WATER QUALITY OUTLOOK

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Water Quality Outlook

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Mission

To be the leading provider of data and information on the state and trends of global inland water quality required for their sustainable management, to support global environmental assessments and decision-making processes.

Preface

This report presents a snapshot of global water quality issues as they relate to achieving the internationally agreed goals on water, sanitation and biodiversity. Evidence suggests that there have been improvements in the quality of water in some parts of the world. However, there are serious problems that must be addressed for health and prosperity to be reached universally.

There are five key points and questions that we illustrate in the pages ahead:

1. One of the key considerations in meeting the Millennium Development Goals is that water quality must be improved at all levels;
2. A critical issue is the quality of inland waters: is it improving or deteriorating?;
3. Appropriate responses to water environment problems are opportunities for development;
4. Governments share the responsibility for assessing the global water environment in a regular manner; and
5. Future needs for water quality monitoring.

Although many challenges remain to properly protect aquatic ecosystems, success can be reached with planning, political and institutional will, and financial and technical resources.

The GEMS/Water Programme provides a vital contribution to monitoring progress towards meeting the MDGs on water, sanitation and aquatic biodiversity. Information on water quality can also contribute to the United Nations World Water Assessment Programme (UN-WWAP), which was established in 2000 in responding to the relevant decision of the UN Commission on Sustainable Development. UN-WWAP is a collective response of the 24 entities comprising UN-Water with a view to assist countries in reaching their commitments in key water-related challenge areas. It creates a sustainable mechanism for reporting on progress made in these areas through the production of a series of World Water Development Reports (WWDRs).

The target audience for this publication includes decision makers and practitioners working to improve integrated water resource management at all levels. We trust that readers will find this report interesting and useful, and we welcome your comments and feedback.

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By Improving Water Quality, We Will Meet the Millennium Goals

No single measure would do more to reduce disease and save lives in the developing world than bringing safe water and adequate sanitation to all.[1]

Access to fresh water and sanitation services is a precondition to all the other internationally agreed goals and targets (see Box 1). By focusing on water *quality*, the water, sanitation and aquatic biodiversity targets can be met. The way we perceive nature and the value of the goods and services that aquatic resources provide to people is fundamental to peace, security and prosperity. Water is vital to the survival of ecosystems, and in turn ecosystems help to regulate the quantity and quality of water.

Box 1

Millennium Development Goals and Water Quality

In 2000, the United Nations established eight Millennium Development Goals (MDGs) with the aim of speeding up poverty alleviation and socio-economic development by 2015. The MDGs were expanded at the World Summit on Sustainable Development, in Johannesburg in 2002.

Millennium Development Goals:

1. Eradicate extreme hunger and poverty
2. Achieve universal primary education
3. Promote gender equality and empower women
4. Reduce child mortality
5. Improve maternal health
6. Combat HIV/AIDS, malaria and other diseases
7. Ensure environmental sustainability
8. Develop a global partnership for development.

Water quality management contributes both directly and indirectly to achieving all eight MDGs, but it is most closely tied to the targets of Goal 7:

- Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources;
- Halve by 2015 the proportion of people without sustainable access to safe drinking water and basic sanitation;
- Significantly reduce biodiversity loss by 2010; and
- Achieve significant improvements in the lives of at least 100 million slum dwellers, by 2020.

[1] UN Secretary General, 2000. "We the Peoples: the role of the United Nations in the 21st century." *Millennium Report*. http://www.un.org/millennium/sg/report/ch4.pdf page 7.

Data from the Joint Monitoring Programme of WHO/Unicef show that since 1990, investments in public provision of safe water for consumption and sanitation facilities have improved coverage around the world. If current trends continue, then by 2015, global drinking water coverage could be 85% and global sanitation coverage could rise to 63%. (See Tables 1 and 2.) However, more effort is required, particularly in Africa and parts of Asia, for the target to be achieved in full.

Table 1 Improved Drinking Water Coverage (Percent)

REGION	1990	1995	2000	2004	2010*	2015*
Africa	56	59	61	62	64	66
Asia + Pacific	74	77	80	82	84	86
Latin America + Caribbean	82	86	89	91	92	93
North America	100	100	100	100	100	100
West Asia	84	85	85		85	85
Europe		95	96	97	98	99
Global	**77**	**79**	**82**	**83**	**84**	**85**

Source: *WHO/Unicef JMP 2004, UNEP GEO Data Portal*
* UNEP GEMS/Water linear extrapolated estimates

Table 2 Improved Sanitation Coverage (Percent)

REGION	1990	1995	2000	2004	2010*	2015*
Africa	38	40	42	44	46	48
Asia + Pacific	30	37	44	47	50	53
Latin America + Caribbean	68	72	75	77	79	81
North America	100	100	100	100	100	100
West Asia		66	69		72	75
Europe						
Global	**48**	**52**	**57**	**59**	**61**	**63**

Source: *WHO/Unicef JMP 2004, UNEP GEO Data Portal*
* UNEP GEMS/Water linear extrapolated estimates

2

Is the Quality of Inland Waters Improving or Deteriorating?

Indicators of water quality can be used to demonstrate progress toward the MDGs, by plotting trends in water quality over time and over space. Aquatic ecosystem and human health depend on the physical, chemical and biological composition of water. Human activities have the greatest impact on the quality of water resources, even in remote areas.

Good quality water depends on dissolved salts and minerals, since they are necessary components to help maintain the health and vitality of the organisms that rely on aquatic ecosystem services.[2]

Human Health

Unsafe water and poor sanitation cause an estimated 80 per cent of all diseases in the developing world. The annual death toll exceeds five million people, and more than half are children. Metallic contaminants and microbial pollution are serious concerns in many water bodies around the world.

Metallic Contaminants

Metals occur naturally and become integrated into aquatic organisms through food and water. Trace metals such as mercury, copper, selenium, and zinc are essential in low concentrations. However, metals tend to bioaccumulate in tissues and prolonged exposure or exposure at higher concentrations can lead to illness. Elevated concentrations of trace metals can have negative consequences for both wildlife and humans. Human activities such as mining and heavy industry can result in higher concentrations than those that would be found naturally.

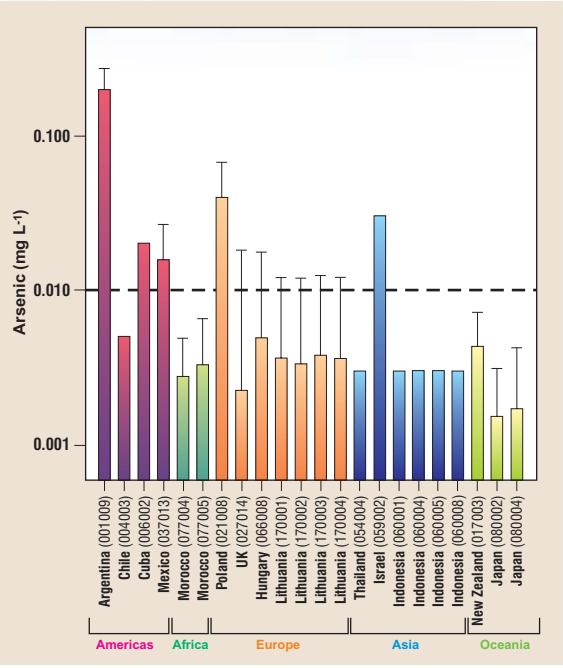


Figure 1. Arsenic levels in groundwater samples. Data are mean ± 1 standard deviation; where error bars are lacking, all observations had the same value which is equal to the analytical limit of detection for that station. The dashed line shows the WHO drinking water guideline, which most countries are safely below.

Monitoring metals in surface and ground water supplies provides background information needed to determine the suitability of water resources for human consumption. Evidence suggests that levels of arsenic in groundwater aquifers in many parts of the world, for example, are acceptably below the WHO drinking water guideline (see Figure 1). It should be noted however, that arsenic remains a serious threat to health in some parts of the world such as Bangladesh and Cambodia, where shallow aquifer tube-wells are abundant.

[2] Stark, J.R., Hanson, P.E., Goldstein, R.M., Fallon, J.D., Fong, A.L., Lee, K.E., Kroening, S.E., and Andrews, W.J., 2000. "Water Quality in the Upper Mississippi River Basin, Minnesota, Wisconsin, South Dakota, Iowa, and North Dakota, 1995-98." *United States Geological Survey, Circular 1211*. http://pubs.usgs.gov/circ/circ1211/pdf/circular1211.pdf.

Microbial Pollution

The largest concern about microbial pollution is the risk of illness or premature death to humans and livestock after exposure to contaminated water. Communities downstream of intensively farmed areas or municipal sewage outfalls, and people working or recreating in infected waters, are at the highest risk of illness due to microbial pathogens. Indicator organisms, such as coliforms, can be used to detect the presence of faecal contaminants in water resources.

In general, the levels of faecal coliform bacteria in rivers correlate with population size of cities located upstream of sampling points, as depicted in Figure 2. With continued population growth and urbanization, more investment needs to be made in improving water supply infrastructure and sanitation facilities in both developing and developed countries.

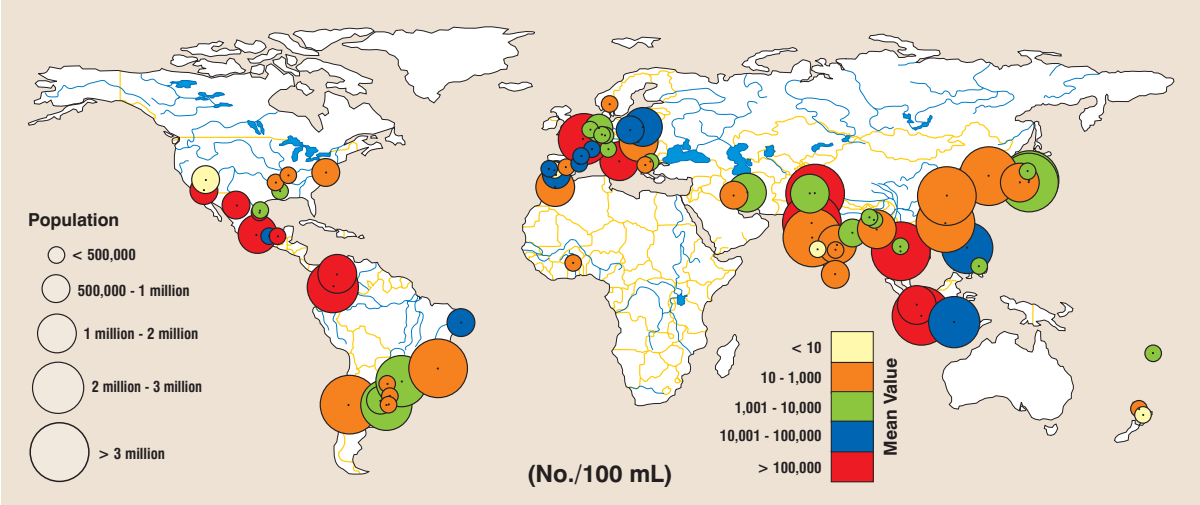
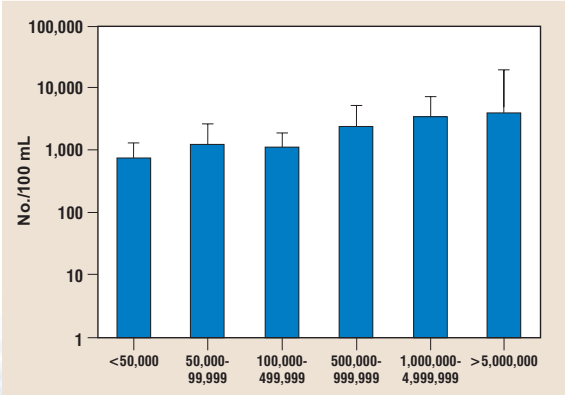


Figure 2. Faecal coliform concentrations at river monitoring stations located near major cities, plotted according to population size (top figure). Bottom figure shows mean (± 1 standard error) faecal coliform concentrations separated by population size class of nearby cities.



Ecosystem Services

The health of the aquatic environment impacts both human health and socioeconomic development. Restoration of some impaired aquatic ecosystems has been demonstrated to varying degrees, including correcting damage caused by eutrophication and acidification.

Eutrophication

Productivity of aquatic ecosystems can be managed by regulating direct or indirect inputs of nitrogen and phosphorus with the aim of either reducing or increasing primary production. Examination of changes in median nitrate concentrations in rivers between the early 1980s and the early 2000s, as presented in Figure 3, shows that improvements (measured as decreases) in nitrate concentrations can be detected at most Swiss river monitoring stations and about half of the Indian river stations, whereas nitrate has increased or remained the same in most Japanese and Russian river stations. The improvements in nitrate concentrations are likely due to local and regional efforts at curbing or eliminating point-source pollution, agricultural runoff, and discharge of municipal waste into rivers and lakes.