



water

research findings for development policymakers and practitioners

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In this issue

Integrated water resource management in Nigeria

Is improving rural water supply a question of finance?

Making watershed services fair in the Caribbean

Sustainable watershed services in Bolivia

A new era for water governance in Kenya?

Increasing the productivity of irrigation systems in China

The agricultural sector has to compete for water with other users, such as industry. Food security does not just depend on how much water is available for growing food, but how efficiently it is used.

Research from the International Water Management Institute, in Sri Lanka, and partners examines how water used for rice irrigation is managed in two sites in China – in the Yellow River basin and Yangtze River basin.

In the Yangtze basin, water is relatively abundant, while the Yellow basin experiences water shortages. In both systems, the main user groups are farmers, irrigation operators, cities and basin managers. The researchers assessed various water-saving strategies on farms to understand if and how water is saved.

In the Yangtze basin site:

- Water is stored in ponds and reservoirs close to users. Farmers order their irrigation water through user groups and village leaders.
- Important decisions – such as when to release water from reservoirs – are based on factors such as available storage and rainfall, and made at a high management level.
- The irrigation system is financially independent, with people paying for water.
- The irrigation system has successfully released water for non-agricultural use, with only a modest decline in rice production. Farmers have learned to harvest more rainwater and rely less on water from the main irrigation system.

In the Yellow basin:

- The Yellow River Conservancy Committee controls gates along the river.
- Water for irrigation systems is managed by the local government. Each irrigation system receives water based on availability along the whole river, and no water is stored near users. The irrigation department collects fees from people who use the water but these do not cover operational costs.
- The pressures and incentives are different between users. The amount of water diverted from the river has been reduced to provide more water to downstream users, and farmers increasingly pump groundwater for

irrigation to supplement scarce river supplies. The water-abundant Yangtze basin site has more water-saving activities. Managers and extension workers promote several ways to save water. Despite water shortages, there are few efforts to save water in the Yellow basin site. The pricing system means farmers have no reason to take less water than is offered. The poor infrastructure and inefficient delivery also discourage farmers from saving water.

However, little water is wasted because excess irrigation water on rice areas is used by people downstream pumping groundwater and drains. The researchers conclude:

- Policies and strategies for changing water use and

management must aim to align the objectives and incentives for different groups, to obtain society-wide goals for improved water use.

- Policymakers must recognise that there is often no easy decision, because of the complex nature of water use. A change in use by one group impacts other users, requiring a basin perspective to understand the impact of various actions.
- Farmers often have to adapt to decreasing supplies due to the allocation of water to other sectors. Farmers rarely drive the reallocation process by saving water and releasing it for cities.

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'Agricultural Water Productivity and Savings: Policy Lessons from Two Diverse Sites in China' *Water Policy* 9 (1), pages 29–44, by David Molden, Dong Bin, Ronald Loeve, Randolph Barker and T.P.Tuong, 2007

Despite water shortages, there are few efforts to save water in the Yellow basin site – the pricing system means farmers have no reason to take less water than is offered

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Is improving rural water supply a question of finance?

Providing access to safe drinking water is a challenge in many parts of rural Africa. Improved financing strategies are necessary to serve the poorest and most vulnerable people, whilst ensuring that there are sufficient funds to sustain services.

One of the seventh Millennium Development Goal targets is to halve the proportion of people without sustainable access to safe drinking water by 2015. However, even existing services are struggling. Research from the University of Loughborough, in the UK, investigates various financial aspects of water provision and presents a systematic approach to determining service delivery costs.

In the past, external experts constructed new water supplies and handed them over to user communities to manage, without adequate financing strategies. This approach was too simplistic. While focusing on short-term capital costs, planners did not adequately address long-term costs associated with operating such systems. As a result, an estimated 35 percent of existing water systems in rural sub-Saharan Africa are not working at any given time.

Ideally, sustainable financing strategies cover direct operational costs as well as institutional support, rehabilitation and expansion costs. While full cost-recovery for rural water services in Africa is rarely achievable, it seems more realistic to cover ongoing services and recurrent maintenance costs. So far, determining the real costs of

Opening a new water well donated by Protos, a non government organisation, in Mali's Sare Seni Village, near Mopti. The village is near the Niger River which is polluted; the water is unusable. The villagers now have access to clean water from the underground water reserves.

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service provision has been a problem because tariffs have not been set systematically.

The research suggests a comprehensive assessment of maintenance, repair and rehabilitation costs for different water system technologies. On that basis, it is possible to develop a more realistic system of tariffs. Regarding sustainable finances in rural water provision, the researcher identifies several issues:

- Direct maintenance and operation costs are generally affordable for rural communities. However, household water tariffs increase by almost four times when rehabilitation and expansion costs are added.
- Community-based management systems lack adequate institutional support.
- Users are unwilling to pay for costs because water is perceived as a right, which might be due to political interference. At the same time, users do not trust water management authorities.
- Infrastructure development is far too capital-intensive and will continue to depend on external support for the foreseeable future.

Despite huge challenges, there is the potential to improve water services in rural areas, particularly in financing strategies. Among the recommendations, the research highlights the following:



- Rural water systems must incorporate recurrent repair costs and future asset replacement to reflect the real costs of service delivery.
- Community management organisations must implement more transparent, secure and sustainable methods of storing and investing money.
- Local governments need to develop budgets to finance institutional support for community-based management systems.
- Unsustainable subsidies need to be phased out and mechanisms for sustainable cross-subsidy developed.

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Integrated water resource management in Nigeria

Integrated water resource management is an increasingly popular approach. It recognises the links between land use and water resources and is used to manage the many competing demands on water resources. However, it has been criticised as being inflexible and difficult to adapt around the world.

Nigeria is divided into 18 River Basin Development Authorities. Each authority has responsibility for developing and managing water resources, including irrigation projects, dams, water supplies, fisheries and pollution. Research from the University of Uyo, in Nigeria, examines irrigation schemes using the integrated water resource management (IWRM) approach. It focused on irrigation projects in the Cross River Basin, where 80 percent of the population work in agriculture.

The Cross River Basin Development Authority (CRBDA) has focused on

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developing dams, boreholes and irrigation infrastructure. However, many other important issues have been overlooked by the CRBDA, such as erosion, flooding and pollution. Many farmers have been displaced from their land by CRBDA projects.

Four large-scale irrigation projects currently function in the area, aiming to improve farming systems and increase food supply. These have been unsuccessful: few people use them and the authority has not been able to recover costs through charging for water.

There are several reasons for this failure:

- Water is readily available in the areas chosen for irrigation projects, so users have no incentive to pay the government to use the new facilities. The government therefore has little incentive to invest in these facilities.
- Funding for the CRBDA has been inadequate and irregular. There is a lot of land set aside for dams and irrigation, but often no money to start these projects. Corruption has meant that some funds and revenue have gone missing.
- Compensation for the land has not been paid properly, so the CRBDA has not been able to claim full control of certain lands and resources.
- The CRBDA has no control over many

water resources, meaning anyone can use them without permission and integrated management is impossible.

Less than four percent of the land acquired by the CRBDA has been developed. Many projects have not developed beyond the design stage. This demonstrates how IWRM will fail if funds are inadequate or managed corruptly, or if projects are placed in areas where they are not needed. Recommendations include:

- Irrigation projects should be placed where water is scarce, with several small projects instead of a few large-scale projects. This will increase their use and improve cost recovery, as users would be willing to pay.
- The government must commit sufficient funds to water management and ensure these are regularly available and that policies remain consistent.
- Local needs and circumstances should determine where IWRM projects are placed, not political interests.

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'Assessing Integrated Water Resources Management in Nigeria: Insights and Lessons from Irrigation Projects in the Cross River Basin' *Water Policy* 9, pages 149-168, by Emmanuel M. Akpabio, 2007

Making watershed services fair in the Caribbean

Many watersheds in the Caribbean suffer from degradation and pollution. Policymakers thus want to charge for the services watersheds provide, including water, to generate funds for management. Yet there is a strong belief that water is a social good and should be more easily available to poor people.

'Payments for Water Services' (PWS) are schemes that connect the providers of watershed services (such as water quality and availability, and the prevention of soil erosion) with those who benefit and are prepared to pay for them.

The Caribbean Natural Resources Institute (CANARI) carried out research in several Caribbean islands to assess how PWS systems might work and whether they could benefit poor people. This was part of a global project coordinated by the International Institute for Environment and Development, in the UK, with further studies in Bolivia, China, India, Indonesia and South Africa.

The research shows that PWS systems are difficult to implement in Caribbean islands. Small watersheds mean that transaction costs are high relative to the value of the services secured. Potential buyers (such as those in the tourism industry) feel they already contribute their fair share through taxes. A lack of understanding means that those who benefit do not necessarily appreciate the services they receive.

The general public see water as a social good that should be subsidised, especially for poor people. Decision-makers fear the political outcomes of charging the full price for water. Further problems include a lack of coordination between the relevant policymakers and insecure land tenure for many of the informal service providers in upper watersheds.

Further findings include:

- Watershed management must be based on effective and integrated institutional structures. Where responsibility is devolved to a local organisation, for example, that organisation must have adequate technical resources and skills, and sufficient funding.
- The water, tourism and agricultural sectors offer the most potential as buyers of watershed services.
- Those who support groups providing watershed services do not always benefit directly, but include companies with a corporate social responsibility agenda or donors aiming to reduce poverty or improve the environment.
- The information needed for a PWS scheme, such as economic valuation, is a valuable tool for communicating between different sectors and interests, and for raising overall awareness of watershed services.

The researchers conclude that PWS schemes cannot substitute for effective

land use planning and poverty reduction programmes. Other conclusions include:

- Key sectors that benefit from watersheds, such as agriculture and tourism, should play a greater role in contributing to the costs of watershed management.
- Even where PWS schemes are not feasible, it could be possible to adapt existing incentives under agricultural and tourism programmes for effective watershed management.
- Tools and methods used for PWS schemes, particularly economic valuation, hydrological analysis and participatory Geographic Information Systems mapping, can contribute to better watershed management.

- Individual islands are unlikely to be able to develop or support all the necessary skills for effective watershed management. It would make sense to develop a regional pool of expertise for communication and technical exchange between islands.

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www.iied.org/pubs/pdfs/13541IIED.pdf

Sustainable watershed services in Bolivia

Bolivia has plenty of water and demand for water is only one percent of supply. Despite this, localised water scarcity can cause conflict within communities. Poor people in rural areas also have to pay high costs for inefficient irrigation and water management systems. Can market mechanisms promote fairer deals for watershed management services?

Market mechanisms rely on voluntary agreements between the individuals and groups that use or control water resources. Upstream landowners, for example, ensure there is water in a stream for downstream users; in return, downstream users agree to help harvest upstream crops. This can benefit everyone involved by ensuring that all water needs are met in a sustainable way, both for the water resource and the environment.

However, research by Fundación Natural Bolivia and the International Institute for Environment and Development, in the UK, found that the majority of large water management projects in Bolivia are 'top-down' – controlled by powerful elites rather than local communities. Despite huge external investment, they have failed to meet local needs or solve watershed problems, including erosion, water pollution and desertification.

Further findings include:

- Investments by international donors have tended to be in large watershed management projects, including dams, but these have had low success rates.
- Poor farmers who require water for irrigation currently pay monthly or annual quotas. These maintain the local irrigation infrastructure and ensure local water supplies. Large scale irrigation projects mean that rights to use water have become a commodity which farmers can buy and sell.
- Decentralisation laws in Bolivia have enabled local people to control the management of some natural resources; this means there is the potential to enable market mechanisms to develop locally.

There are other innovative schemes in Bolivia to manage natural resources.

These include the first ever 'debt for nature swap' in the Beni region and the pioneering Noel Kempff Mercado carbon sequestration project. Market mechanisms for managing watersheds have not yet been tried in Bolivia, but these previous successes suggest that the country could be open to innovative watershed management initiatives.

To be successful, market-based management schemes must be small-scale and developed and managed by local people. This will help to ensure that they meet local needs in sustainable ways.

Important policy lessons include:

- New watershed management initiatives must build on existing local practices for watershed management. For example, they must take place within local systems for property rights, which have developed through local cultures and institutions.
- Initiatives from outside have generally failed and local people are consequently suspicious of externally led projects. New initiatives must be based on trust, communication and participation with local people.
- External investment is best directed towards supporting local people to design and manage projects, for example training in adaptive management and critical thinking.

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A new era for water governance in Kenya?

The Kenyan government recognises that effective governance is essential for national water management. Kenya's Water Act of 2002 established a Water Services Regulatory Board to issue licenses to water providers, determine standards of service, handle consumer complaints and advise on how to provide cost-effective and efficient services. Are the reforms working?

Research from the University of Westminster, in the UK, evaluates Kenya's water governance framework. Water governance refers to the political, social, economic and administrative systems that regulate the development and management of water resources and provision of water services.

The Global Water Partnership (GWP) has addressed issues of water governance and proposed solutions to problems – failure to cope with demand, failure to manage supply, institutional weaknesses, and financial and technical shortcomings – found across the globe.

Kenya is not meeting GWP benchmarks. A high level of water is unaccounted for: water loss in many urban areas is 40 to 70 percent due to leakages, theft and collusion between revenue collectors and consumers. Most water consumers are not metered.

Record-keeping is poor and billing and revenue collection practices are inefficient. Tariffs are uneconomic as consumers do not pay the real cost of getting water to them. Poor people are denied services, either because they live far from the nearest network, or because water service providers view them as commercially unattractive. Utility companies are overstuffed – commonly there are 25 to 50 employees per thousand water connections.

The Water Act established a National Monitoring and Information System to collect and analyse water industry data and ensure it is publicly available. It is becoming an important channel of communication between top water managers and the public. New procedures for public consultation represent a commendable attempt to involve the public in water policy debates. However, the Act has shortcomings:

- Procedures for determining standards and prices are unclear: will consumers be involved?
- The Water Services Regulatory Board (WSRB) has powers to determine water prices, but the legislation does not specify how this is to be done.
- It is vague about how to ensure that members of each Water Service Board (WSB) are drawn from a representative population of stakeholders.



A Bangladeshi farmer in the Rajshahi Division keeps a wary eye on his water pump, which he has just repaired. Without the pump, hundreds of hours of manual irrigation would be required to irrigate the surrounding fields. It takes an average of 5,000 litres of water to produce one kilo of irrigated rice.
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Water loss in many urban areas is 40 to 70 percent, due to leakages, theft and collusion between revenue collectors and consumers

- The minister responsible for water has wide powers to define the jurisdiction of a WSB and choose its members.
- It is not clear how the Water Services Trust Fund – set up to extend water networks to unserved areas – relates to other agencies.

If Kenya is to develop a model system of water governance the authorities should recognise that:

- metering is necessary for an open and transparent billing system
- uneconomic tariffs have implications for social equity where rich people pay for water at the same rate as poor people, but derive more benefit from it as a public good
- price and standard setting procedures must be clarified
- there is a conflict of interest when the minister is allowed to appoint and oversee the operations of both WSBs and the WSRB
- participatory approaches, accountability and transparency must be promoted
- as many consumers are illiterate, verbal communications from the public should be recorded and acted upon.

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'Toward Effective Governance of Water Services in Kenya', *Water Policy* 9, pages 529–543, by Owiti A K'Akumu, 2007

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