Multipurpose dams

Challenge: Too little water **Adaptation response:** Water storage and Riverine flood protection

Description

Multipurpose dams combine two or more functions of traditional single-purpose dams into one hydro infrastructure project. A multipurpose dam may combine storing and supplying water for irrigation, industry and human consumption with other uses such as flood control, power generation, navigation, run-off storage and water discharge regulation.

The construction of multipurpose dams is based on the same principles used for single purpose dams (barriers across a body of water), but additional features may be included to accommodate their different purposes, such as irrigation channels or power generation facilities. Multipurpose dams are particularly appropriate in developing countries, as the multi-functionality of the operations can help meet a number of development goals simultaneously, such as those related to energy, water and food security, and economic development.

Implementation

Local community needs should always be considered when establishing the multipurpose dam's benefits, in addition to how the benefits should be prioritized amongst the various users. Further steps include dam site identification and an environmental impact assessment as appropriate. Calculations on water retention capacity, flow rates and minimum water requirements for various uses should be conducted for planning purposes. Socio-economic and environmental evaluations should be conducted at the selected sites, and criteria should be established to monitor potential community and environmental changes after construction. Dam designs vary, and the chosen design is agreed upon between planners and construction engineers. Operational management includes flushing out sediments and monitoring selected environmental and socioeconomic variables, amongst other activities.

Environmental Benefits

- Mitigates climate change through production of renewable energy.
- Provides climate change adaptation through reducing seasonal water stress and improving access to water during droughts.

Socioeconomic Benefits

- Provides flood regulation and protection.
- Increases water and food security.
- Makes inland navigation possible on large dams, improving trade and development. Inland navigation is a relatively cost-effective and a less-polluting form of transport.
- Provides recreational benefits for local communities.

Opportunities and Barriers

Opportunities:

- Climate change mitigation and adaptation benefits and contribution to a number of cross sectorial development objectives (e.g. energy production and agricultural development)
- Provides multiple benefits from a single investment

- Often an attractive investment for government and donors due to contribution to a multitude of development objectives
- Navigation development

Barriers:

- Higher planning and operating complexity than single purpose dams (need to negotiate competing uses)
- Changed natural river flows can negatively impact aquatic ecosystems. Impacts may include blocking migratory routes for fish and altering the chemical composition and temperature of water. Care must be taken to minimize these risks
- Still water in dams is a potential habitat for organisms such as mosquitos, which could increase the rates of vector borne diseases
- The separate functions of multipurpose dams often mean that no single function can operate at a maximum capacity level, unlike single-purpose dams

Implementation considerations*

Technological maturity:	2-3
Initial investment:	4-5
Operational costs:	3-4
Implementation timeframe:	2-3

* This adaptation technology brief includes a general assessment of four dimensions relating to implementation of the technology. It represents an indicative assessment scale of 1-5 as follows:
Technological maturity: 1 - in early stages of research and development, to 5 – fully mature and widely used
Initial investment: 1 – very low cost, to 5 – very high cost investment needed to implement technology
Operational costs: 1 – very low/no cost, to 5 – very high costs of operation and maintenance
Implementation timeframe: 1 – very quick to implement and reach desired capacity, to 5 – significant time investments needed to establish and/or reach full capacity
This assessment is to be used as an indication only and is to be seen as relative to the other technologies included in this guide. More specific costs and timelines are to be identified as relevant for the specific technology and geography.

Sources and further information

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