

Editors' Note

The United Nations designated 2005 to 2015 as the International Decade for Action “Water for Life.” In April 2005, its Commission on Sustainable Development identified water as one of its three important issues. On the World Environment Day of June 2005, the UN secretary general said that by 2030, more than 60 percent of the world’s population will live in cities, and the growth will impose huge problems, including clean water supplies. This implies, we believe, that concern about the critical condition of water resources is widely shared among the international community. Asia in particular has witnessed degradation of water resources both in quality and quantity over the past decades, which is one of the major threats to future sustainable development in the region. In response, IGES initiated the Freshwater Management project in 2003. Among different sources of freshwater, this project starts with studying groundwater resources, one of the least understood, but most demanded.

Groundwater is a crucial resource for humankind, yet not many people realize its critical situation. “Out of sight, out of mind” may best describe the attitude of most towards the unique problem of groundwater. A large number of people depend on it as their source of potable water, and a much larger number of people depend on food grown by irrigation using groundwater. But groundwater is, quite literally, hidden beneath the ground, such that its current condition and the impact we have upon it are difficult to fully comprehend. This issue of the *International Review for Environmental Strategies (IRES)* aims to highlight the importance of this “out of sight” resource in order to investigate its significant implications.

Groundwater is our largest source of fresh water—one study shows that 95 percent of the fresh water on the planet is in the form of groundwater.¹ It is reliable through seasons of drought, and is naturally purified by the process of filtration, making it suitable for human use. For these reasons, it is considered an ideal resource. It is economically sound and widely used. Particularly in Asia, the demand for groundwater is high and is expected to increase with population growth, urbanization, and industrialization.

Being such an ideal resource, or so we have speculated, groundwater has been used to an extent that now seems irreversible. Land subsidence is evident in large cities and once groundwater contamination occurs, it is almost impossible to reverse. Though attempts at sustainable resource use are being made, land-use control and legal regulation to protect the “out of sight” resource have not been effective.

Sharing common concerns about these alarming problems, the authors of this issue of *IRES* present new technologies and innovative solutions for groundwater management and policy.

Laszlo Somlyódy, President of the International Water Association, and Olli Varis start with an overview of the situation. They present the current issues concerning sources of fresh water. They stress the links between different water resource problems and the inadequacy of our comprehension regarding the fact that the resource’s economy; environmental threats; the involvement of traditional societies, the

1. United Nations Environment Programme (UNEP), *Groundwater and its Susceptibility to Degradation: A Global Assessment of the Problem and Options for Management* (Nairobi, Kenya: UNEP, 2003). This figure does not, however, include the water contained within the polar ice caps.

informal sector, agriculture, industry, energy, and services; and economic growth must all be taken into account in policies and actions. They conclude that water will ultimately be a life-or-death issue.

Takashi Asano introduces an innovative use of groundwater: water re-use by recharging groundwater. The case of California demonstrates the urgency of securing a sustainable water supply, and recharging groundwater with reclaimed water provides a solution. His summary on water re-use and related technologies provides an excellent overview.

As a government official, Monthip Sriratana Tabucanon provides insightful views on how to secure a sustainable supply of clean water and to deal with sanitation issues for Thailand. In her article, organic pollution is highlighted and a number of policies, legislative instruments, wastewater technologies, and financial arrangements are presented.

Blanca Jimenez of Mexico addresses the issues surrounding agriculture and wastewater irrigation, which ultimately affect groundwater contamination, the ecological cycle, and human health. She concludes that instead of promoting unrealistic policies, one should learn from existing small-scale irrigation practices, employing techniques such as wastewater re-use, and gradually improve them to reduce negative impacts.

Davide Bixio and others discuss wastewater reclamation and re-use in the European Union and Israel. They find two distinctive characteristics in the study area: Southern Europe and the Mediterranean are prone to drought, which has led to wastewater re-use for irrigation and eco-management applications, while Northern and Central Europe utilize reclaimed wastewater for eco-management applications and industrial purposes. The two findings are successful cases of wastewater reclamation, and it is suggested that their practice be expanded.

Yatsuka Kataoka examines the groundwater issues of the Japanese city of Osaka. From 1950 to 1960, Osaka implemented intensive controls on groundwater extraction. These measures have caused long-term problems for subway tunnels and the basements of buildings, most notably flooding caused by the abundance of groundwater.

Keishiro Hara provides an overview of groundwater issues in Asia, especially the matter of quality. He emphasizes that preventative measures are particularly important, considering the high cost of dealing with contamination. A holistic view is also vital in understanding both natural and human causes of groundwater contamination.

Mukand Singh Babel and others present a case study of Bangkok, Thailand. They explain that the groundwater reservoir of Bangkok has been overexploited and, as a result, severe land subsidence has occurred. Although mitigation measures are now in place, the authors claim more should be done.

M. Ashraf Ali discusses arsenic contamination in Bangladesh. Mitigation technologies have been adopted that include official testing and validation processes; however, their performance does not seem to meet all expectations. Irrigation using contaminated water is also a concern, as the arsenic is expected to pass through the food chain, resulting in its ingestion by humans. The author suggests more studies are needed to combat the problem of arsenic contamination.

N. P. Dan and others present a case study of groundwater contamination from Vietnam that feature phenomena typical of many developing countries: insufficient industrial wastewater treatment and unsanitary landfill. At present, the local government has no plans for cleaning up the contamination. The authors propose the practical solution of impermeable liners for landfills to minimize the problem.

Gemunu Herath introduces current issues faced by Sri Lanka. As a free commodity, groundwater is heavily exploited. The Indian Ocean tsunami of December 2004 caused severe saline contamination and raised concerns regarding the protection of this valuable resource.

Xu He and others explain the rapid economic growth of China and its impact on water, with particular focus on groundwater exploitation. The authors stress that inadequate water resources, uneven water resource distribution, contamination, insufficient treatment facilities, and irrational management policies have all contributed to the problems.

Chikafusa Sato and others present the groundwater issues of Tokyo. This mega-city once experienced severe land subsidence. However, with efforts to regulate groundwater extraction, the water table is now higher than when the Government started taking data in some area. Much effort is now devoted to stabilizing the water table and to maintaining the quality of water.

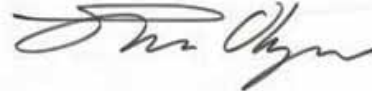
Setiawan Wangsaatmaja and others also explore the problem of land subsidence. Rapid urbanization has created demand for groundwater in Bandung, Indonesia. Recent efforts at decentralization have greatly raised the stakes for local government, leading to the issuance of more water extraction permits than reservoirs can supply.

Kyoko Matsumoto introduces one of the new movements in water resource management, which is to share information and experiences among Asian nations—to learn, to co-operate, and to assist one another. The Water Environment Partnership in Asia (WEPA) is a project to create an information platform on water resource management using an online database for the Asian monsoon region. It further aims to achieve capacity building in Asia.

Taking this opportunity, we would like to thank you, the readers, who have supported *IREs* and *IGES* activities. We invite you to share your thoughts with us in order to improve our efforts to promote environmentally sustainable development.



Akio Morishima
Chair of the Editorial Board
International Review for Environmental Strategies
Chair of the Board of Directors, President
Institute for Global Environmental Strategies



Shinichiro Ohgaki
Special Editor
International Review for Environmental Strategies
Professor
The University of Tokyo