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Viewpoint – Fifty Years of Hydroelectric Development in Chile: A History of Unlearned Lessons

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ABSTRACT: The development of hydroelectricity in Chile illustrates a situation where water resources can be both well and badly managed when a private or public utility company, in this case ENDESA, is powerful enough to operate largely outside standard policy and bureaucratic processes. It successfully increased hydroelectric capacity more than fourfold over three decades characterised by periods of significant political instability. This was done without noticeable conflict due to its recognised efficiency and absence of environmental concerns in Chilean policy until the late 1980s. Since that time there has been increasing pressure from international agencies and NGOs to place more emphasis on environmental dimensions in development. The interplay among the diversity of agendas and tactics adopted by the interest groups attempting to influence decision on hydroelectric projects has, in some cases, been counterproductive. ENDESA chose to withhold information and modify EIA procedures as tactics to reduce costs. The NGOs' single-minded dedication to preclusion of dam proposals tended to distort public debate. The government, presumably due to risk aversion, proved unwilling to take a proactive stance by not specifying and implementing requirements for approval of a dam project, providing a comprehensive policy framework for debate or facilitating dialogue on the issues.

KEYWORDS: Chile, river basin development, hydroelectric dams, environment, vested interests

INTRODUCTION

This paper examines hydroelectric development in Chile since the early 1960s with a view to identifying some of the lessons for water management. These 50 years can be divided into two distinct phases, pre- and post-effective incorporation of environmental concerns in policy. Although on a world scale, the environment became a significant component of decision making from the time of the United Nations (UN) Stockholm Conference in 1972, in Chile the environment was essentially considered irrelevant to policy until the mid-1980s.

The pivotal player in Chilean hydroelectric development throughout the last 50 years has been ENDESA (Empresa Nacional de Electricidad, Sociedad Anonima). It was created in 1943 as a state enterprise with responsibility for production and transmission of electricity, and particularly to develop the country's hydroelectric potential. Since that time ENDESA has seen itself to be the custodian of this potential. At the outset there was one other private company, Chilectra (subsequently nationalised in 1970) with minor hydroelectric capacity. With privatisation of ENDESA in the late 1980s another state-owned company was split off – Colbun – and later privatised. By 2000, these two companies had developed about 25% of ENDESA's hydroelectric capacity. They have essentially followed procedures adopted by the lead enterprise since then. Thus, in this discussion, ENDESA is used as a proxy for the hydroelectricity sector. Like many state- owned power companies of the 1940s to 1950s (e.g. NZ Hydro in New Zealand, the Secretariat for Hydraulic Resources (SRH) in Mexico, the Army Corps of Engineers in the US) ENDESA was regarded as efficient, relatively free of government bureaucracy and enjoyed considerable independence at the national level; reputedly it could negotiate loans with international

banks without recourse to the Chilean Central Bank. Unsurprisingly, under such uncontrolled circumstances the organisation became arrogant as there was little or no rationale for it to disclose detailed information or consult other interests on plans and operations.

Between 1962 and the mid-1980s ENDESA quadrupled hydroelectric capacity in Chile. This was accomplished with minimal conflict in spite of significant political instability from 1969 to 1975; however, environment was considered a non-issue by the government during this period. In 1965, ENDESA publicised a plan to develop six relatively large dams on the Bio Bio River which evoked no comment from the media or the public at large. The furore generated 25 years later over the construction of the first two of these dams illustrates the sharp contrast between the pre- and post-environmental eras in Chile.

In the 1980s the government set about transforming the country's electric energy sector primarily through the 1982 Electric Law and subsequent privatisation of ENDESA through sale to a Spanish company with the same name and sale of Chilectra in the late 1980s. Several of ENDESA's powers were transferred to new agencies. The National Energy Commission (CNE) constituted the lead organisation for setting energy policy, pricing and conflict resolution. The Office of Electricity and Fuels (SEC) was charged with monitoring and enforcement of rules on electric company behaviour, and the Economic Load Dispatch Centre (CEDEC) controlled which generating plants should be in operation to supply expected demand at any given time. The transmission arm of ENDESA was classified as a regulated monopoly (Transelec) but remained in company ownership.

With the increasing weight given to environmental concerns in Chile from the mid-1980s, other organisations progressively either felt an obligation to become involved in hydroelectric development – central and local government, business associations, the academic community – or felt empowered to do so – notably domestic and foreign non-governmental organisations (NGOs) and international organisations such as the UN, Organisation for Economic Cooperation and Development (OECD), World Bank, and Inter-American Development Bank (IDB).

Despite the above changes in organisation, between 1990 and 2010 ENDESA added 12 dams, doubling national hydroelectric capacity and in 2004 announced plans to build 13 dams, four of which were large projects in Patagonia. In this 'post-environment' era ENDESA essentially retained its pre-environment era stance, i.e. to be as hermetic as possible on details of projects and operations and maintain a guarded approach to environmental impact assessment (EIA) and the requirement for consultation with affected parties in the process.

HYDROELECTRICITY IN A MULTI-OBJECTIVE, INTERDISCIPLINARY WATER MANAGEMENT CONTEXT

Multi-objective water management requires taking into account the needs of a variety of users of the water. However, ENDESA has traditionally attempted to avoid situations which might require it to negotiate with other water users. In the Maule and Laja basins ENDESA did sign agreements with the Irrigation Department in the 1950s to accommodate irrigation use and, since then, it has entered into a few additional agreements. Thus, it deals with existing water users but studiously avoids being linked to multi-purpose projects which would develop other uses such as irrigation.

The Rapel Dam (380 MW) in the Cachapoal Basin, completed in 1970, created a reservoir of over 8000 ha which, within 10 years, became a major recreational area generating significant economic activity. Understandably, the project was conceived without regard to recreational potential. However, in view of an unexpected by-product a mid-course adjustment might have been in order. Since 1980 ENDESA has elected to ignore the trade-offs from reservoir management which might have had costs in generation and benefits from enhanced tourism e.g. by maintaining water levels in the summer months. The fact that these trade-offs have not been considered by the CNE or CEDEC reflects, either a myopic view of water management, or a reticence by regulatory authorities to question the operating principles of a powerful public utility company. In answer to the concerns of recreational water users

ENDESA has blamed the management regime on CEDEC which is required to use the short-term lowest marginal generating cost as the sole criterion for scheduling generation by any particular plant. One might construe such a manoeuvre, either to deny the existence of a conflict or to place the conflict in the 'not my department' category, as obfuscation.

Chile has a chequered history in attempting to implement the integrated river basin development (IRBD) concept, and the role of the hydroelectricity sector in the process is illuminating. The country might have seemed set on an early path of IRBD implementation in 1959 when the government decreed that the Bio Bio Basin, with Concepcion as the hub, would be developed as a pole to offset the dominance of Santiago in the Chilean economy. However, little action was taken until 1989 when the European Latin American Programme (EULA) was established with Italian technical and financial support for 'Management of Water Resources in the Bio Bio Basin'. In the early 1990s this project was converted to the 'Centro EULA', which remains a permanent academic unit in the University of Concepcion. There is little evidence that this initiative had any significant influence on decisions related to the two highly controversial dams constructed on the river between 1990 and 2004. One might hope that exercises of this sort might have some relevance to policy beyond enhancement of higher education.

In 1963 the Maule River Basin Project was set up under the USAID funded Chile-California Program aimed at preparing a plan for investments primarily in irrigation. It did identify the Colbun site on the river as a joint power and 200,000 ha irrigation project. ENDESA subsequently built the Colbun – Machicura dams in 1985 and shelved the irrigation component. The river basin project was discontinued in 1966 and any idea of integrated development in the basin was dropped .

In 1990 the IDB supported a two year study to develop investment and management plans for eight pilot IRBD projects. The study was carried out by the Forestry Institute, with technical support from the Dutch consulting firm DVH. The IDB expected to lend for the priority 'integrated' components identified by the study. Since this was expected to be a long-term commitment by the IDB, a River Basin Commission was set up with representatives from the Forestry Institute, the Forestry Development Corporation (CONAF), the Water Resources Directorate (DGA), the flood control division of the Ministry of Public Works (MOP) and the Ministry of Planning (MIDEPLAN). Conspicuous by their absence were the CNE and all the major water users: the electricity companies with hydro generating capacity, the Irrigation Department of MOP and urban water supply entities (Emos – Santiago, Esval – Valparaiso and the water supply division of the MOP which serviced the smaller urban centres). Given the lack of representation of all major water users, it was no surprise that the pilot basins selected were considered to have no hydroelectric potential. It is also clear that the key players, in particular the hydroelectric companies, had no desire to be 'integrated' or 'coordinated' by potential river basin authorities.

In spite of these drawbacks in terms of complete stakeholder membership, the study did highlight a number of constraints in practical application of IRBD theory. For the purposes of implementing investments called for by an IRBD plan the IDB needed priority components which could be subject to feasibility analyses for justification of a loan. At one extreme, as required by theory, the Bank would need these components justified through demonstration of the interrelationships between land development, water use and biotic resources in a basin system with multiple objectives broadly defined in terms of economic efficiency in production of goods and services, sustainability and improved social equity. The time and cost of measuring the physical cause-effect relationships of change (through investment or enhanced management) in the 'state' of one or more resources were deemed beyond the capability of a normal project preparation activity. Furthermore, physical interrelationships would only have relevance to project design if a social or economic cost or benefit could be associated with the change.

Because of infeasibility of multi-objective interrelated component analysis, the study went to the other extreme – a vastly simplified approach where components were generally single-purpose within seven categories defined by the Bank: protected areas; erosion control; flood control; rehabilitation of degraded areas; soil management; forest, brush and pasture management; and control of water pollution. An additional component was incorporated in each basin to fund the necessary information collection and modelling to move towards an integrated approach at some time in the future. Between 30 and 50 components were identified and costed in each basin: in 40% of components benefits were quantified and for the remaining 60% it was decided that the time and cost of achieving quantification with sufficient credibility to establish a priority ordering would be prohibitive. Priority components which would move to full feasibility analysis were established by the Delphi technique i.e. iterative use of expert judgement. As in the case of the Maule Basin project no action was taken by the government on this initiative i.e. to move to a loan proposal covering components identified in the eight basins.

Ten years after the IDB's foray into the IRBD arena, the World Bank supported a similar venture led by the DGA and Irrigation Department. Seven river basins were selected to test the approach, again avoiding those already identified by ENDESA as having hydroelectric potential. The first phase called for a detailed study of the Elqui Basin in north-central Chile to test methodology which would be applied to the other six basins in a second phase. The study included: extensive use of geographic information systems (GIS) for mapping the baseline 'state' of natural resources; analyses of hydrology, geology, soils, etc.; meetings with local communities and sociological surveys; assessment of agricultural, industrial, mining, tourism and infrastructure development options; examination of legal and administrative constraints and options for implementing an integrated plan; and the application of strategic environmental analysis as a basis for selecting priority investments in technical assistance, studies, infrastructure, etc. which could be eligible for loan financing by the Bank. This exercise suffered the same fate as the previous three attempts to introduce IRBD as a useful instrument of public policy for design and implementation of investments, regulations, incentives, etc. in intensification and conservation of renewable resources. One might conclude from the above record that, with the exception of the Irrigation Department, most of the big players in water use (the hydroelectric sector in particular) have little time for the IBRD concept. This is logical – entities accustomed to independence and power would be reluctant to surrender these to a basin authority. The disinterest of the government is less easily explained. It paid lip-service to ideas suggested by external funding agencies but evidently had no desire to force the issue with powerful domestic interests.

EIA (which is taken to include social impacts) has proved to be the Achilles heel of dam projects worldwide. For instance, it has been a highly contentious area of World Bank lending for at least four decades. Chile is no exception. It is also the area where the Chilean hydroelectricity sector has dramatically demonstrated its distrust of transparency as an operational concept. Up to the dates of completion of the Colbun-Machicura dams (490 MW) in 1985 and the Pehuenche Dam (570 MW) in 1991 (both in the Maule Basin), little public or government attention was given to potential environmental or social consequences from construction and operation of such projects, since the topic was effectively excluded from public policy.

Announcement in 1990 of plans to build the Pangue Dam (467 MW), one of the six identified by ENDESA in 1965 in the Bio Bio Basin, ushered in a new era of dissent in the country over hydroelectric development due to heightened public concerns over environmental quality. This discussion addresses the conflicts over: (i) the Pangue/Ralco projects between 1990 and 2004 when Ralco (690 MW) was put in service; and (ii) proposals made in 2004 to build four dams on the Baker and Pascua rivers in Patagonia (total capacity 2800 MW and estimated cost $4 billion) – conflicts which still rage in 2013.

Pangue/Ralco projects

In 1990 the newly elected Chilean government established the National Environmental Commission (CONAMA) which was charged with development of environmental policy and standards and

overseeing the EIA process to be applied in approval of private and public investment proposals. In the same year, ENDESA requested funding support for the Pangue Dam from the International Finance Corporation (IFC), the private sector window of the World Bank. The EIA of the project formed part of IFC's appraisal and was contracted to a US consulting firm. The study covered an 'area of influence' of about 17,000 ha and addressed the issues of resettlement of indigenous Pehuenche people and others affected by the 500 ha reservoir.

Under the World Bank's operational guidelines (which broadly applied to the IFC), this study should have been preceded by a preliminary assessment of the environmental and social impacts which might be expected from the six dams originally proposed for the basin in 1965, and were still under active consideration by ENDESA. This step was skipped, as ENDESA stipulated that Pangue was a stand-alone project and there were no plans for further construction. On this basis, IFC signed an agreement in 1993 for a $170 million loan and brokered an additional $140 million from European bilateral aid agencies and banks. The loan agreement specified conditionality related to environmental protection. This included the conduct of resettlement which covered acquisition of land for the reservoir and for relocation of people displaced, compensation, technical assistance and other welfare conditions, particularly those applicable to the indigenous people affected. ENDESA set up the Pehuen Foundation to implement the resettlement component of the project. Particular emphasis was placed on treatment of the indigenous people who were considered at risk of being disadvantaged by the process. The serious conflicts which subsequently surfaced, involving the Pehuenches themselves, NGOs and the IFC, mainly centred on the Foundation's structure and operations. In 1995 the IFC contracted an anthropologist to review its operations. The report was submitted in June 1996 and three weeks later IFC requested permission from ENDESA to release the findings. The company refused, and it subsequently transpired that the reason was because the negative findings (prejudicial treatment of the Pehuenches in relocation, and indirect effects from third parties using the project as an excuse to exploit the Pehuenches' timber resources, which appeared to apply to the potential 'areas of influence' – particularly upstream – of both the Pangue and Ralco dams) would jeopardise prospects for approval of the Ralco project. Thus, in fact, ENDESA had always seen Pangue and Ralco as a joint project in its six dam plan for the Bio Bio. If this had been explicit six years earlier one would expect the two dams to have been subject to a single EIA and a stronger case could have been made for preliminary assessment of social and environmental impacts of the six dams planned for the basin.

Whether or not IFC was aware of ENDESA's hidden agenda is a matter of conjecture, but release of the report was delayed for 18 months i.e. until after the Ralco project was approved in June 1997. The incident undoubtedly created friction between IFC and its client; in February 1997 IFC threatened to declare ENDESA in violation of the environmental conditions of the loan agreement and a month later ENDESA bought out the IFC loan with funds obtained from the Dresdner Bank. As discussed later in the section on NGO involvement, these obfuscation tactics damaged the credibility of what was formally a highly respected power company. It probably resulted in ENDESA abandoning its plans to build the remaining four dams in the Bio Bio and switching its attention to the rivers in Patagonia. Determination of whether or not this move will prove advantageous for Chilean society would rest on the findings of a full analysis of the Bio Bio options plus a review of the hydroelectric-transmission options for all rivers in Patagonia discussed below.

The Patagonia Project

In pursuing its plans to develop four dams in Patagonia over the eight years since 2004, ENDESA still seemed to be reluctant to release information. The company's initial studies in the Baker and Pascua basins were undertaken in 1962 and over the next 40-50 years ENDESA presumably progressively refined options for exploiting the hydroelectric potential of the largest river in the country. However, in its initial meetings with local communities and NGOs it was reluctant to provide definitive figures on its proposals (e.g. dam heights, area of forest flooded, population displaced). ENDESA was somewhat

defensive on the EIA required by CONAMA and probably anxious to avoid a debacle such as that caused by the anthropologist's report on Pangue. In negotiating with bidders for the EIA contract at least one consulting firm pulled out because ENDESA refused to allow a single firm to carry out the full study with integration of all components. It is illustrative of the company's influence that it was able to convince CONAMA that components of the EIA could be contracted to a number of consultants while ENDESA itself carried out the integration and drew final conclusions.

Aside from the somewhat unorthodox procedure to be applied to EIA of the dams, it was evident from the outset that the principal environmental and social impacts were likely to stem from a new 1800 km direct current (DC) transmission line from the generating plants to Santiago. This line would traverse national parks and forest reserves in the fjord region of southern Chile, plus the relatively densely populated Central Valley. Thus, as in the case of the Pangue and Ralco dams, one might expect that the generation and transmission components would have been considered one project for EIA purposes given that one would not be built without the other. However, it was argued that Transelec was a separate entity from ENDESA, and therefore should have to present its own EIA for the transmission line project. CONAMA accepted the idea of a separate EIA to be presented by each entity. A further aspect of this apparent subterfuge was the muted discussion of the hydroelectric potential of all rivers in the Chilean segment of Patagonia – estimated at 8,000 – 10,000 MW. Since development of such potential would obviously carry environmental implications, one might expect that some preliminary exploration of this aspect would be in order as a prerequisite to decision on the Baker-Pascua dams. If such potential was deemed exploitable, some thought might have been given (and undoubtedly was given by ENDESA and Transelec) to the DC transmission component i.e. should capacity accommodate the 2,800 MW covered by the proposal or approach 5-8000 MW as an approximation of potential that would eventually be developed.

One can only conclude from the procedures adopted by the above three players, that they felt it would enhance probabilities of eventual approval of both 'projects'. The endless bureaucratic delays which ensued, and which continue in 2013, suggest that the tactic of obfuscation has not expedited decisions. ENDESA's original schedule called for initiation of construction in 2012. If a project is to be rejected hopefully it would not require transactions drawn out over nine years.

THE ROLE OF OTHER STAKEHOLDERS

Aside from the hydroelectric sector itself, there are a wide range of stakeholders – domestic, foreign and international – which have influenced how the hydroelectric sector has performed in terms of its contribution to Chilean socio-economic development.

Non-governmental organisations

The stance of NGOs has appeared to be systematic opposition to, and derailment of, dam projects. Accordingly, there has been little love lost between ENDESA, together with the other companies in the hydroelectricity sector, and NGOs. One may identify two types of NGO entity: (i) those which represent vested interests who are prejudiced by river control works e.g. the Chilean and American rafting companies in the case of the Pangue project which was proposing to flood five Grade 5 rapids on the Bio Bio, or sport fishing enterprises in the case of the Patagonian dams; and (ii) those, usually with a membership structure, focused exclusively on advocacy of environmental protection and associated human rights. The latter have been the key antagonists to dam construction. To achieve their goals NGOs have resorted to mobilisation of the public at large, and the local communities affected, as their primary instrument to oppose the proposals. In the process, pronouncements by many of these entities give the impression that they consider themselves to be speaking on behalf of the entire Chilean society.

The absence of information supplied by ENDESA has played into the hands of the NGOs who could then invent their own figures i.e. ENDESA was not the only source of misinformation. In the case of Pangue it was suggested, in NGO releases to the media, that about 30,000 indigenous people would be negatively impacted by the dam. This figure bore no relation to reality. In fact, there were four families (non-indigenous) displaced by the 500 ha reservoir and 14 families (12 indigenous) affected along the shoreline. Thus, for Pangue the total directly impacted probably did not exceed 100. With inclusion of the 3400 ha Ralco Reservoir (which was not officially under discussion at the time of the media release), about 5000 Pehuenches lived upstream, of whom 600 faced resettlement, with many others indirectly impacted, as suggested above.

The intervention of the Natural Resources Defence Council (NRDC) in the Pangue case offers another illustration of how misinformation may be transmitted. The Council sent a high profile representative (Robert Kennedy Jr.) to Chile to argue against the project. The case rested largely on assertions that: Chile needed less energy not more i.e. what was required was massive introduction of energy-saving technology in generation, transmission, distribution and final use; in the US obsolete hydroelectric dams were being dismantled – the implication being that the same situation applied in Chile; and, a predatory foreign-owned company (Spanish) was maximising profits (to be sent off-shore), from unsustainable exploitation of natural resources, at the expense of Chilean society. The first assertion was relevant to formulation of comprehensive policy on energy and water which could be a prerequisite for decision on any energy project. The remaining two appear irrelevant – what may be good for the US is not necessarily good for every country and, if foreign investment is seen as a problem, NGOs should be arguing against the 70-80% foreign ownership of the copper, gold and lithium mining in Chile.

The media

The media can hardly be construed as a positive force in conflict resolution. This is not its objective as it thrives on bad news. Press reporting on the increasingly shrill debates over pros and cons of dams has inevitably emphasised the catastrophic scenarios espoused by NGOs. In instances such as the Robert Kennedy Jr. visit, no effort was made to add any analytical context to his statements. Clearly, nothing can be done about this situation except to hope that other stakeholders will try to keep the issues in perspective through other means of public communication. Again, the lesson here would appear to be the importance of transparency, as well as broad participation in effective resolution of inevitable conflicts associated with hydroelectricity.

International agencies

The role of the IFC in Pangue illustrates how theory is distorted in practice by the informal rules of the game. Having disbursed a loan, the international entity was reluctant to apply its own operational directives for fear of antagonising its client and placing the loan in jeopardy. The IFC argued that by remaining associated with the project it was keeping ENDESA 'more' in line than it would be otherwise. One consequence of the confrontation between IFC and ENDESA seems certain, that is, ENDESA would never again negotiate a loan with environmental conditionality attached. The report on human rights, associated with resettlement in the Pangue case, prepared by the American Association of Anthropologists, inferred that even private banks should apply conditionality, particularly with respect to human rights. This offers an interesting topic for debate.

From the foregoing discussion of IRBD it is evident that some national and international aid agencies have a technocratic approach they would like to see adopted as national policy. The hydroelectricity sector in Chile has steadfastly resisted this for 50 years. Perhaps the lesson here is that we need to change the focus away from the technical questions in addressing multi-use, multi-objective renewable resource management to (i) the institutional constraints which have precluded a move in this direction; and (ii) how these may be overcome. To paraphrase from Robert McNamara's speech to the 1972 UN

Conference on the Environment: "[t]he question is not whether hydroelectricity should be seen as an instrument for economic growth, in the context of sustainable resource management. It must be. The solution, to what appears to be an impasse in Chile, revolves not about whether but how". Why has all the good advice on environmental management from a parade of domestic and international agencies and academics over five decades been ignored with such astonishing single-mindedness? Part of the answer to this question is illustrated by the IDB's experience, discussed above – the time and cost of assembling the necessary information for a fully integrated approach. Another part is illustrated by the World Bank's foray into IRBD, also discussed above. In project preparation an exhaustive study was made of the opportunities and constraints in setting up an administrative mechanism for the Elqui Basin. However, the conclusions were insufficient to persuade the major vested interests (including key government agencies such as the Ministry of Finance) to implement the project. The implication here is that international agencies in their desire to promote loans have failed to take adequate account of, or chose to ignore, the views held by decision-makers who must be in agreement if a project is to be approved and effectively implemented.

Local communities

NGOs frequently play their hand through local communities whom they perceive to be opposed to the hydroelectric projects. In both the Bio Bio and Patagonia cases local groups were formed and although there were definite differences between various interests at that level, the general tone conveyed by the media was one of dissent. One might expect automatic objection from those who would be displaced and/or have their lands flooded; gained a livelihood from a free-flowing river, or owned enterprises downstream which would be prejudiced by a change in flow regime. This has generally been true, but in the case of the Patagonia dams, there were local sub-groups which favoured the project because of perceived socio-economic benefits in the form of improved infrastructure and services (health and education), electrification and opportunity for new economic activity. If these types of benefits were quantified there was very little dissemination of the results.

Professional and business groups

Several universities, professional associations, think tanks and business organisations have attempted to elucidate the controversial issues associated with ENDESA's projects through research publications, workshops and public meetings. In some cases these initiatives were oriented to offsetting perceived environmental biases promulgated by the NGOs. These efforts, by well-qualified professionals and entrepreneurs, have been disparate and collectively appear to have had little impact on decision-making either by the hydroelectricity sector or those in government who are in a position to put some order into the process.

Government

The dominant actor is the central government which may use regulatory, market-based incentive and public investment instruments to evolve an interrelated energy, water resource, climate change and environmental policy framework for decisions on hydroelectricity. In theory, the DGA, the CNE and the Ministry of Environment (which replaced CONAMA in 2010) should be able to establish an overall context which circumvents many of the conflicts and misinformed polemics that have characterised the debate on dams since the late 1980s. If there had been genuine conviction that IRBD was the best approach to natural resource development and conservation, one might speculate that the electric power companies and other big water users could be brought into line through more effective specification and implementation of policy. Experience from the past 50 years, and particularly the past 15, suggest that the informal rules of the game (which determine what is done rather than what should be done) still trump the formal rules (laws, regulations and policy statements). Private and public enterprises in the electric energy sector constitute a formidable lobby which has generated

considerable transaction costs both to itself and the public at large by failing to engage with other stakeholders in water management on a transparent basis.

Faced with this situation the government has chosen to maintain a low profile. It has not required factual information to be disclosed which could have clarified some of the debates which have remained stubbornly obscure for many years. Nor has it made any systematic effort to specify the issues and engage interest groups in both preparation and evaluation of relevant information. The government had no appetite to get involved in the ENDESA-IFC debacle. Nor did it wish to get into thorny trade-off issues inherent in formulating energy-water-environment policy which might eventually lead to IRBD. In early 2006 the incoming President of Chile attempted to diffuse the accelerating conflict over the Patagonia project by decreeing that, henceforth, hydroelectric dams would only be approved in the context of a nationwide IRBD plan, covering about 30 river basins. This plan would specify those basins eligible for such projects. Given *de facto* rejection of IRBD over the previous four decades such a plan had little prospect of success. In practice, the idea merely prolonged, but did not change, the ongoing debate: and expenditure was incurred in unnecessary studies.

The government subsequently took the position that approval of dam projects should rest on application of the Environmental Impact Evaluation System (Sistema de Evaluacion de Impacto Ambiental – SEIA) currently administered by the Ministry of Environment. Initially, the SEIA would only decide on the basis of final design. The expensive and drawn-out process which has characterised official review of the Patagonia proposals since 2005 suggests that the government should provide much clearer signals on management of the project cycle, especially in complex infrastructure initiatives like hydroelectricity. The government needs to define: (i) 'boundary conditions' for a project e.g. electricity generation with or without the requisite transmission lines; (ii) what social, economic and environmental information is required on alternatives in the initial stages of project formulation; (iii) how and when in the project cycle, and to whom, should this information be disclosed; and (iv) how a purposeful effort should be made to engage interest groups (for and against the proposals) in provision and evaluation of information.

The inertia and the reactive, rather than proactive, stance shown by the government on energy (specially in hydroelectricity, as is evident from the foregoing discussion) must be attributed to a combination of politics, reticence of bureaucrats to be held accountable or to become involved with anything potentially conflictive, and the very real power wielded by ENDESA. There has been little or no reference to corruption associated with approval and building of hydroelectric projects, but extensive use of influence by ENDESA is widely recognised and implicitly accepted. Politicians have no desire to face the unpleasant prospect of electricity shortages 'on their watch'. This gave ENDESA considerable leverage with the elected congress, and during the 18 years of the dictatorship the regime clearly saw electricity generation as a cornerstone of its economic development policy. Since 1990 there have been a series of coalition governments which required allocating ministries to various parties. This has not been conducive to coherent decision- making. There were inter-ministerial rivalries which were not effectively handled by the president and there was little interest in transparency. Management of the Rapel Reservoir, resettlement operations for the Ralco Dam, the EIA of the Baker/Pascua dam proposals and special treatment of the Patagonia transmission line represent clear cases of obfuscation by both ENDESA and government regulators.

SUMMARY AND CONCLUSIONS

Over the past 50 years the hydroelectricity sector in Chile has acted relatively independently of government. The enterprises, wholly dominated by ENDESA, do not act as if they are bound by policy initiatives. This position was easier to defend because of the vague and often contradictory nature of policies on energy, water resources and environment. This enabled rapid, economically efficient and conflict-free development of hydroelectric capacity over the first 25 years during which there were

periods of significant political instability and a growing bureaucracy. In the late 1980s, Chilean policy started to incorporate environmental dimensions. At the same time, the energy sector was restructured and ENDESA was privatised. Together with the dictatorial approach favoured by ENDESA, these changes have resulted in accelerating opposition to hydroelectric dams (on environmental and social grounds) reaching crescendo proportions in the cases of the Pangue, Ralco and Patagonia projects.

ENDESA has tried to control how EIA is undertaken and minimised information released on its proposed projects and operations. The government has maintained a low profile. It has seen fit not to evolve an overall energy-water-environment policy which could have placed these projects in context, or to play any constructive role in disseminating information and promoting dialogue among vested interests. The improvised attempt to defuse conflict over the Patagonia project (preparing a national IRBD plan) went nowhere. In view of the government's and ENDESA's approaches, the domestic and international environmental NGOs have had a field day. Their aim has been derailment of all dam projects. The absence of transparency has enabled them to invent their own numbers to demonstrate potential infringement of human rights and environmental disaster. The media has been quick to take up the bad news, and once in print it has been hard to refute. The challenge is in moving towards a more informed and efficient definition of the issues and a more effective dialogue among those potentially benefitted or prejudiced by a dam or transmission line.

The absence of transparency on project design, and particularly on plans for relocation of indigenous Pehuenches displaced by reservoirs, reached an extraordinary level in the cases of Pangue and Ralco in the early 2000s. Information was withheld on the intention to build two dams as an integrated project. Further, IFC withheld information on resettlement operations at the request of ENDESA. Both entities lost credibility in the process. As a result, ENDESA refinanced the IFC loan in order to avoid complications introduced by World Bank Operational Directives on environment and resettlement associated with dam construction. Another example of misinformation promoted by the company was its successful effort to convince CONAMA that, for purposes of EIA, the generation of electricity from the four dams on the Baker and Pascua rivers in Patagonia was unrelated to the 1800 km transmission line, which would be required to get the power to the users.

The lessons from this review of Chilean experience hinge on the diversity of, first, agendas of the various stakeholders and, second, the tactics they adopted in pursuing these agendas. The government is the prime stakeholder with responsibility for orienting behaviour of all others towards outcomes responding to the aspirations of society at large – widely available and affordable electric energy, with a caveat (after the mid-1980s) that the environment be 'adequately' protected in the process. The hands-off approach adopted during the period 1960-1985 appears to have paid off, although perhaps with some avoidable environmental impacts. ENDESA was given a free hand or, perhaps more accurately, was able to the keep the bureaucracy at arm's length, and performed well. The lesson here is that one does not always need greater state control of public utilities to achieve socially desirable results. The prerequisite is an efficient utility company (private or public) with a clear goal and a mandate to pursue it. This was the case until the mid-1980s. From that time on the challenger for the government and ENDESA was the increasing international and domestic pressure to address environmental and social impacts of dams.

This pressure came from a range of stakeholders – the multi- and bi-lateral lending agencies which attached environmental conditionality to their loans for development of water resources, domestic NGO and academic entities engaged in study and advocacy of environmental protection, and international agencies and foreign NGOs which provided financial or technical support to the above domestic entities. The agenda of lending agencies was to impose EIA and its implementation as a condition for projects supported, and introduce IRBD as a framework for design of projects for renewable resource development and conservation. The lesson in this instance is that the agencies failed to recognise deep resistance from powerful domestic vested interests e.g. in the case of hydroelectricity the power companies and many government departments. In addition, as illustrated by

the Pangue case, agencies may be more concerned with the loan dimension than compliance with environmental directives. One must hope these two lessons have been learned. The agendas of domestic and international NGOs are the same – rejection of all dam proposals by the domestic authority responsible for decision – CONAMA and later the Ministry of Environment. Their tactic generally is to disseminate information on negative impacts (sometimes exaggerated or as uninformed rhetoric) without reference to potential economic, social or even environmental benefits. They mobilise that segment of a local community which is opposed to a particular dam and make the most of the media's propensity to headline disaster scenarios. The media is right, bad news does 'sell newspapers' but it has tended to distort public opinion in the case of dams in Chile. NGOs have successfully created increasing dissent within Chilean society on the hydroelectricity issue, but to date they have not managed to derail a dam project. The lesson here is that, rather than 'preaching to the converted', NGOs should explicitly recognise that dams affect multiple interests and engage in dialogue on the trade-offs with those groups who see benefits from the initiative. As the *London Economist* put it in 1995: "[i]f environmental groups continue to reject pragmatic solutions and focus on utopian visions, they are likely to lose the battle of ideas". If there is a lesson here, it seems to be still unlearned.

ENDESA's agenda is driven by maintaining independence and, where environment is concerned, by reducing costs. In this latter area it has seen EIA as a threat, increasing costs of resettlement or requiring expensive mitigation measures which might render a project economically infeasible. Its tactics have centred on withholding information in the expectation that lower cost options would be approved e.g. resettlement in the case of Ralco and using its considerable influence to 'persuade' CONAMA that, in the Patagonia project: (i) the company itself, rather than an independent consultant, should control the EIA preparation; and (ii) electricity generation should be decoupled from transmission for purposes of EIA – one may surmise that the rationale rested on a premise that if the EIA of one component is approved the EIA of the other could be massaged to enable approval of the overall project. With the benefit of hindsight, these tactics failed. The lesson that transparency pays was not learned by ENDESA in its process of building two, and planning four, large hydroelectric dams since 2000.

Other stakeholders on the Chilean scene – including industry associations, local authorities, unions, academics – have had little influence on the course of events. Many made useful analytical contributions which could have clarified the debate, but were unheard by the key decision-makers. The lesson lies in government reluctance to take a proactive position in addressing the conflicts by promoting dialogue to incorporate ideas from such groups. It has not provided any analysis of its own or provided a coherent policy framework on energy, water, environment and climate change which might have focused a debate on renewable energy, energy efficiency and the role of hydropower. By default, it allowed ENDESA to distort CONAMA's rules and deliberately adopted a low profile in the Pangue/Ralco 'fracasso'. The lesson is not more government regulation; there are more than enough regulatory agencies. It lies in a clear enunciation of the rules (particularly on information requirements and consultation processes in the various stages of a dam's project cycle) and firm resolve in their implementation. This is nothing more than a statement of the obvious. But, in the Chilean case, it is a lesson which has proved extremely difficult to apply. One might assume that every entity in the country espouses transparency, accountability, participation and sound economic/social/environmental analysis in the process of approving dam projects. The record suggests that this impeccable theory has not been particularly relevant to practice. The reason would appear to be structural, i.e. domestic society's, or external development agencies', inability to assess and then orient the institutional processes of decision making toward less conflictive outcomes.

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