



Water security: from abstract concept to meaningful metrics

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Background

Awareness of natural resource constraints, and their implications for equitable development outcomes, is resurgent. Among resources, water captures popular and political imagination like no other. Freshwater is a fundamental form of natural capital that underpins equitable, stable and productive societies, and the ecosystems on which we depend. Yet water faces many pressures worldwide, with changing patterns of population, production and consumption, and anthropogenic disturbances to earth systems, most obviously with climate change. These challenges are acute in developing countries where rapid economic growth is running ahead of young institutions and inadequate infrastructure.

From conceptual to operational

There are growing references to the concept of water security to capture a range of issues at the intersection of hydrology, ecology and society. At a political level its meaning is debated, influenced by related concepts of national and human security. Yet the operational meaning of water security remains unclear, not least because we lack ways to measure it in simple, reliable terms: to track progress, balance trade-offs and direct resources to those in greatest need. Without measurement tools, water security is unlikely to become a meaningful objective in practice and policy.

Two factors provide the imperative to integrate aspirational aims with operational needs.

- **Global goals:** The international community will define a new set of goals, targets and indicators beyond 2015 to succeed the Millennium Development Goals (MDGs). These could integrate social and economic objectives with consideration of natural capital.
- **Value for money:** Without adequate metrics to communicate the scale of the water crisis and to underscore water's importance to policy goals, from climate change adaptation to food security, the sector could lose out in difficult spending decisions.

The desire to include a sectoral issue like water in a post-2015 framework should not distract from the fundamentals, such as the spirit and reach of global goals. Work around drinking water, sanitation and hygiene in the post-2015 debates aims to provide options for possible targets and indicators, whatever the shape of overarching goals. But what are the options for measuring the broader concept of water security?

About this Working Paper

In 2012, ODI's Water Policy Programme embarked on a review to identify the particular challenges and potential options for measuring water security. Many attempts have been made to concretise other abstract water concepts such as water poverty, water risk and water scarcity, with corresponding indicators. Many such efforts now dot the literature as monuments abandoned for lack of resources, insufficient architecture for monitoring and evaluation, or a disconnect with the realities of planning and decision-making. Even where agreement can be reached on *what* to measure, working out *how* to measure (e.g. relevant temporal and spatial scales) is a formidable challenge, and good quality data is often lacking.

Key findings

Key themes emerge from our review, each of which requires different responses in terms of measurement.

- **Understanding what's really available.** Conventional measures of availability under-emphasise groundwater and soil moisture, while variability in quantity and quality is often averaged out. And to be meaningfully available, water must be accessible. Multi-dimensional indicators have been proposed to capture how institutions and infrastructure mediate access, but often appear as 'black-boxes' to non-experts. Technology can help to map water resources more accurately, which can then be set against indicators (or better still, in-depth, site-specific analysis) of society's capacity to access water.
- **Grappling with variability and risk.** Probabilistic estimates of water risks, like flood and drought, can help us to communicate uncertainty. Climate science has boosted understanding, though more work is needed to integrate modelling of the global climate with hydrological models. Exposure and vulnerability of people and assets are also important components of risk. Again, multi-dimensional indicators are available, as are simpler proxies, such as the volume of built and natural water storage capacity as a buffer against extremes.
- **Retaining a human face.** Amid technical details, it's easy to lose sight of the objective – more equitable and sustainable outcomes for people. Work on post-2015 indicators on water supply and sanitation is looking beyond simple coverage measures to sustainability, affordability and quality. We have economy-level indicators like agricultural water productivity or 'crop per drop'. But we are further behind in devising appropriate measures for access and availability at the household-economy scale, where water is used to support livestock and irrigation.
- **Protecting natural capital.** The hydrological cycle is intricately linked to biological processes from plant transpiration to algal growth, and, in turn, the ecosystem services on which we depend. Reliance on a statement of income (GDP) to plan and manage finances ignores countries' expenditure of natural capital. Moves towards a system for environmental-economic accounting (SEEA), including for water, could help countries establish their true balance sheet, factoring in the 'external' costs.
- **Gauging institutional readiness.** An undue focus on process could distract us from outcomes. But institutions are essential to address conflict, manage competition and facilitate collaboration. Simpler measures of institutional readiness – such as whether international treaties assign rights to shared water resources – can highlight 'hotspots', guiding in-depth assessment of how institutions and actors reinforce or destabilise cooperation over water.

While workable indicator options are available, the foundations of the monitoring architecture, such as stations to gauge river flow, have been weakened by under-investment. There has been a similar lack of resourcing at the apex, to consolidate information at national and global levels. There is a new appetite for the concept of water security. But if we are to bridge the yawning water information gap, it must become a rallying cry to acquire, share and interpret high-quality data.



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This summary is drawn from the Working Paper of the same name written by Nathaniel Mason, Research Officer, Water Policy Programme and Roger Calow, Head of Water Policy Programme.

To read the full version, visit www.odi.org.uk/resources.



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