



Water supply in shared waters

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Access to clean water for consumption and basic sanitation is the single most important factor for human development. But fresh water constitutes only a small percentage of the global water resources and almost half of it is shared between two or more countries. The key to achieving a sustainable development and management of water resources lies in resolving long-term governance challenges; not least to enforce legislation and empower local communities and vulnerable groups. On the international arena, cooperation already is the norm. Successful water agreements outnumber conflicts over shared waters by almost ten to one.

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A sufficient quantity of clean and wholesome water is essential for human health but only 3 per cent of the world's water is fresh and only 0.3 per cent of this fresh water is available as flowing, surface waters. To complicate matters further a significant proportion of these waters are shared. Globally, there are 263 river basins that cross the political boundaries of two or more countries. These basins represent about one half of the earth's land surface and forty per cent of global population. What is less known is that most of the world's fresh water is stored in groundwater (30.1 per cent) or glaciers (68.7 per cent). These are also often shared. There are an estimated 300 transboundary aquifer systems in the world which lie under 15 per cent of the earth's land surface.

Waters that cross national borders can carry pollution from upstream to downstream countries, impacting human health and livelihoods. But water also crosses political, administrative, ethnic and climatic boundaries within countries. Upstream users can extract too much water, or use it inefficiently, threatening the quality and quantity of water available for those living downstream as well as the environmental needs for water.

Increasing stress and competition for fresh water

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The world's water resources are finite and therefore under increasing pressure from demographic and environmental changes such as population growth, desertification and urbanisation and increasing consumption as a result of economic growth. Climate change, which is already altering the global water cycle at an unprecedented rate, adds further complexity to these challenges through its impacts on the timing, intensity and variability of rainfall, droughts and flooding. The projected sea level rise threatens the safety of coastal populations and imperils the supplies of freshwater upon which they depend. The United Nations estimates that, by 2025, as many as 1.8 billion people will live in countries or regions facing water scarcity, and as much as two-thirds of the world's population could be facing water stress.

Deteriorating water quality

In the near term, shrinking mountain glaciers (as a result of climate change) result in lower dry-season flows, and potentially more flooding during the wet season. In the long term, if glaciers completely disappear, overall flows may be substantially reduced. Both impacts can have a dramatic effect upon



the water supplies and livelihoods of downstream residents. Land use changes can also have a marked effect on water availability. Urbanisation and deforestation affect stream flows: flooding in Bangladesh for example is exacerbated by land use changes in upstream Himalayan countries. In Jakarta, rapid urbanisation of the upper catchment is blamed for frequent flooding in the city, polluting water supplies and causing serious sanitation problems.

Broken water pipe,
Democratic Republic of Congo.
Photo: Manfred Matz

Even the largest natural water bodies can be adversely affected by human activities. Kampala had to find an extra €9.5 M to extend the city's water intake into deeper water, when the level of Lake Victoria dropped. In Mongolia, numerous unregulated mining operations have allowed cyanide and mercury to enter watercourses, forcing the closure of small town water supplies and jeopardising Lake Baikal. UNDP-GEF is actively supporting the Russian and Mongolian governments' efforts to control these problems.

Similarly, poverty-driven gold mining operations in the upper reaches of the Pungwe River between Zimbabwe and Mozambique have led to extensive erosion and deteriorated water quality downstream. Miners use mercury in the gold panning process, which has elevated concentrations of mercury and other heavy metals such as lead and cadmium which are bound to the suspended sediments since they exist naturally in the soils. The suspended sediments make the water unsuitable for drinking, washing and irrigation, bury the aquatic fauna, prevent photosynthesis and have effects on the fish population.



Return flow from Mafambisse sugar estate just upstream of Beira water intake, Mozambique.
Photo: Björn Holgersson

Salinisation of freshwater resources is another problem jeopardising water supplies, and desalination remains prohibitively expensive for most people in the developing world. So much water was being abstracted from the Pungwe River that little freshwater reached the sea at Beira during the dry season. Sea water was intruding up the river and threatening the city water supplies. The Swedish International Development Cooperation Agency (Sida) is supporting transboundary cooperation and strengthening the capacities of local river basin organisations to address these issues through an integrated water resources management approach.

For many small island developing nations, relying on a thin lens of fresh groundwater balanced above denser salt water, the water supply situation is even more vulnerable. As sea levels rise many small islands will lose this resource, their only source of fresh water.

Poor groundwater management – such as the uncontrolled drilling of private water supply boreholes in Lima, Peru – allows sea water to penetrate aquifers, rendering them saline and useless. And natural disasters – such as tsunamis and storm surges associated with cyclones – can flood land with salt water and destroy drinking water supplies.

Chemical and biological pollution

In many countries, regulation of industrial and mining discharges is weak, and agricultural practices allow pesticides and nitrates to contaminate water sources. Acid rain crosses international borders and pollutes water bodies. Pollution does not respect administrative boundaries. A complex system of land holdings in Papua New Guinea meant that only a small minority of residents were consulted in the development of

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the Ok Tedi mine near the Indonesian border. But up to 80 million tonnes of tailings entered the river system each year, with elevated levels of heavy metals. The complex land holding system also complicated claims for compensation. Distant residents, both in Papua New Guinea and in Indonesia, have struggled to receive any compensation.

Poor sanitation is another serious source of freshwater pollution. Globally, over 2.4 billion people lack adequate sanitation facilities. Much of their faecal waste pollutes groundwater and local streams causing diarrheal diseases and cholera outbreaks. But even where sewerage systems are available these are often poorly maintained, or built to too low a design standard to cope with urban growth and climate change. Untreated or poorly treated effluents upstream become the water source for those living downstream, jeopardising public health and the environment and adding significant cost to water treatment in downstream water works. At the border town of Malaba in Kenya inadequate sanitation facilities are available for the growing amount of truck drivers awaiting custom clearance. They use plastic bags, so called 'flying toilets', which are disposed into the river passing the problem downstream to the Ugandan population.

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Decision making capacity

Water specialists have long been aware that water is essential to sustainable development, but they are not the ones to make decisions on development and they do not control the necessary human and financial resources. Leaders in government are constrained by a range of social, political and financial factors that prevent them from safeguarding drinking water supplies. Another reason lies in the fact that environmental education is non-existent in many countries. Government officials may never have had the opportunity to learn about environmental management, and do not understand how to manage their water resources.

Environmental education is non-existent in many countries.

For example, on Nias Island (in Indonesia) the local government located a solid waste dump on a hillside above a spring that supplied a town with water. Within two years, oils and other chemicals seeping through the groundwater polluted the spring. Although acting in good faith, local officials had no understanding of groundwater flow and simply did not realise the problems the dump could cause.

And many communities do not understand the links between sanitation, pollution and health. Poor sanitation causes children to fall sick. But parents do not understand why their children are sick, and they are still reluctant to invest in better toilets.

Governance and enforcement constraints

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Many environmental problems are by nature chronic, long term issues – climate change in particular is one example, where significant changes take place over a long period of time.

Unfortunately most political systems and development programmes operate over much shorter time scales. Investing in climate change mitigation or adaptation measures might bring few immediate benefits. Project managers see little benefit in climate change resilience – river floods and sea level rise may eventually affect a community, but not within a typical project life cycle or political mandate of a few years.

Poor environmental practices harm people – especially poor people – as well as harming natural resources, plants and animals. But unfortunately many practitioners still see environmental management as a hindrance to development. Environmental safeguards are seen as obstructive and unhelpful, and staff are unfamiliar with their implementation.

In many cases, the means to enforce existing laws and permits simply do not exist.

In many countries, the enforcement of environmental regulations is weak. Some environmental regulators have never seen an Environmental Impact Assessment (even if one is required by law for all large developments). Sometimes the responsibility for enforcement of environmental rules is unclear; police forces, for example, may see environmental regulation as being outside their mandate. But more commonly the means to enforce existing laws and permits simply do not exist. Gauging and monitoring networks are inadequate or poorly maintained, and local authorities lack qualified staff, facilities, transport and equipment.

The quality and quantity of water resources determine the costs and availability of potable water but in many instances the institutional structures governing water supply and sanitation differ from those responsible for water resources management. The same applies for stakeholder participation and revenue collection.

Clearly, much work is needed to strengthen environmental governance, to define responsibilities for development control and to enforce existing laws. Otherwise water catchments will not get the protection they need, deforestation will continue, and more inappropriate developments will be built.

Financial challenges

Even when water management is recognised as a key issue, gaining a high level of political support, there is a failure to translate this into effective action and increased investment flows. Current aid levels for the water sector are lower than in 1997 in real terms, and since 1998 the ODA (official development assistance) for water has grown more slowly than ODA overall. The current global economic recession has depleted ODA even further.

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Too often the returns on water management and investments are underestimated; as a result, the limited resources available are prioritised for other sectors perceived to be more productive. Yet the economic rate of return for each \$1 invested in achieving the Millennium Development Goals water and sanitation target was estimated in 2006 at \$8. Historically, management of water resources has been crucial in catalysing economic growth and development. Many of the earliest civilisations, and particularly those on the floodplains of the world's great rivers, succeeded by harnessing and managing water, thereby increasing production and reducing the risk of destruction.

Unfortunately, neglect of water and sanitation is nothing new. Despite numerous cholera outbreaks, little was done about London's sewerage until 1858, when the 'Great Stink' of the River Thames made the Houses of Parliament uninhabitable. The recent cholera outbreak in Harare is another example of how severe such problems need to become before politicians and donors are prepared to invest in water supply and sanitation

Given the importance of water to poverty alleviation, human and ecosystem health, the management of the water resources becomes of central importance. Key interventions are needed in a wide range of sectors to address these challenges and meet the Millennium Development Goals.



Local sea level rise flooding water sources and sanitation facilities, Sumatra Indonesia.

Photo: Alastair Morrison

Addressing decision making capacity

There are endemic skills shortages in the sector – both in developed countries, and more critically, in the developing world. And awareness of water issues must not be confined to a few specialists. Better environmental education is the key to helping decision makers to learn about the water problems we face, and to help find solutions.

Water and environmental issues should be mainstreamed into all development programmes, as a cross-cutting issue, and not considered in isolation. Water plays a pivotal role in sustainable development and poverty reduction and cannot be neglected in national adaptation programmes or poverty reduction strategies. Analyses of the 2006 UNDP Human Development Report indicate that no variable examined – access to energy, education, or health services – explains more of the variance in the Human Development Index than access to clean water and basic sanitation.

Information on water and sanitation coverage, water resources and water quality is still scarce in many countries. Better monitoring is needed so we can use our finite resources more efficiently.

Resolving governance and enforcement constraints

Resolving the governance challenges must be a key priority if we are to achieve sustainable water resources development and management.

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Most countries have environmental legislation, but few enforce their legislation thoroughly and effectively. Institutional responsibilities for enforcement need to be clarified, and the rules should be applied fairly and transparently. Budgets to local authorities and monitoring networks should be strengthened and staff need to be trained and furnished with adequate tools and equipment. To achieve better raw water quality, polluter pays/ pollution management systems should be improved and prioritized. Many costly mistakes can be avoided if polluters understand that they will bear the costs of the pollution they cause.

Local communities and vulnerable groups should be fully empowered to participate in development programmes. Social

and environmental impact assessments should not be a purely bureaucratic exercise – they should be an integral part of all projects, and able to meaningfully influence project design.

To address long term and chronic problems (such as climate change), some governments have established special offices and committees with long-term mandates. These organizations can propose more sustainable solutions and realistic targets. Their independent mandate allows them to consider difficult issues that might otherwise be overlooked in the normal, short-term political cycle.

Solutions to financial challenges

Water professionals invariably promote their projects for their social and environmental benefits. These are important, but water projects are also some of the best financial investments a country can make. Professionals in the water sector need to reach out more to Financial Ministries (and donors) to make the case for more resources.

The current global economic recession may impede the necessary investment. On the other hand, many governments are looking to increase investment in public works to stimulate the economy and provide employment, and the water sector is an ideal vehicle for such investment. Water infrastructure has long-term development benefits and helps the poor, who are most at risk during the economic decline.

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The benefits of cooperation

History shows that cooperation, not conflict, has been mankind's prevalent response to the challenges presented by transboundary waters. Over the last 60 years more than 300 international water agreements have been reached while there have only been 37 cases of reported conflict between states over water. What is even more important, cooperation on shared waters has been shown to help build mutual respect, understanding and trust among countries and to promote peace, security and regional economic growth.

There are many examples of international co-operation to halt the destruction of water resources. In 2005 a chemical explosion at Jilin in Northern China caused 100 tonnes of benzene to enter the Songhua River, a tributary of the Amur on the Russian border. China notified the Russian authorities

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in time for them to close down water supplies to border villages, and provided labour and materials to protect the water supply of the Siberian city of Khabarovsk.

And in Europe, concerted efforts, funded by UNDP-GEF, have seen demonstrable water quality and ecosystem improvements in the Danube basin. Across South-East Europe, numerous projects have been funded to install low cost wastewater treatment units, conserve wetlands, and reduce soil erosion. Nutrient loads entering the Black Sea have been substantially reduced, preventing harmful algal blooms and conserving fisheries.

Water supply for human consumption needs to be given the highest priority.

Water supply for human consumption might only constitute some 5 per cent of the water use in most developing countries, but it is this use which needs to be given the highest priority. As this paper has shown, real improvements are possible with an integrated approach, where different stakeholders, institutions and states co-operate.

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Ulaan Baatar on the Tuul River,
Mongolia. Photo: Alastair Morrison



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