

Contributing Paper

Multipurpose Dams

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International Trends in Project Financing

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3.2 MULTIPURPOSE DAMS

3.2.1 Overview

Approximately 30% of large dams (using the ICOLD definition) are for multipurpose use. The different functions are listed below:-

Irrigation	48%
Electricity generation	36%
Water supply	36%
Flood control	39%
Recreation	24%
Inland navigation	5%
Fish breeding	5%

In practice some of these functions, such as recreation and fish breeding, tend to be a secondary utilisation of a reservoir that already exists for another primary purpose such as irrigation, electricity generation or water supply. It is this primary purpose that dictates the financing arrangements.

With the exception of electricity generation, water supply and (sometimes) irrigation, the above functions tend to fall within the "non-commercial" category as far as the provision of storage is concerned. That is to say that it is relatively unusual for a dam to be promoted primarily for flood control, recreation or fish breeding, although these may be a useful spin-off.

In most countries irrigation water is seldom priced at its full supply cost, and although there are many commercially viable private irrigation schemes around the world, there are equally many publicly owned irrigation projects which do not fully bear their direct cost in financial terms but are nevertheless economically justified. Irrigation projects in the private sector tend to be centrally managed estates growing high value cash crops. In the public sector the situation is more mixed, with many schemes being managed on a smallholder basis, often growing relatively low-value crops. The implementation of a successful irrigation scheme hinges around many more factors than just the completion of the works. For these reasons the public and private sectors tend to be quite separate and there is not the same fundamental shift to financing occurring in the irrigation sector as in the power industry, at least at the present time.

On the other hand the water supply industry is being privatised and therefore, to a degree, the issues that arise are similar to those for hydropower. However in comparison the quantities required for water supply are relatively small, and the market value of the commodity high, so the problem of financing is less critical. Furthermore the asset represented by the dam is typically only a small proportion of the total value of any water supply scheme.

Experience has shown that flood control is usually difficult to justify as the sole reason for building a large dam, and typically it tends to be treated as an (often unquantified) additional economic benefit to be added to the overall benefits of a dam whose primary function is hydropower or irrigation. In the operation of such a dam there is often a trade-off to be achieved between the interests of flood attenuation which requires the reservoir level to be held down at certain times of the year so that buffer storage is available, and the irrigation/hydropower interest which will generally be seeking to maintain a full reservoir for security of supply. It is not unusual to find that the provision of flood attenuation storage in the reservoir can only be achieved by sacrificing some of the hydropower benefits, which may well represent a larger overall economic loss but a socially justified position.

Reservoirs are increasingly being used for recreational purposes, but it would only be in extremely rare cases that this is the primary purpose of the dam and the basis upon which it is funded. The same would be true for fish breeding, the most common application being in small farm dams (basically intended for irrigation) in the Far East.

A small number of reservoirs are used to maintain the water supply to canals for inland navigation. In practice very few of these are likely to be built in the future, and anyway the issue of financing is unlikely to be a central issue because of the relatively small cost as a proportion of the total asset value of the navigation.

In summary therefore the financing of multipurpose dams tends to hinge around the primary functions of hydropower, irrigation and water supply.

3.2.2 Main Considerations

In terms of financing, most multipurpose dams still lie firmly in the public sector funded, at least in the developing world, through the ILAs on a long-term concessional basis. Although such schemes will not be immune from the wider pressures towards privatisation of infrastructure development, multipurpose projects are difficult to fund privately because they share many of the problems of hydropower (section 3.1) and, in addition, have the following factors to take into account:

- i) Potential water management conflicts.
- ii) They are usually reservoir projects.
- iii) Multiple beneficiaries result in a complicated and potentially vulnerable contract structure.
- iv) Lack of financial viability.

From the host government's viewpoint the regulatory issues are more severe than for hydro alone, because a multipurpose project can exercise control over a large area of the river basin in terms of determining downstream flow patterns and water availability. The situation is complicated because of the necessity to protect not only the position of existing projects but also the rights of future projects yet to be developed.

In these circumstances water rights issues, always sensitive at the best of times, loom particularly large because no government can afford to commit itself for a long period to methods of reservoir operation which it may subsequently wish to change. Yet to the private owner the limits with which he is free to operate the reservoir and use water will be crucial to the income of the project and the profitability of his investment.

Against this background it is not surprising that there have been very few privately financed multipurpose schemes. One of the few exceptions is the Cascecnan Transfer Project in the Philippines which is described later.

3.2.3 Trends in the Development of Multipurpose Schemes

In the past most multipurpose projects were implemented by the public power utility or, to a lesser extent, the water utility or the public agency responsible for irrigation development. In many cases the power benefits effectively underwrote the financial viability of the project, while the multipurpose benefits allowed access to more concessional financing that might otherwise have been available for a power-only project. A further factor was that in many countries the power utility had more experience and capability in implementing large capital works projects.

However this approach of a single-purpose agency, like the power utility, developing a multipurpose project gives rise to problems. There are inevitable rivalries and conflicts of interest between the different water users, and projects were often plagued by the lack of a cohesive approach. There is a growing recognition that planning considerations extend far beyond the interests of a single project, and needed to be viewed at the river basin or even the national level.

It is now widely accepted that the river basin is the natural planning unit for water resources developments. In consequence many river basin development authorities have been established over the last two decades, particularly in the parts of the world where the development process is still relatively immature and has far to run. The Tana and Athi Rivers Development Authority (TARDA) in Kenya is an example: founded in the mid-1970s it has responsibility for planning and co-ordinating all water-related developments in a catchment that provides most of the country's power and irrigation potential, and the water supply to the capital Nairobi. However TARDA only implements multipurpose projects, leaving single purpose projects to the government agencies concerned.

This pattern is being repeated elsewhere for the large multipurpose projects, although in practice there is, as for hydro, a significant downturn in new starts, due to:

- The withdrawal of traditional sources of public sector funding, particularly for large dam projects.
- The complexity of launching multipurpose projects in the private sector (regulatory issues).
- The relative unattractiveness of most multipurpose projects to private investors because they often depend upon accruing "benefits" from a number of water-users, most of whom will not be creditworthy.
- The fact that under privatisation, the power and water utilities are no longer able or interested in promoting projects which are not immediately beneficial to their core activities.
- Most significant multipurpose projects involve large storage reservoirs which are facing increasing opposition on environmental grounds.

3.2.4 Emerging Models

The financing of multipurpose projects is inevitably going to lag behind and reflect what is happening on single-purpose hydro projects. As already indicated the constraints - and opportunities - are similar.

There are very few privately financed multipurpose projects. One example of a genuinely privately funded scheme is Casecanan on Luzon Island in the Philippines. This \$500 million project is an inter-basin transfer involving 26 km of tunnel which will carry water to irrigate 50,000 ha and produce 400 GWh/yr of hydropower. The project is being developed by a locally incorporated special purpose company with 70% holding by two large American investors. The project is being financed using \$350 million of debt (72% debt - 28% equity ratio) raised on the USA bond markets in one of the first examples of bond financing for a hydro project. The government counterpart agency is the National Irrigation Authority which buys both the water and power, and then on-sells the power to the National Power Corporation.

This project is viable in the private sector because of the high value attributed to the irrigation water (US 2.9 c/m³) which accounts for 45% of the revenue, and because it also has a strong revenue stream from the sale of power. The private company is only dealing with one off-taker (NIA) and, perhaps most important of all, it is a run-of-river project with no large reservoir involved. It is arguable that had this not been the case, it would not have been possible to raise the finance.

Also within the Philippines is another quasi-private multipurpose project at the early stage of construction, called San Roque. This combined hydropower and irrigation project involves a large reservoir, and it is notable that at the time of writing construction is being constantly interrupted by banning orders initiated by local groups who are objecting over issues relating to compensation and resettlement. The project is in fact largely financed in the public sector by JEXIM (Japan Export Import Bank) and it is geographically split, with a number of government agencies taking responsibility for the "non-power" elements including the dam where much of the construction risk lies. The private sector element is the powerhouse, which is again largely financed by JEXIM backed by commercial lending.

In summary, Casecanan has proved that under favourable conditions multipurpose projects are financeable in the private sector, but most will still rely heavily on public sector funding, either partially (like San Roque) or completely as in the case of, for example, the Masinga multipurpose dam built by TARDA on the Tana River in Kenya in the early 1980s.

In the long term the solution to the problem of attracting private finance to multipurpose projects probably lies in some form of public-private partnership of the type outlined in Section 3.1.4 iii) above.

3.2.5 Key Issues Arising

The key issues arising from the trends in multipurpose project financing are:

- The willingness (or otherwise) of host governments to allow private control over any strategically important water project which can influence all other downstream projects in the river basin.
- The reluctance of the private sector to get involved with projects that it views as being complicated and circumscribed with potential bureaucratic hurdles because of the involvement of many parties.
- The regulatory controls that would be needed to achieve a sensible balance between the interests of the private investor, the consumer and the host government are complicated and not easily replicable from project to project.
- The public sector has an even larger role to play than for private hydro in terms of providing funding for projects that may be financially only marginally viable in their entirety, but for which discrete elements may well be viable.
- Most multipurpose projects require dams, and a balanced approach is needed to firstly weigh the benefits and disbenefits, and then to streamline the consultation and permitting process. Without such clearance already in place, the private investor will not be attracted.