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Les barrages : vers de nouveaux enjeux pour la montagne

Preface

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Preface

Sophie Bonin

« Avec ténacité, ce qu'il veut (l'homme), c'est arracher aux Alpes la seule richesse qu'elles recèlent, asservir la force de leurs eaux. » (Documentaire du 17 octobre 1960, La Grande Dixence, 3'50", TSR, <http://www.ideesuisse.ch/250.0.html?&L=1>, consulté le 15 décembre 2007)

- 1 Hydroelectricity has been officially classified as a renewable resource by the Beijing Declaration on Renewable Energy for Sustainable Development¹ – obviously, it was not by chance that this declaration was made in China a few months before the end of construction work on the Three Gorges Dam, and the fact that it was officialized also implies that it was not self-evident.
- 2 This form of energy has in fact two sides to it²: it is without question a renewable type of energy, does not produce greenhouse gases (except in the case of tropical reservoirs), and is not predatory (except again in the case of large expanses of water, which increase evaporation and result in changes in land use, and in the case of penstocks, where hydrosystems of streams and torrents are lost). Hydropower represents 20 % of electricity produced in the world and is the principal source of primary energy that is renewable, produces limited amounts of greenhouse gases and is non-nuclear. In France, 95 % of electricity produced from renewable resources is hydraulic. It is also independent of the oil market and its resources are far better distributed throughout the world than is the case for fossil fuels. Moreover, hydropower installations generally have a longer lifespan. The possibility of pumping water from downstream also makes this form of energy more flexible and more available so that it can be reserved for times when it is most needed by the market: it therefore contributes to more secure power supplies and greater financial benefits. Nor should it be forgotten that the large structures associated with hydroelectricity are symbols of modernity, progress, mastery over Nature and an affirmation of political power. Finally, reservoirs today are being used for an increasing number of functions, both environmental (supplementing low-water periods for the preservation of ecosystems) and social (recreation, green tourism, drinking water).
- 3 The problem is that large dams have taken on a new look in recent decades. The first critical reviews date from the 1960s and, interestingly, were carried out by geographers

investigating the impacts of tropical reservoirs³. Since that time disturbing statistics have continued to appear with every ex-post evaluation: 40 to 80 million displaced people, essentially from poor fragile populations who have sometimes become further impoverished; half of the major rivers of the world interrupted by these structures which have also upset the sedimentary and biological processes of rivers; disappointing profitability of the majority of projects⁴ – even if Alpine dams are not concerned by this latter point. The image of large dam projects has also been affected in a lasting way by the conflicts that have surrounded their implementation – in this respect, Tignes was the subject of numerous studies and a lot of media coverage – and by catastrophes, where this time the Alps have figured prominently (Malpasset in France, Vajont in Italy).

- 4 As with other large installations, large dams have suffered from more general criticism relating to “modernity” and development policies that have favoured national “flag waving” and tended to neglect local and environmental aspects. But implementation of this type of policy and its technological solutions seems inevitable at the world scale. Even in Europe, hydraulic energy, after several years of relative neglect in both discussions and projects, is once more back in the news: on the one hand because of the large number of concessions of the 1930-1960 period that are now close to their expiry date, and on the other because their renewal will be taking place under new and strong pressures. The opening up of the electricity market to competition will introduce new actors and new management principles. The objective of obtaining 21 % of electricity from renewable sources by the year 2010 will plead in favour of maintaining current dams, and may stimulate innovations with regard to small hydraulic installations. Finally, the Water Framework Directive requires that States restore “artificial bodies of water”. Large dams are thus at the crossroads of two important public policies⁵, relating to power and water, which may reveal contradictions.
- 5 It therefore appears necessary today to rethink the installation and operation of these large structures, and particularly their environmental and social aspects. Many negative impacts of dams result from a poor understanding of local socio-economic situations, of the complexity of relations between populations and rivers, and of the ability of societies to adapt to a radically transformed environment. In short, developers and planners can be reproached for not having been sufficiently geographical and sociological in their thinking.
- 6 Environmental and social impacts constantly interact, but three types of changes, in progress or yet to occur, may be distinguished with respect to development projects.

Development of geographical and social thinking among planners

- 7 “Ex-post” assessment studies of major installations show that the stumbling block is the social question, a question that involves the trauma of local populations, “landscape upheaval”, problems of “environmental justice” between upstream and downstream populations and rural and urban populations, and the social risks for populations that are poor and have little training. Two directions can be identified in dealing with this question. First, social risks must be taken into account in project design along with technological and financial risks⁶. Next, local participation must be encouraged. Here too there have been considerable changes: strong principles are

accepted today based on the fact that local participation in projects is not only a way of making future development more acceptable, and of informing and communicating, but also of improving projects prior to implementation and of better ensuring long-term profitability by integrating complex socio-economic factors often overlooked by economic and technical experts. Armelle Faure carries out a sort of retrospective assessment of the typology constructed by international development organisations (in particular the World Bank) to impose new social standards on projects that require population displacements, based on the French experience acquired in constructing four dams in the 1945 to 1960 period. It reveals how little some of these social dimensions were taken into account in these projects and were the source of trauma that is still felt today by succeeding generations. Today, better preparation and monitoring of these new principles thus represents a remarkable step forward in terms of sustainable and equitable development. Anne Dalmasso pursues a similar objective but adopts a different approach and uses examples from the 1930s, which did not generate conflict at the time. To understand these situations, the author first places large dams in the more general context of the history of hydraulic energy development in the Alps and the multiplicity of local actors (industries, owners, government departments). Next, she identifies the role, namely ideological, of engineers in the trend towards structures of far greater scale, both technically and economically. Finally, she notes the build up of a gradual consensus for a certain model of development and then examines the model of “sustainable development” that holds sway today and which, in its principles, is also imposed “from above”, from outside, on local communities. Her paper is a call for caution with regard to these good intentions.

Integration of environmental and social costs and benefits into economic assessments

- 8 In recent years, we have seen the development of economic assessments based on these “non-market goods”, on the monetization of externalities, which are used in new battles to get the government and dam owners to yield. The same is true of the presence of endangered species in zones affected by flooding or the right of native populations to their traditional uses of natural resources: the cost of demolishing structures ends up being less expensive than corresponding compensation payments (Columbia River basin, with the removal of three large dams on the Elwha and White Salmon rivers). In France, the Poutès dam in the Massif Central was subject to an economic assessment of the options to either remove the dam or leave it in place, with the value of “salmon” included in calculations, according to different scenarios⁷: the value of “salmon”, presented as an “additional cost of maintaining the dam”, can be compared with the cost in terms of energy production foregone with the removal of the dam, according to a study conducted by the concessionary company. But these methods can easily be manipulated and caution must be exercised in using them. Depending on basic assumptions and objectives, the conclusions reached can be contradictory. Thus in the case of a dam project upstream of Toulouse, a study of households in the catchment basin of the Garonne river to assess their “willingness to pay” for raising the river’s flow rate in the summer reached a conclusion in favour of the dam, but totally neglected environmental and social costs at the more local level. In the same way, the monetization of carbon dioxide emissions adds a substantial environmental benefit to

hydropower projects. However, care should be taken to ensure that other environmental factors are not forgotten, since the consequences of these large-scale development projects may be very complex. Furthermore, the majority of negative impacts that did occur were not foreseeable at the time of the project. This brings us back to the need for a risk-related approach. In his article, Franco Romerio examines this progression – albeit moderate – in the consideration of environmental and socio-economic stakes, through the history of hydraulic development in the canton of Tessin. He suggests that political choices in the future will undoubtedly be far more influenced by the reorganisation of markets related to the opening up of competition in Europe, but where environmental data nevertheless play a role, thanks to the urgent need for certification of structures.

Increased respect for the ecological dynamics of river systems

- 9 The sustainability of dams is undoubtedly to be obtained first and foremost by improvements, from an environmental point of view, in both management and hydro-electrical techniques. Solutions must be found to make reservoir management more ecological without compromising production, while technical devices must be more respectful of river life.
- 10 First, there is considerable room for improvement in reservoir management: water reserves can be used more “ecologically” and there are also new socio-economic uses that respect the principles of sustainable development. This is already the case, for example, in the Pyrenees, where EDF reserves are used regularly to supplement low-water flows and to enable a balance to be maintained between water consumption requirements (agriculture, drinking water) and the minimum requirements to sustain ecosystem life (in return for financial compensation, of course, for losses in energy production). The dam at Serre-Ponçon was a model in this respect, given that since its conception, management of the reservoir, and indeed the hydraulic system of the Durance river, has been decided on in consultation with water users, including actors in the tourism industry for example. There is a problem, however, in that fish or macrophytes have difficulty in negotiating any kind of hydraulic structure. These storage reservoirs are also being increasingly used for the production of artificial snow. This aspect is dealt with in the fourth article of this issue by Alain Marnezy. Negotiations, thanks sometimes to the lever of reserved flows, are conducted with ski resorts, local authorities and electricity companies. These projects, however, are not without problems in terms of sustainable development, since they are pursuing the “modern” course of action of exploiting natural resources, catering to dominant uses in the short term. It is true that supporters base their arguments on the fact that this avoids having to resort to small headwater reservoirs, which tend to be poorly regulated and controlled from an environmental point of view. It is also a way of giving water resources back to the local area. Nevertheless it creates an additional demand for water resources that are already highly solicited. It is clear that the question of dams can no longer be separated from the development models that we adopt, from our ambitions for economic growth, or from the question of natural resource exploitation denounced by ecologists as a disastrous “headlong flight” in the long term, whether

this be in relation to agriculture (irrigation development) or tourism (development of artificial snow production).

- 11 Another path being explored concerns reduction of the ecological impact of development projects through improved management of reservoir discharges (artificial restoration of floods). This has been examined scientifically with the concept of a “natural hydrological regime” and already tested on several dams in Canada and the United States. In this issue, a Swiss and German research team (Sabine Mannes, Christopher Robinson et al.), including an official from the electricity authority concerned, review an experiment that began in 2000 on the river Spöl, in the Swiss National Park. The ecological assessment is very positive, particularly with regard to spawning, and the interest of this experiment is that it was undertaken without any cost in terms of electricity production.
- 12 Finally, technical solutions may be developed and perfected for the re-oxygenation of waters downstream of reservoirs (cf. EDF on the Petit-Saut in French Guiana). There is also certainly room for improvement of the devices used to help fish negotiate rivers. Technical solutions need to be found to link up the different sections of the river and to ensure the appropriate dynamics for river flows and sediments as it is these that ultimately govern all river functions, including those of direct interest to man (fishing, self-purification, recreation, landscape) and of course ecosystems (biodiversity, species abundances).
- 13 The challenge in all the areas of endeavour, where the ultimate aim is sustainable development, is to make large dams and their reservoirs compatible with river systems that are living, or at least have a certain level of life.

NOTES

1. Cf. <http://www.un.org/esa/sustdev/whats_new/beijingDecl_RenewableEnergy.pdf> (consulted on 2 October, 2007).
2. Cf. Bonin S., 2007. – « L’hydroélectricité, énergie renouvelable, énergie durable ? » Actes du FIG de Saint-Dié 2007, consultable sur <http://fig-st-die.education.fr/actes/actes_2007/bonin/article.htm>.
3. An early testimony is provided by a symposium on artificial lakes by the Royal Geographical Society of London in 1965, where six contributions dealt with the impact of artificial lakes in the Tropics on the environment, health and the socio-economic situation. Cf. Scudder T., 2005. – The Future of Large Dams, Earthscan: 6. Symposium published in Lowe-McConnell R. H. (dir.), 1966. – Man-Made Lakes, New York Academic Press.
4. Cf. report on the evaluation of 150 large structures (and some ten detailed case studies) in the world, conducted by a commission supported by the World Bank and the International Union for the Conservation of Nature: WCD (World Commission on Dams), 2000. Dams and Development: a new framework for Decision-Making. Earthscan.
5. Pour un développement, à d’autres échelles et dans d’autres régions du monde, voir Blanc N., Bonin S. (dir.), 2008. – Grands barrages et habitants : les risques sociaux du développement, coll. Natures sociales, MSH/ Quae.

6. Cf. Scudder T., The future of large dams. Dealing with social, environmental, institutional and political costs. Earthscan.
 7. Christophe Lesieur (coord.), 2007. – « L'analyse socio-économique des projets hydrauliques : le cas du barrage de Poutès », D4E (Direction des études économiques et de l'évaluation environnementale), Lettre Évaluation, n° 13, Sept. 2007.
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