The Economic Value of Moving Toward a More Water Secure World

Key messages

- People's intuition about the importance of water is so strong that plans to increase water security are rarely subjected to rigorous economic analysis.
- Such economic analysis should include the costs and benefits of both infrastructure interventions and changes in water allocations to various users.
- The economic value of a unit of water varies widely across different types of water uses.
- Societies face many risks other than those related to poor management of water. Therefore understanding the economic value of water security compared to other priorities is important.
- States and households value improvements in water security differently. While states strive to ensure their survival and seek security from systemic risks, households seek to minimise water-related risks that threaten their health and livelihoods.
- Generic, global estimates of the economic value of increased water security are not useful for guiding investment decisions at country or regional level.

Assessing investment in water security

"Water is not like other natural resources. It renews itself annually and moves through the hydrological cycle and across national boundaries. It has proved to be a difficult natural resource for states to understand and control...[so] how do we prioritise investments in water security?"

Dr Mohamed Ait Kadi, Chair, GWP Technical Committee

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▷ Basic concepts

Economic analysis of investments in water security is essential for designing appropriately scaled, cost-effective projects as well as avoiding unnecessary costs of delay and unwise investment. Intuition about the general importance of these investments – no matter how strong – cannot be a substitute for thorough analysis of individual investment choices.

Marginal utility theory – that each additional unit acquired has less value than the one before – is applicable to water. The first few litres that an individual uses are essential for survival – for drinking – and a person will pay almost anything for them. Their economic value is high, but this value is different from the value that either the individual or the state would attach to additional units of water that would be used for other purposes.

As more water is available, uses beyond drinking are possible – such as cooking, hygiene and the range of agricultural and economic activities that require water as an input. These units of water are valuable, but not as valuable as drinking water. Additional water will be put to progressively less valuable uses as the amount increases.

Thus the economic value of an additional unit of water is determined by comparison – how much additional utility an individual obtains by moving from one 'state of the world' to another, as illustrated in Figure 1.

Because of interdependence in a large water-resources system, investments in infrastructure affect many stakeholders positively and negatively. Individual users will experience benefits and costs, but cannot always see the system-wide changes that result from such investments. It is the responsibility of the state to consider the 'system value' of water.

States make strategic choices among competing water development paths. Once a particular path is chosen, the economic value of specific steps along it must be measured. Whether a specific intervention makes economic sense at a particular time and place requires proper analysis of costs and benefits.

Figure 1a

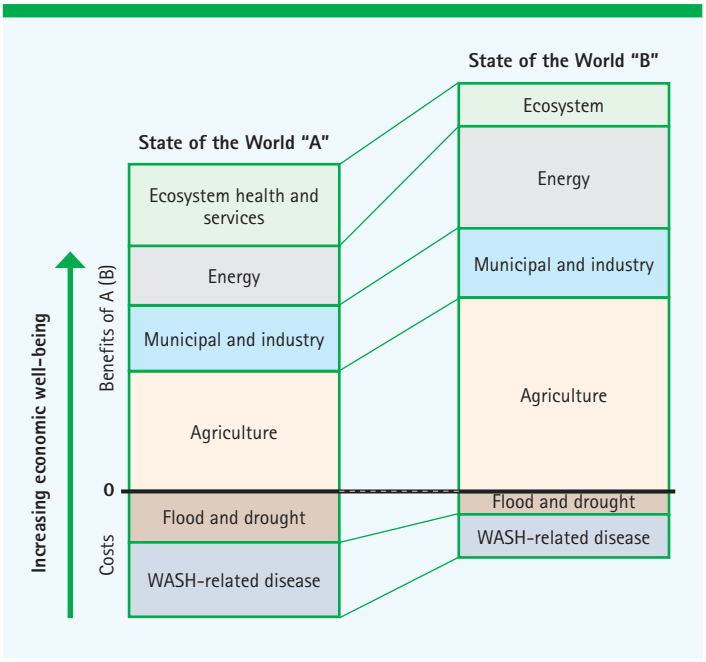

Figure 1b

Sector/water event	Description of change in economic well-being as a result of the policy intervention	Direction of change in economic well-being from A→B
Ecosystem health and services	Benefits provided by ecosystems decline → loss	– –
Energy	Benefits provided by hydropower increase → gain	+++
Municipal and industry	No change in water to municipalities and industry increases benefits → neutral	0
Agriculture	Increased water for irrigation schemes → gains	++
Food and drought	Greater water control reduces costs of floods and droughts → gain	+
WASH-related diseases	Improved water quality and sanitation reduces health costs (losses) → gain	++
Total economic value of policy intervention = ∑ sector changes		

The perspective of the state

An essential role for the state is to invest in major water infrastructure and to make other policy decisions that will determine the country's water development path. Economic development and growth will be a prime objective, but the state has other considerations to weigh that can trump economists' notions of the economic value of increased water security.

States also face important strategic choices, like balancing competing demands from municipalities, agriculture, and energy. For the management of international rivers, the most important choice is usually between cooperation and unilateral development, and there are strong pressures to choose the latter.

Economics remains essential in answering the questions facing governments, which struggle to understand complex hydrologic systems and development opportunities. The state needs detailed knowledge about the options and trade-offs it faces in the development of its water resources, not global observations.

There are five principal reasons why reducing water-related risks and enhancing water productivity is so important to the state:

1. Not all water-related threats result from variations in the hydrological cycle or natural events – some are man-made. Households and states can be confronted with water-related risks from the behaviour of other states. It is the role of the state to address the problems caused by the behaviour of other states when a river or aquifer crosses international boundaries.
2. When floods, droughts or epidemics strike, many citizens experience losses at the same time. When citizens suffer random losses, the state is typically not held accountable; they can easily become accepted as part of normal baseline conditions. But the legitimacy of the state is still called into question if it fails to mobilise adequately to confront large-scale, complex disasters.
3. Water is one factor of production in irrigated and rain-fed agriculture, and its economic value depends on food prices. Food shortages may arise for a variety of reasons, including natural disasters, floods, droughts, crop disease, and disruptions in global trade. It is generally considered the state's responsibility to ensure its citizens' food supply.
4. It is the state's responsibility to determine water allocations that balance the objectives of a high-growth, dynamic economy with fairness and equity.
5. Improved water services play an important role in the transition to a high-growth economy, and the state is responsible for the economic policies needed to do this. Investments in water security cannot be viewed in isolation from the dynamic processes of such a transition.

The household view

The economic value to poor households (expressed by their willingness to pay) of minimising the risks from drought, floods, and water-related diseases is often small because they face so many different risks and demands on their financial resources. Sometimes this may also stem from a belief that protection should be provided by the state.

The largest water-related risks to households are health-related and probably appear random. Except for some epidemics, like cholera, households are unlikely to hold the state responsible for illness related to poor water and sanitation.

The economic value of reducing water-related risks is also highly dependent on context. Global averages will not reflect household preferences where risks are especially high.

The differing perspectives of the state and the household are illustrated in Table 1.

Policy relevance

Progress toward improved water security could be undermined in the future by climate change, population growth, infrastructure deterioration, and economic and dietary transitions. While great gains are being made in ensuring access to water supply and sanitation services in many parts of the world, water-related disasters are increasing in frequency, and the challenges of allocating water for competing uses are growing as economies and populations increase.

The different perspectives of the state and households highlight that there is no 'one-size-fits-all' answer to the question of the economic value of the steps that lead to an improvement in water security.

- *Decision-makers and water professionals must adapt to the dynamic nature of the economic value of increased water security along development paths.*

Global advice on the economic value of increased water security that ignores local and regional realities, and lacks knowledge about the specific water-development path that a country is on, is not only unhelpful but also pernicious in the sense that it offers simple but illusory answers.

- *Authorities must do the analytical work required to understand complex hydrological systems and determine the costs and benefits of available policy interventions to different stakeholders.*

Table 1: Summary comparison of household and state perspectives

Perspective on...	Households	State
Economic value of water	User value	System value
Investment planning	Steps along a water development path	Responsible for choice between alternative water development paths
Economic value of disasters	*Ex-ante* (Economic value determined before disaster)	*Ex-post* (Insurer of last resort)
Non-cooperative behavior	Conflicts with neighboring households	Conflicts with other states on shared water bodies
Dynamic, high-growth economy	Reactive (Little an individual household can do)	Proactive (Responsible for the policy framework, including water)
Knowledge base about water resources	Largely limited to very small geographic scale, site specific	Responsible for systems understanding, but difficult

A central challenge is to design a public-sector decision-making process that will consistently pick winning investments from along the path of water development. But given the complexity of water, how can economic discipline be applied to investments in water security?

- *Careful, rigorous economic analysis must be undertaken, regardless of how strong policy-makers' intuition might be that a certain investment is justified.*

The expense and complexity of water security investments often delay both decision-making and implementation. Water investments should at least be subjected to cost–benefit analysis that compares two 'states of the world' (with the project and without it). The cost of 'doing nothing' must be included in the analysis, to enable policy-makers to make informed choices.

- *To capture the complex relationships between water projects, analysts should examine system values rather than user values of water.*

On a river-basin scale, this will often involve the development of hydrological-economic models that capture the range of trade-offs across water uses and illustrate the economic outcomes of various infrastructure and allocation scenarios.

An important challenge here is to clearly articulate the counterfactual: what would the capital have been used for and what would have been the economy-wide consequences had the investment not been undertaken?

- *'Scenario analysis' can be an alternative approach for examining alternative 'states of the world' for water security, since it does not rely on extrapolation but allows for significant changes in policies and circumstances.*

Moving a country onto a high-growth development path can fundamentally change the economics of water security. It takes sound analysis, well-designed institutions, and the ability to make good decisions in the face of uncertainty and ambiguity, to identify, launch, and sustain a high-growth water development path.

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The Global Water Partnership is an intergovernmental organisation of 13 Regional Water Partnerships, 84 Country Water Partnerships and more than 2,800 Partner Organisations in 169 countries. Our vision is a water secure world. Our mission is to support the sustainable development and management of water resources at all levels through Integrated Water Resources Management (IWRM). IWRM is a process that promotes the coordinated development and management of water, land and related resources in order to maximise economic and social welfare in an equitable manner, without compromising the sustainability of vital ecosystems and the environment.

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