Shanghai.

The CYJV studies were overseen by a steering committee that included CIDA, YVPO, the Chinese Government and the World Bank. These studies had been largely completed when the Canadian Government withdrew its support in the wake of the Chinese student rebellion of the late 80s.

#### ***Description of the project and study area***

The reservoir area, which spreads from Chongqing in Sichuan province to the dam site (Sandouping) in Hubei, is mountainous and difficult to access, except by boat. The people living on the river banks are generally poorer than the average populations of their respective provinces as a result of soil quality, which decreases at higher elevation, the difficulty of land transportation and the backwardness of its industry, which partially results from the prolonged uncertainty about the project. About half of the population being resettled lives in an urban setting, mostly in small cities and towns spread on steep banks, high above the river. Finally, the cultural heritage of the flooded area — one of the cradles of Chinese civilization — is extremely rich.

There are officially three main reasons why Chinese authorities have decided to build the dam: flood control, to prevent or alleviate the Yangtze's severe

**There are officially three reasons why Chinese authorities have decided to build the dam: flood control; power generation; and navigation: a fourth reason is a massive scheme to divert water from the Yangtze to drought-stricken northwest China**

floods which have caused massive losses of life over the last centuries; power generation: with its installed capacity of 18,200 MW, Three Gorges will become the largest hydroelectric power plant in the world; and navigation, which has historically been impeded by 139 strong rapids and treacherous shoals from Yichang and Chongqing.

A fourth reason, which may be even more important, is a massive river diversion scheme which would move water from the Yangtze basin to drought-stricken northwest China (Bravard, 2001; Sanjuan and Bereau, 2001). This fourth purpose seems to partially explain why the Chinese authorities have finally selected the 185 meter dam alternative at Sandouping. The project will deliver its first power output in August of 2003 and will be completed in 2009.

***Identification of key social issues and impacts***

The project's impacts on the human environment were assessed by a multidisciplinary team of CYJV specialists who carried out 14 sectoral studies. A report summarizing all the resettlement-related sectoral reports and which amounted to a RAP was prepared (CYJV, 1988). The SIA conducted in the context of the study was entirely focused on resettlement-related issues, which had already emerged at that time as the project's most outstanding human impact by far. Only the main conclusions of the sectoral report on social impacts will be presented here.

CYJV reassessed the previous estimates of relocatees that had been calculated by YVPO on the basis of surveys conducted in cooperation with local authorities. Specific estimates were made according to the four project alternatives, which were based on reservoir levels (NWL or normal water level). CYJV came up with figures varying from a total of 539,000 people (at NWL 150 meters) to 1,184,000 at NWL 180 meters. Social impacts were differentiated according to the different categories of people affected by resettlement. A total of 28 categories of social impacts emerged from this analysis. The most significant were:

- In rural areas (flooded and host), five critical social issues were identified: those associated

with the loss of landmarks related to ancestor cult; the selection of host areas (then confined to the vicinity of the reservoir area); the redistribution of already contracted land; job conversions to non-agricultural sectors; and the social effects of the agricultural intensification scheme, which involved a much larger use of cash crops.

- In urban areas (flooded and host), the four outstanding social issues were: impacts on living conditions; the closure of outmoded factories and their social effects; a possible reduction in social cohesion; and the loss of distinctive architectural characteristics.
- A number of positive social impacts (such as income increases and better living conditions) were also identified in flooded and host areas.

Another important social issue that was left largely unresolved at that time was the fate of the so-called 'non-registered residents', people who may have lived for many years in the urban areas that would be flooded, and who represented a significant percentage of their overall populations. Because they were not considered as permanent residents, Chinese authorities did not believe they were entitled to compensation, a position which with CYJV disagreed.

***How data were collected and impacts measured***

Before CYJV became involved, YVPO had carried out two major surveys in 1958 and 1983. In addition to the number of relocatees, these surveys had estimated all the lost assets (such as infrastructure, factories, housing and farmland). A Chinese academic had also carried out a survey on the attitudes of reservoir populations towards resettlement. However, no SIA of resettlement issues had been conducted before CYJV became involved.

CYJV completed this database with field visits, the interpretation of aerial photographs, the analysis of census records, meetings with local authorities, industry managers, neighborhood and village committees, and interviews with a small number of residents. These meetings and interviews were carried out in four counties (out of the 19 affected) that were considered representative of the reservoir area. Rapid rural assessment (RRA) and semi-structured interviews of groups or individuals were mostly used for data collection.<sup>2</sup> Quantitative data were also collected whenever possible, along with qualitative data. The CYJV team mostly traveled by boat and foot in the reservoir area.

EIA specialists (including the SIA practitioner) were asked to assess in their sectoral reports the critical or outstanding issues that had emerged from their list of impacts. The impact assessment was conducted in Montreal and to a more limited extent in Wuhan, a large city on the Yangtze downstream of the dam. Each assessment was reviewed by a group of other CYJV specialists familiar with the

field and summarized in the resettlement study. Finally, the feasibility of resettlement itself for each of the four project alternatives was assessed on the basis of 14 criteria which had been established with the support of the steering committee of the study and of all the other parties involved in the review of the resettlement report.

The CYJV report concluded (with most resettlement experts at that time) that “the existing Chinese laws and regulations related to resettlement were well conceived and quite specific on several resettlement planning aspects”. Furthermore, the Chinese policy of “resettlement with development” recognized that development funds, in addition to compensation, were required to improve the livelihoods of the relocatees, to provide new job opportunities and to mitigate impacts on host populations.

### ***How SIA was used in the decision process***

The main recommendation of the feasibility report in regard to SIA, resettlement in general and the whole project was to implement the NWL 160 meter alternative with a 185 meter dam. The rationale for that recommendation was to limit as much as possible the number of people who would have to be resettled, while ensuring that the three goals of the project would be met. More specifically, the study concluded that CYJV could not “confirm feasibility” of resettlement above the NWL 160 meter alternative. If that alternative had been selected, 465,000 persons (as planned in 1988) would not have been forced to be resettled. The alleviation of social impacts, therefore, strongly influenced the selection of CYJV’s recommended alternative.<sup>3</sup>

The 185 meter dam was recommended in order to increase the capacity of the reservoir to stock more water and therefore prevent severe downstream flooding as well as massive loss of life, which was considered as one of the main goals of the project. There were, however, two drawbacks to the NWL 160 meter alternative. First, the power output of the dam would have been reduced. Secondly, people living between elevations 160 and 180 meters would have been subjected to infrequent flooding in the eventuality of severe floods (more than 1:20-year occurrence). Such an outcome is nothing new in China: along the Yangtze, many people already live in so-called ‘diversion areas’, which have been laid out for that purpose.

Another drawback, which may have turned out as decisive for Chinese authorities, was the incompatibility of the NPL 160 meter alternative with the massive water diversion scheme — more specifically with the ‘central channel’ alternative. CYJV was not aware of that incompatibility when it prepared the feasibility study.

Although CYJV’s recommended alternative was rejected, Chinese authorities translated its full report, including the sectoral studies. Beyond any specific influence these studies may have exerted and that

was informally confirmed afterwards, the very extensive exchanges that took place between Chinese and western specialists in the context of the study provided to all participants a forum staged at a key point in the evolution of resettlement policies. It influenced the thinking of the organizations involved about issues such as ‘land for land’ and ‘development-oriented’ resettlement.

Since resettlement was undertaken, numerous media reports have emphasized the negative impacts that this process had triggered. CYJV or the authors had predicted many of these. These reports, which are difficult to confirm in the absence of social follow-up, also seem to show that the implementation of resettlement plans had very significantly deviated from the plans recommended by CYJV and endorsed by its steering committee. This outcome probably became very difficult to avoid in the current Chinese context after the World Bank withdrew from the project.

### **Ilisu (Tigris River, Turkey)**

The authors were involved, from 1997 to 2001, in the environmental assessment of the Ilisu project. The promoter is the Turkish General Directorate of State Hydraulic Works (DSI). The assessment itself was conducted by a group of foreign and Turkish specialists. It was sponsored by an international consortium under the leadership of Swiss companies that had been involved in large hydro projects in Turkey since the 1950s.

The assessment was overseen by the Export Credit Agencies (ECAs) of the countries where the head offices of the various consortium companies were located. The project suffered a setback and delay when some consortium members dropped out, followed by the bank coordinating the financing, in a context of environmental controversy and for financial reasons as well. As a result, construction has been postponed.

#### ***Description of the project and study area***

The reservoir area is located in southeastern Anatolia close to the borders with Syria and Iraq. Almost two-thirds of the 31,000 ha which would be flooded are unsuitable for agriculture. A growing portion of the cultivable land is irrigated. Flocks of sheep and goats roam the surrounding plateaus. About a fourth of the population that would have to be resettled lives in the city of Hasankeyf and the rest in small rural villages or hamlets. A large percentage of the farmland, the more productive portion, belongs to a class of large property owners who gained a semi-feudal status under the Ottoman rule.

The reservoir area is entirely populated by people of Kurdish or (to a lesser extent) of Arabic descent. As in the rest of southeastern Anatolia, the area has suffered heavily from the turmoil caused by the

armed confrontation, now virtually ended, between the Kurdish Workers Party (PKK) and the Turkish Government. As a result, more than a third of the people living in the reservoir area had forcibly or voluntarily left and nearly half of the settlements that would be totally or partially flooded are not populated any more (as in many other regions of southeastern Anatolia).

The prolonged uncertainty about the future of the project has also negatively affected Hasankeyf, the only city that would be flooded. Much of the international campaign and of the concerns raised by local mayors against the project have been focused on the flooding of Hasankeyf, the capital of a small Arabic kingdom during the Middle Ages. Although its most important landmark — the citadel — would escape flooding, much of the other archeological remains would be lost. Some may be moved to higher altitudes. A salvage excavation program has been undertaken, with international support, in Hasankeyf and in other parts of the reservoir area. The cultural heritage of the Tigris valley, one of the great transportation routes of early history, is very rich from Paleolithic times to the period of the Ottoman empire. This area is especially important for an understanding of early agricultural development during the Neolithic period.

The Ilisu dam with an installed capacity of 1,200 MW has been designed as a single-purpose project focused on power production. Most other dams constructed or planned in the region are multi-purpose, providing a combination of electricity production and large-scale irrigation. Little land suitable for agriculture would be left around the reservoir after flooding and, for that reason, a multi-purpose dam would not be advisable. However, Ilisu could be completed by another downstream project, the multi-purpose Cizre dam to be built closer to the Syrian border. Ilisu would help to regulate the Cizre reservoir which would be used in its turn to irrigate an area suitable for agriculture and to produce electricity.

Only one project alternative has been actually assessed in the context of the EIA: a 135 meter dam with a reservoir operated at normal storage level at 525 meters. That alternative had already been sanctioned in 1982 by Turkish authorities after considering other possibilities that had been assessed primarily on the basis of technical and economic factors.

#### *Identification of key social issues and impacts*

The project's impacts on the human environment were assessed by a multidisciplinary team, which included an archeologist, an agronomist, an economist, a sociologist and civil engineers. No sectoral reports were written as such: the conclusions reached by each specialist were directly integrated in the main report. A RAP was prepared on a parallel basis by a Turkish consulting firm under the guidance of DSI. Only the main conclusions reached by the sociologist in the context of the EIA report (EIAR)

(Consortia for Ilisu, 2001) will be presented in this paper. The SLA conducted assessed all the human impacts of the project, whether they were related or unrelated to resettlement.

Much effort and time were dedicated to a precise identification of the settlements that would be affected by flooding and of the number of people who would have to be resettled. Many lists of affected settlements and estimates of their population, showing wide variations, had previously circulated. These data were systematically validated in cooperation with DSI to clarify as much as possible (in the absence of a systematic survey of all the households of the reservoir area) the many uncertainties and distortions that still existed.

After implementing that procedure, the EIAR concluded on the basis of the available data that 28,000 people would have to be resettled. The total number of people living both in "totally" and "partially" affected settlements, according to these estimates, turned out to be much higher (close to 60,000). Because 16,000 people do not live in these settlements any more, the actual number of people living there is estimated to be in the range of 44,000. However, in many "partially affected" settlements, no houses and only a small proportion of the farmland would be flooded. For this reason, resettlement could be avoided for the majority of the people living in these settlements.

Finally, of the 28,000 people who would have to be resettled, 8,600 have already been forced to leave the area (often as a result of the conflict with the PKK) but could claim compensation. Therefore, the actual number of people who would have to be resettled would fall below 20,000.

Resettlement was identified as one of the four most important environmental issues of the project (along with water quality, downstream discharges and cultural heritage). The issues raised by resettlement were differentiated according to three categories:

- Issues common to urban and rural areas: the need for fully validated data; administrative restructuring; the coordination of resettlement programs; the strengthening of the organizations in charge of resettlement; the consultation of relocatees; the

**Resettlement was one of the four most important environmental issues in the Ilisu project and the concerns raised by resettlement fell into three categories: issues common to urban and rural areas; issues in urban areas; issues in rural areas**

resettlement of women; the timely implementation of the resettlement programs; and the biophysical impacts that could result from the creation of new settlements.

- Issues in urban areas: the selection of a new site for Hasankeyf; the preservation or salvage of its historical heritage; the recognition of the property rights of Hasankeyf dwellers; the creation of new sources of livelihood; and the protection of a village by a dyke.
- Issues in rural areas: the identification of farmers entitled to resettlement benefits who have already left the reservoir area; the registration of property rights in that same area; the search for suitable agricultural land; and the technical and financial assistance for relocatees.

Six other categories of social impacts unrelated to resettlement were also identified: health-related impacts; repercussions of new roads; impacts on shepherds using the reservoir area on a seasonal basis; gender-related issues; impacts on community relations; and impacts on religious beliefs, lifestyles or quality of life.

#### ***How data were collected and impacts measured***

Before the EIAR, no surveys had been recently undertaken to identify the settlements that would have been affected by flooding and the number of people who would have to be resettled. Moreover, the information available was extremely sparse as a result of the conflict with the PKK that had prohibited for a long time scientific research and the collection of other types of data in the reservoir area.

As the EIAR was carried out, the organization preparing the RAP, however, conducted a large-scale survey, which tried to clarify as well the list of settlements that would be flooded and the estimate of their populations. That survey also provided much data on housing, crops, revenues and other characteristics of the populations living in the reservoir area (including attitudes towards the project and resettlement). These data were integrated in the final version of the EIAR.

The authors of the EIAR completed the database available when they undertook the study with the analysis of maps and satellite imagery, meetings with local authorities and professionals familiar with the reservoir area, numerous field visits as well as interviews with local residents. These exchanges took place in Hasankeyf, the capitals of the five provinces affected by flooding and in various parts of the reservoir area. Some remote sectors could not, however, be visited because of their lack of roads or because they were considered as unsafe at that time. RRA and semi-structured interviews of groups or individuals were mostly used for data collection. The team traveled mostly by car, helicopter and foot. During the early field visits, armed convoys had to be organized in order to visit areas considered as unsafe.

The Ilisu EIAR assessed for the first time the biophysical and human impacts (related or not to resettlement) of the project. Because the EIAR was written in Ankara, a number of short field trips and meetings with Turkish specialists could be organized to better grasp specific issues. After their identification, social impacts (as well as other categories of biophysical and human impacts) were assessed with the help of a formal matrix.

A list of complementary studies was also recommended to understand more fully all the potentially significant characteristics of the study area. Finally, specific recommendations were issued on the mitigation of social impacts and on resettlement criteria that would ensure an equitable treatment of all categories of affected populations.

#### ***How SIA was used in the decision process***

In early 2003, the composition and further involvement of the international consortium set up to build the dam were still under review, while it seems unlikely that Turkey is presently in a position to finance the project.

Because no further decision has been taken in regard to resettlement or other social issues, it would be vain to speculate on the likely influence of SIA on the decision-making process. We will only emphasize that DSI well received the EIARs recommendations on resettlement because of its familiarity with the policies of the World Bank, among other factors. However, other Turkish organizations play a more direct role in the implementation of resettlement plans.

Neither the SIA nor the EIAR resulted in a change of the preferred alternative although they strongly influenced recommendations of the EIAR about mitigation and compensation measures. In spite of their wide distribution (it could be consulted on a British government web site), the influence of the EIAR and of its SIA on the evolution of public debates in countries, such as the UK and Switzerland, where the project was the most discussed seems to have been limited.

As usual, the viewpoints reported in the media were mostly those of the anti-dam NGOs, which turned out to be very influential. This outcome, the possible consequences for their reputation and the need to carry out considerable complementary studies (as recommended by the EIAR) played a major role in the decision of some consortium partners to pull out of the project.

In addition, the ECAs, which are widely perceived as the successors of the World Bank in the financing of large infrastructure projects, were deeply involved in the review of the EIAR. As a result, they agreed for the first time on a joint approach to establish environmental and social conditions for their participation in the financing of the project. It also prompted them to develop with the assistance of the OECD (Organization for Economic Cooperation and

Development) some common generic environmental and social guidelines that represented a turning point in their evolution.

### **Urura 1 (Sinu River, Colombia)**

One author of this paper carried out eight short missions to Colombia from 1996 to 1999 as a member of the Agra-Monenco team that monitored all aspects of the construction phase of the Sinu River project on behalf of the Nordic Investment Bank. URRSA SA implemented the project, and was also responsible for its compliance with all the permits related to environmental and social aspects. Construction was delayed for 15 months because of a long legal process, which led to an agreement with the indigenous Embera-Katio community living in an area located upstream of the dam.

#### ***Description of the project and study area***

The Urura 1 project is located on the 350km long Sinu River that flows into the Caribbean Sea, in the northwestern part of Colombia. Its installed capacity is 340 MW and its reservoir covers an area of 7,400 hectares. Construction began in 1994 and its four units were commissioned in 2000.

Upstream of the dam, the Sinu valley has been used by indigenous people since pre-colombian time and has been colonized by non-aboriginal settlers since the 1950s. The upstream valley, which is included in the Paramillo Park (the largest in Colombia), is an isolated area with almost no government presence, where subsistence-level agriculture, extreme poverty and high levels of ethnic, social and political conflicts prevail. The Embera-Katio community, with some 450 families, lives in a 2,000 km<sup>2</sup> reserve adjacent to Paramillo Park.

Downstream of the dam, the main economic activity is extensive cattle raising on large properties. The biodiversity of the downstream Sinu River is rich with its 147 species, some of them migratory. Fishing remains a significant activity, especially in wetlands, but the health of its fish population was already a matter of concern before construction began. It has suffered from human intervention, especially from agricultural pollution and the use of wetlands for agriculture.

#### ***Identification of key social issues and impacts***

The main social impact of the project is the involuntary resettlement of some 7,300 people who inhabited an area of some 18,000 ha required by the construction of the civil works and the creation of the reservoir. Another significant issue is related to the impacts of the project on the Embera-Katio community. Although the project did not force that community to resettle and only impounded 417 ha of its reserve, the Embera-Katio have to deal with a

variety of impacts from the Urura 1 project, primarily because they use the Sinu River for transportation and for fishing. The project also generated social and cultural impacts in the community.

Other issues were identified:

- dislocation of communication links because of the presence of the dam and of the reservoir with resulting social and economic repercussions;
- existing social, ethnic and political conflicts exacerbated by project impacts;
- migratory pressures, which could threaten the integrity of Paramillo Park;
- indirect effects on fishermen in the lower Sinu valley;
- loss of archeological remains in the reservoir area.

#### ***How data were collected and impacts measured***

At the time when the Urura 1 project was planned, Colombia had no legislation calling for the preparation of an EIA or SLA. However, the promoter was well aware of the environmental and social issues raised by large dams. As a consequence, the University of Cordoba was hired to carry out an impact assessment.

The university identified the economic, social and cultural characteristics of the populations affected by the project, determined the main social impacts of the project and prepared a socioeconomic management plan. This plan was updated in 1990-1991, prior to project construction. The study was based on participatory observation, interviews and three surveys (carried out in 1982, 1986 and 1990).

Subsequent studies addressing social impacts focused on the development of measures facilitating the adaptation and social integration of the resettled population. They also designed socioeconomic development plans for the Embera-Katio community and the population living upstream of the reservoir. Several monitoring studies were also carried out as resettlement was being implemented.

#### ***How SIA was used in the decision process***

Social assessment was one of the main inputs that influenced the design of the resettlement plan. Several monitoring studies carried out during its implementation demonstrated that its overall outcome was positive: the living standards of the resettled population significantly improved, largely as a result of the magnitude of the efforts and resources invested in the implementation of the plan (De Castro, 1999; De Castro and Egge, 2000). Beyond the construction of new infrastructure, URRSA SA devoted much effort to the economic adaptation and social integration of the resettled population. This program was managed by a team of dedicated social workers and anthropologists who maintained day-to-day relations based on mutual trust with the affected population.

This positive outcome later became particularly



**The resettlement plan for the Urra 1 project used social assessment as one of its main inputs: the living standards of the resettled population significantly improved, largely as a result of the efforts and resources invested in the implementation of the plan**

important in the context of the opposition to the project of other affected groups, especially of the Embera-Katio living upstream of the reservoir and of the fishermen in the lower Simi valley. Additional tensions arising from resettlement could have jeopardized the completion of the project. Indeed, during the planning phase and the first years of construction, the promoter focused its efforts on the implementation of the resettlement plan and did not emphasize as much the mitigation of the impacts generated outside of the construction site and the reservoir area.

Because of the very low level of public investments in the region, the Urra 1 project in fact acted as a social catalyst. Claims and legal actions were filed in order to improve the deteriorating living conditions of the fishermen and of the indigenous community which previously prevailed and therefore resulted from other causes as well. These actions resulted in systematic negotiations with these other affected groups and a more active involvement of responsible government agencies.

**Key lessons learned**

The following lessons can be drawn from our involvement in the projects summarized above from the perspective of recent trends and best practice in SIA, particularly in industrialized countries.

***SIA methods***

The lack of data on the remote regions of the developing countries where many hydraulic projects are planned nowadays represents a significant source of professional risk for SIA practitioners. Combined with tight schedules and possible translation misinterpretation or bias, this can result in the omission or underestimation of important impacts, in erroneous predictions about the way they may evolve and a lack of appropriate mitigation.

These risks can be somehow reduced as practitioners gain experience about the issues raised by dams. The environmental components that affected populations value the most are often strikingly similar from

one part of the world to the other: for example, the importance of burial sites for farmers of Asian countries and North American aboriginal populations. Other factors can reduce the risks: the lessons provided by past social follow-up studies; the use of techniques such as RRA; and the assessment of social impacts and the writing of the EIA report in the study area or in the country where the project is being implemented. When the study is contracted to an international consulting firm, it is also essential that the EIA-SIA team includes a good proportion of local staff.

Because of lack of time and data, practitioners working in developing countries are often forced to carry out analyses focused on broader societal issues instead of more detailed SIAs. For instance, in the context of Ilisu, the EIA first identified all the social issues raised by the project, and their linkages, before formally assessing social impacts. This clarification of the social issues at stake is well suited for the discussion, inside the project teams, by the media or with the public, of the most important social problems raised by a project and for the design of more effective mitigation measures or impact benefit agreements with local populations.

Finally, because they are often carried out before RAPs and provide data much needed by them, SIAs can contribute much to the preparation of RAPs. SIAs should come to some definitive conclusions about the identification of categories of people affected by resettlement, the number of people who should be resettled, their social characteristics and the definition of equitable resettlement criteria ensuring a restoration or improvement of livelihoods. This contribution can help RAPs identify more precisely the needs of the re-locatees and focus their attention on their main goal — the preparation of detailed plans, cost estimates and budgets for resettlement.

***Impact perceptions***

The perception (or apprehension) of impacts at the pre-project stage often influences the behavior of affected populations to a far greater extent than actual impacts. Psychological stress or community tensions related to these perceptions can reach their highest degree of intensity at the pre-project stage. They can also lead, at later stages, to the underutilization of critical and fundamentally sound resources because they are perceived as contaminated or jeopardized in some way by the project. When perceptions of local populations markedly differ from impacts anticipated by project proponents, the traditional model of involving the public in the formal impact assessment process often leads to open conflicts, delays in project construction or even project cancellation.

Perceptions depend on a wide array of factors, which in most cases cannot be influenced by the EIA. However, an earlier and more direct involvement of local populations in the design and implementation of large dam projects, and in the

preparation of their EIAs, can influence to a large extent the perception of impacts. An open, transparent communication process and the direct involvement of affected communities in the design of projects, of their impact studies and of their mitigation or compensation measures can reduce the probability of misperceptions about impacts and the intensity of their social repercussions.

EIA practitioners should therefore provide accurate and understandable information about the likely or actual impacts of the projects and on their level of risks in order to avoid, among other objectives, these misperceptions and the social amplification of risks. They should also help design participation programs and propose factual and accurate descriptions of the social issues at stake.

### *Analysis of project alternatives*

As shown by the Three Gorges Project, the level and nature of most social impacts also vary greatly according to basic engineering options such as the location of the dam, the reservoir level and the downstream river flow pattern resulting from dam operation.

A critical step of any feasibility study should therefore involve a systematic comparison of project alternatives on the basis of technical, economic, environmental and social criteria through a participatory approach until an optimal balance of societal needs is reached. This process should result in the selection of the alternative that is technically and financially feasible and minimizes environmental and social impacts.

Such a comparative analysis should help reduce controversies by ensuring that development proceeds along avenues that are accepted, if not preferred, by key stakeholders. A comprehensive scoping of the social issues raised by each alternative and an analysis of the viewpoints of these stakeholders should be one of the key contributions of SIA to the comparative analysis of project alternatives.

The environmental design of new alternatives that are technically and financially feasible has recently opened promising new avenues. However, the incorporation of social and environmental factors into the comparison of project alternatives is often thwarted by pre-determined decisions made in the context of pre-feasibility studies carried out at a time when tools such as EIA, SIA and integrated watershed management plans did not exist.

### *Mitigation, compensation and follow-up*

For a successful restoration or improvement of living conditions (and of other important aspects of community life), the implementation of efficient mitigation measures and the follow-up of social impacts are as important as, if not more so than, an accurate prediction of impacts and a detailed definition of mitigation measures at the pre-project stage.

The outcome of the resettlement plan implemented in the context of the Urra Project — which was positive overall — shows that, to a large degree, social impacts can be significantly alleviated by the timely implementation of mitigation or compensation measures developed with the participation of stakeholders and supported with sufficient resources. A critical part of the SIA process is therefore the identification, planning and implementation of such measures, especially in countries where the option of judicial appeal does not exist and where, as a result, project-affected populations are much more vulnerable. In such cases, resettlement programs, negotiated agreements and mitigation measures in general should be reinforced in several ways: more specifically, through the development of detailed mitigation or resettlement plans, yearly budgetary commitments for their implementation and the sustained involvement in this implementation, if not the joint supervision, of the organizations involved in the financing of the project.

Negotiated agreements may take the form of packages of monetary and non-monetary benefits (sometimes known as impact benefit agreements or IBAs) signed with project-affected populations.<sup>4</sup> Social scientists should help design IBAs on the basis of their intimate knowledge of the social issues raised by projects and of the goals and values of the involved stakeholders. Such processes generally require the building of relationships based on trust between the parties over a number of years.

Because IBAs usually involve the recognition of the basic rights of the stakeholders and the resolution of conflicts over the use of publicly owned resources, the State should be a party to the agreement or even support the negotiations. The results of these negotiations can be submitted later on for public consultation to project-affected groups (in certain cases, they can be approved through referendums).

Finally, social monitoring and follow-up programs should be systematically implemented and their results should be used to constantly adapt these measures to the evolving context. Affected populations should be involved in the management and implementation of these programs in order to reduce possible misperceptions of actual impacts, focus the programs on the issues that populations perceive as the most important and empower them at this critical stage.

### *Ethical boundaries*

Practitioners may face situations that raise ethical dilemmas resulting from the gap between the values inherent to SIA and the reality of projects. These situations may involve, for example, the arrest of project opponents, the absence of public consultation or the implementation of resettlement policies that have repeatedly failed. To help them decide what they should do when they are confronted with these situations, SIA practitioners should develop their

own ethical guidelines that would specify conditions for their on-going involvement in projects. If these 'ethical boundaries' are violated, SIA practitioners should immediately pull out from projects and inform the organizations financing the project about such violations.

## Conclusions

As demonstrated in the three cases presented above, the contribution of SLAs to a clear understanding of the social issues at stake in a large dam project is essential. Within the project teams, the involvement of SLA practitioners alerts promoters to the importance of equity issues and strongly contributes to keeping those issues at the forefront of project planning. In addition, SLA practitioners can (and should) play a central role in consultations and negotiations with involved stakeholders on all aspects of the project that determine its social feasibility, which is now viewed by many as a key condition to dam construction. The World Commission on Dams has indeed identified as its first strategic priority that "public acceptance of key decisions is essential for equitable and sustainable water and energy resources development" (World Commission on Dams, 2000).

However, lessons drawn from the three cases also show that pre-project SIAs only amount to a starting point. SIAs will not prove effective, in regard to the maintenance or improvement of socioeconomic conditions, if they are not followed up by the implementation of equitable mitigation or resettlement plans developed with the participation of all stakeholders, supported by sufficient budgetary allocations and regularly reviewed according to the results of monitoring or follow-up programs. Another important (and parallel) condition, which is not often met, is the sustained involvement of SIA practitioners, ideally with the same nucleus of specialists, from feasibility studies to the implementation of mitigation or resettlement plans.

In addition, the effectiveness of SIA depends on many outside factors such as NGO pressures, the ability of local populations to voice their concerns, the willingness of the developer and of government agencies to support the measures proposed in the SIA, and the institutional and financial capability of these government agencies to implement such measures. One of the most critical factors is the enforcement of the mitigation and resettlement plans, as defined at the feasibility stage, by international lending institutions. The withdrawal of these institutions, under external pressures, can strongly undermine the implementation of more equitable policies. Finally, some groups may also take advantage of the high visibility and stakes of a large dam project to propel or impose their own agenda, distorting the understanding of the issues at stake or increasing the complexity and difficulty of their resolution.

## Notes

1. The literature on resettlement issues emerged in the early 1960s, before SIA was born, and has grown considerably over the years. Resettlement is now considered as a field of specialization in itself, which is also, paradoxically, multidisciplinary in nature. Because it affects all aspects of life, resettlement planning involves a wide range of disciplines, from anthropologists and sociologists to agronomists, civil engineers, urban planners and economists (among others). Thayer Scudder and Michael Cernea are widely viewed as the foremost experts of the field (see, for example, Cernea, 1985). The successive versions of the World Bank guidelines on resettlement have been very influential, shaping the policies and planning of many other organizations.
2. RRA was developed in the late 70s as a field technique adapted to the study of rural areas that have to be surveyed quickly in the context of development-focused projects implemented in developing countries, especially in regions that are hard to access or where project teams cannot stay very long. RRA has generated its own literature and has evolved in various directions (for example, as a public consultation tool). One of its early proponents is Robert Chambers (1981).
3. Strangely enough, the harsh critics of CYJV's report never mention that key recommendation.
4. An example of such an IBA is the agreements signed in 2002 by the Government of Quebec and Hydro-Quebec with the Cree Nation of Northern Quebec for the construction of the Eastmain-1 hydropower dam and the study of the proposed Eastmain-1-A hydropower dam, which involves the partial diversion of the Rupert River, in the southern James Bay area. The agreement includes economic and community benefits and the creation and financing of a joint study group to conduct the EIA of the Eastmain-1 - A/Rupert Diversion project.

## References

- Bravard, J P (2001), "Un enjeu hydropolitique et environnemental majeur pour la Chine: le transfert! Sud-Nord", *Herodote*, 102, 3rd trimestre, pages 57-71.
- Cernea, Michael M (editor) (1985), *Putting People First: Sociological Variables in Rural Development* (Oxford University Press, New York).
- Chambers, R (1981), "Rapid rural appraisal: rationale and repertoire", *Public Administration and Development*, 1(2), pages 95-106.
- Consortia for Ilisu (2001), *Ilisu Dam and HEPP – Environmental Impact Assessment Report*, prepared by Hydro Concepts Engineering.
- CYJV, CIPM-Yangtze Joint Venture (1988), *Three Gorges Water Control Project, People's Republic of China, Volume 9 Resettlement* (sponsored by the Canadian International Development Agency) [Volume 8 Environment of the same report presented the EIA of the project].
- De Castro, Margarita and Dominique Egre (2000), "Successful Involuntary Resettlement: Lessons from the Urra 1 Project in Colombia", *The International Journal on Hydropower and Dams*, Issue 2, 2000
- De Castro, Margarita (1999), "Lessons from resettlements of Urra Hydropower Project", paper submitted to the World Commission on Dams (WCD) Regional Consultation on Large Dams and their Alternatives in Latin America.
- Egre, D, and P Senecal (1990), "Resettlement studies and human environment impact assessment of water control projects: similarities and discrepancies", *Impact Assessment Bulletin*, 8(3), pages 5-18.
- Sanjuan, T, and R Bereau (2001), "Le barrage des Trois Gorges: entre pouvoir d'Etat, gigantisme technique et incidence regionale", *Herodote*, 102, 3rd trimestre, pages 19-56.
- Senecal, P, and D Egre (1999), "Human impacts of the La Grande Hydroelectric complex on Cree communities in Quebec", *Impact Assessment and Project Appraisal*, 20(4), December, pages 319-329.
- World Commission on Dams (2000), *Dams and Development, a New Framework for Decision-Making* (Earthscan, London).