

W **GEMS** **Water**



2004 State of the UNEP GEMS/Water Global Network and Annual Report

**United Nations Environment Programme
Global Environment Monitoring System (GEMS) Water Programme**



UNEP GEMS/Water Programme Structure

Established in 1978, the Global Environment Monitoring System (GEMS) Water Programme is the primary source for global water quality data. It is a multi-faceted water science centre oriented towards building knowledge on inland water quality issues worldwide. Key activities include monitoring, assessment and capacity building. The twin goals of the programme are to improve water quality monitoring and assessment capacity in participating countries, and to determine the state and trends of regional and global water quality.

These goals are implemented through the GEMS/Water data bank, GEMStat, with water quality data from more than 100 countries, and over two million entries for lakes, reservoirs, rivers and groundwater systems. GEMS/Water activities add value to country-level data by creating global and regional water quality assessments. The programme also carries out assessments on a range of water quality issues and methodologies. GEMS/Water data have been used by many organizations, including the UN system and universities around the world. GEMS/Water is part of the Division of Early Warning and Assessment (DEWA) of the United Nations Environment Programme (UNEP). Governance and strategic guidance for GEMS/Water is provided by a Steering Committee, while scientific expertise is enhanced by a Technical Advisory Group.

Annual Report 2004

© 2005 UNEP
GEMS/Water Programme
ISBN 92-95039-02-5

This publication may be reproduced in whole or in part and in any form for educational or non-profit purposes without special permission from the copyright holder provided acknowledgement of the source is made.

UNEP GEMS/Water Programme would appreciate receiving a copy of any publication that uses this publication as a source. The designation of geographical entities in this report, and the presentation of the material herein, do not imply the expression of any opinion whatsoever on the part of the publisher or the participating organizations concerning the legal status of any country, territory or area, or of its authorities, or concerning the delineation of its frontiers or boundaries.

Source for all quotes is WHO Water for Life

Members of the Steering Committee

Dr. Jamie Bartram
World Health Organization (WHO)

Dr. Avinash Tyagi
World Meteorological Organization (WMO)

Dr. Andras Szöllösi-Nagy
UNESCO International Hydrology Programme (UNESCO-IHP)

Mr. Halifa Drammeh
UNEP Division of Environmental Policy Development and Law

Dr. Steve Lonergan
UNEP Division of Early Warning and Assessment (DEWA)

Dr. Salif Diop
UNEP Division of Early Warning and Assessment (DEWA)

Dr. Veerle Vandeweerd
UNEP Global Programme of Action

Dr. Gordon Young
World Water Assessment Programme (WWAP)

Dr. Jean-Marc Faurès
Food and Agriculture Organization (FAO)

Dr. Pradeep Aggarwal
International Atomic Energy Agency (IAEA)
Isotope Hydrology Section

Members of the Technical Advisory Group

All Steering Committee members plus:

Dr. Rafik Hirji
World Bank

Mr. Neils Henrik Ipsen
UNEP Collaborating Centre on Water and Environment (UCC-Water)

Mr. Hiroya Kotani
International Lake Environment Committee (ILEC)

Dr. Jac A.M. van der Gun
International Groundwater Resources Assessment Centre (IGRAC)

Dr. Thomas Maurer
Global Runoff Data Centre (GRDC)

Dr. Gen Inoue
National Institute for Environmental Studies (NIES)

Mr. John Chilton
British Geological Survey (BGS)

Dr. Michel Meybeck
IGBP Water Group

Mr. Ingvar Andersson
UN Development Programme (UNDP)

View from the Executive Director of UNEP

Will there be enough water to grow food for the almost eight billion people expected to populate the Earth by 2025? This is among the many questions that are interlinked with a complex series of other serious water sustainability issues. I am pleased that 2005 marks the kick-off for the International Decade for Action "Water for Life" 2005-2015. It offers an exciting framework within which the world's water and sanitation problems can be resolved.

UNEP's GEMS/Water Programme is doing its part by focusing specifically on environmental water quality, and by providing sound scientific assessment results to the international community. Canada's friendly challenge issued at the World Summit on Sustainable Development, of having 35 new developing countries participate in the Programme by 2007, is on track. At the end of 2004, 16 developing countries joined in GEMS/Water activities.

This report outlines the current state of the GEMS/Water global network of water quality monitoring and assessment, and directions for the future. It highlights efforts over the past year to broaden global data coverage, improve collection and methods, promote alternate technologies, contribute to assessments and early warning, and keep aquatic environmental protection as an international priority. You will find that a common thread that connects these core activities: the global quest for healthy and sustainable water resources.

As I have said before, the role of UNEP GEMS/Water – the UN system's centre for water quality data – will grow even more important in the years ahead as the world wrestles with the need to do more to protect our vital water resources.

 *Dr. Klaus Töpfer*



View from the Director, GEMS/Water Programme

Access to fresh water and sanitation services is a precondition to the other goals in the Millennium Declaration. The way we perceive nature and the value of the goods and services it provides to people are 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.

Our Programme serves to provide water quality monitoring and assessment results at regional and global levels. To be comprehensive and valuable to decision-makers and all governance processes, we must have as much governmental participation as possible. All Governments benefit from participating in GEMS/Water, including from the perspective of implementing policy commitments and achieving targets. A summary of your country's participation in GEMS/Water's global database is listed at the back of this report.

Many results have been achieved over the past year, relating to GEMS/Water's four core activities: data warehousing, data integrity, capacity building and assessments. The new global database GEMStat was launched, while new publications include the Analytical Methods guide, this report, newsletters, and several technical papers. GEMS/Water has become increasingly engaged with water assessments, including the Global Environment Outlook, the Millennium Assessment, the World Water Development Report, and indicators development work.

Linkages with the UN family are a critical factor in our work. The ability to provide results within UNEP, such as to GPA, UCC-Water, IETC, and others, is a priority. At the system-wide level, we are delighted to team up with IAEA, UNESCO, WMO, WHO, CSD, UN-Water, UNSD, FAO, UN-ECE and others. Some of our collaborations are highlighted in this report. I would like to thank the GEMS/Water Steering Committee and Technical Advisory Group for their continued leadership and cooperation.

 *Dr. Richard D. Roberts*



GEMS/Water and the International Decade of Action: Water for Life 2005-2015

GEMS/Water Youth: Living on the Edge

The world's 263 international watersheds generate about 60% of global freshwater flow and are home to about 40% of all people. Youth know this means that many of their friends are living on the edge of a river, a lake, a stream, a wetland and other types of surface water resources.

"Living on the Edge" is GEMS/Water's Youth initiative which focuses on young people documenting observations about water quality from shorelines of any inland water body around the world.

The main objectives of "Living on the Edge" are:

Awareness-raising:

- By showcasing studies so that others are inspired to do similar

Knowledge and Information:

- Learning about water quality in one's own local environment so that it can be celebrated or action can be taken to mitigate changes and problems
- Experiences and observations can contribute to environmental assessments and reports

Communication:

- By showing that youth can make a difference (especially international cooperation)

The recent international water agenda has put water quality issues at the forefront, with the need for measuring the achievement of the "Water and Sanitation Targets" including water quality assessment, as a priority. As 2005 marks the launch of the International Decade of Action, Water for Life, UNEP is preparing to strengthen water quality monitoring and assessment results through the GEMS/Water Programme. We will focus on increasing developing country participation, particularly Africa, Small Islands, Latin America, and Central Asia.

Water Quality and the Millennium Development Goals

How will water quality data and assessments help reach our common goals?

While the global community has pledged to halve the proportion of people without access to safe drinking water and sanitation by 2015, realizing these goals is a monumental task. UNEP reckons that one billion people will need help over the next 12 years. There is a need for reliable, current data and information about water resources at the global level for the water and sanitation goals and targets to be measured. We plan to focus on these three steps to help the process of reaching these goals:

1. It is vital to recognize that the global water demands implicitly need good quality water, not just any water availability
2. These goals, and their related activities, must be measured. This requires enough data and information about quality and quantity of global water resources
3. Any state of the world's water assessment must be policy relevant

In 2004, we answered 271 requests for information from the international community not including any United Nations body.

Key Performance Measures

We are in the process of developing and implementing a core set of indicators for our core activities.

Data Source for International Community

Key Indicators	1992	Baseline 2000	2005	2008 Targets	2011 Targets	2015 Targets
Global Coverage through participation/data submission	58	69	76	114	152	191 UN member states
Global Coverage through proactive data collection	n/a	n/a	80	140	200	261 countries and areas
Watercourse Coverage	69	69	112	162	232	263 major international basins

The Great Water Quality Data Drive

To mark World Environment Day 2004, we launched “The Great Water Quality Data Drive,” designed to strengthen the scientific basis for global and regional water assessments, indicators and early warning.

Global Call to Action: Send Water Quality Data from All Types of Water Resources Now

The Great Water Quality Data Drive was a specific call for inland water quality data to all water authorities around the world. Geographic priorities include Central America and the Caribbean islands, South America, Central Asia, Africa and the Small Pacific Islands. Key data to submit were: metadata, BOD, pathogens, POPs, nitrogen and phosphorus, suspended solids and sediment quality data. Data from all types of inland aquatic environments are important. These include surface waters such as lakes, reservoirs, streams, rivers, estuaries, and wetlands; and ground water aquifers. Monitoring stations include baseline, impact, trend and flux stations. The 2004 Drive was implemented over six months, closing in December 2004.

The main outcomes were:

1. www.GEMStat.org – a new searchable database of global water quality data and statistics
2. new data and information sources, such as metadata, BOD, pathogens, POPs, nitrogen and phosphorus, suspended solids and sediment quality
3. renewed focus on groundwater data and monitoring as a regional and global priority
4. integration of alternate technology: from indigenous knowledge to remote sensing

These four results will serve to strengthen our data warehouse, which contains over two million data points of over 100 parameters covering nutrients, organics, metals, ions and is expanding to address emerging issues.

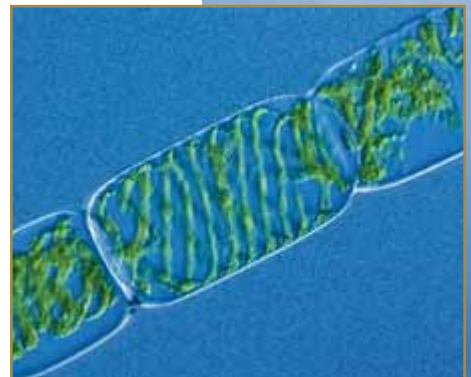
Harmonization Reporting Processes

How can the plethora of requests for data and reporting be handled more effectively?

GEMS/Water-Belgium focal point, the Flemish Environment Agency, provides some answers. There are a number of international environmental reporting processes taking place at sub-regional, regional and global levels, calling for water quality data submissions. For example, UNSD, UNEP, UN-WWAP, the CBD, OECD, EU, and many regional and basin treaties include provisions for assessments and reporting. These reports are important tools for tracking progress, policy evaluation, and for informing the general public.

The trouble is that the number of reports and processes brings a heavy reporting burden to national governments who are responsible for submitting water quality data and information to each report. This burden can be particularly great for developing countries, small islands, and economies in transition. To help cope with multiple reporting requirements, our Belgium NFP has developed a synthesized work sheet for data collection, as a tool to manage data reporting. The UN Statistical Division is also helping by holding a work session on water statistics in June 2005.

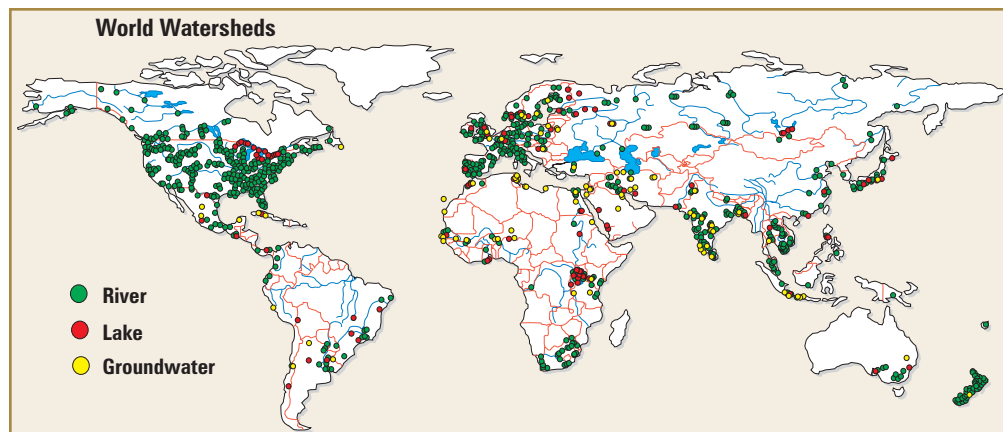
To reach the MDGs, there is a need for more trained personnel in the water sector: 300% more in Africa and 250% more in South East Asia.



In order to meet the water supply MDG target, an additional 260 000 people per day up to 2015 should gain access to improved water sources.

Year in Review: Global Water Quality Data

Increasing Global Data Coverage



Results:

Development and maintenance of global water quality data and information systems to improve accessibility to credible and comparable data; and contribution to the development and use of indicators for better understanding and decision-making of inland aquatic environmental and human health issues, and in support of MDG/WSSD and other targets.

Regions	Number of Stations	Number of Data Points	Physical / Chemical	Major Ions	Metals	Nutrients	Organic Contaminants	Microbiology	Date Range
Africa	138	206907	26712	79889	6439	41289	370	832	1977 - 2004
Americas	662	417994	47198	73210	88124	47284	3593	10401	1965 - 2004
Asia	332	641940	118868	159329	83005	98796	6794	32018	1971 - 2004
Europe	318	823323	146747	136392	154742	108815	14539	27260	1978 - 2003
Oceania	94	206650	31678	12237	2535	46992	1438	1383	1979 - 2004
Total	1544	2296814	371203	461057	334845	343176	26734	71894	1965 - 2004

Service and Use	Human Health Drinking Water	Agriculture	Energy/ Industrial	Ecosystem Stability, Structure & Health	Tourism & Recreation
Parameter	Total Coliform Faecal Coliform Pathogens POPs Turbidity	Nutrients Nitrogen Phosphorus Salinity Chlorophyll A Pathogens	BOD COD Heavy Metals (particularly in Sediment)	Temperature pH - acidity Conductivity Major ions Oxygen Suspended Solids Biodiversity	Parasites Pathogens

Different health requirements and water uses need different degrees of water quality. The needs of an aquatic ecosystem are the most important. If the ecosystem is healthy, then the others fall into place. The suite of substances that can be monitored are summarized at left.

The United States was the Number 1 data provider for 2004

Links with WHO Guidelines

GEMS/Water is working with WHO guidelines and other assessment publications. The World Health Organization (WHO) Collaborating Centre for Health Promoting Water Management and Risk Communication, Institute for Hygiene and Public Health, was tasked with reviewing the occurrence of pathogens in surface waters for the WHO Drinking Water Guidelines. The study included information about the occurrence and measured concentrations of selected bacteria, viruses, fungi and protozoa and their relationship with indicator parameters as well as types of catchment areas. The related database contains 230 references on the occurrence of pathogens in surface waters with 87 entries for bacteria, 70 for parasites, 60 for viruses and 12 for fungi. The Centre is located with the University of Bonn in Germany.

Launch of GEMStat: Global Water Quality Online Database



Water quality statistical summaries and other information are now online with a search engine and other features. Access to information and sharing tools and resources are vital to achieving results.



New Monitoring Guidelines for Europe

A new strategy was tabled at the 5th UN Economic Commission for Europe (ECE) Water Convention's Working Group on Monitoring and Assessment (WGMA). The paper covers all types of transboundary waters (rivers, lakes and groundwater). The main objective is to show the key principles of monitoring and assessment of transboundary waters to people responsible for establishing and carrying out official co-operation between riparian countries. We provided input on water quality monitoring and assessment from a multilateral perspective. The strategic guidelines present a common view of the main principles applied to joint monitoring of transboundary watercourses. Although the strategy is not legally binding, the Meeting of Parties when adopting it in Berlin, in 2006, will strongly recommend it for the entire UNECE region. The guidelines are linked to other European monitoring systems, as well as to our operations. The Finish Environment Institute, as chair of the process, is leading the development of the guidelines.



"The Millennium Development Goals are not limited to water scarcity and access.

Water quality is as an important determinant of availability. Water which is not fit for a particular use is effectively unavailable."

– Richard Roberts, quote of the month on www.UNESCO.org/water

LOOKING AHEAD

- GEMSoft new software tools for our focal points
- continued focus on data sources
- renewed attention to groundwater

Year in Review: Global Water Quality Assessments

Results:

Enhanced awareness of, and cooperation on, water quality and water quality monitoring, problems and emerging issues, among governments and the public, to better support sustainability.

Pollution prevention and successful water treatment systems reduce harm to water courses flowing to coastal areas.

Our water quality data are useful for regional and global environmental water assessments. This past year, data and statistics were used by UNEP's GEO Yearbook. We tailor-create graphics and maps for all assessment results including the World Water Development Report.

Biodiversity Convention Work on Water Quality Indicators

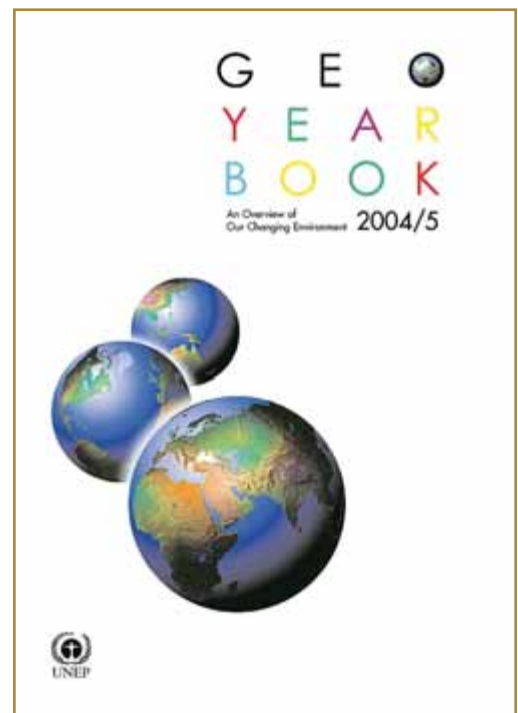
The Convention on Biological Diversity (CBD) is working on the "2010 Biodiversity target" including indicators and targets for water ecosystems. Suitable indicators and datasets will be considered for use in the Global Biodiversity Outlook 2006.

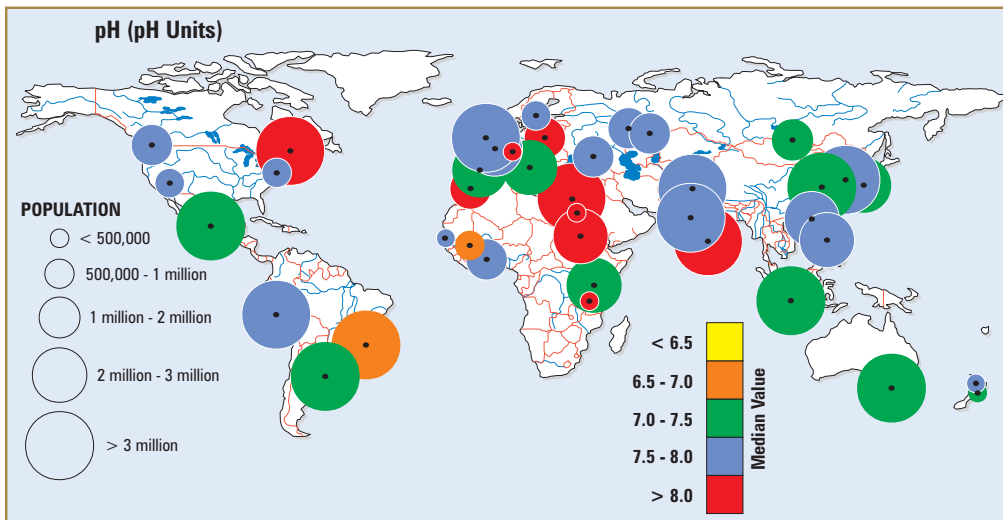
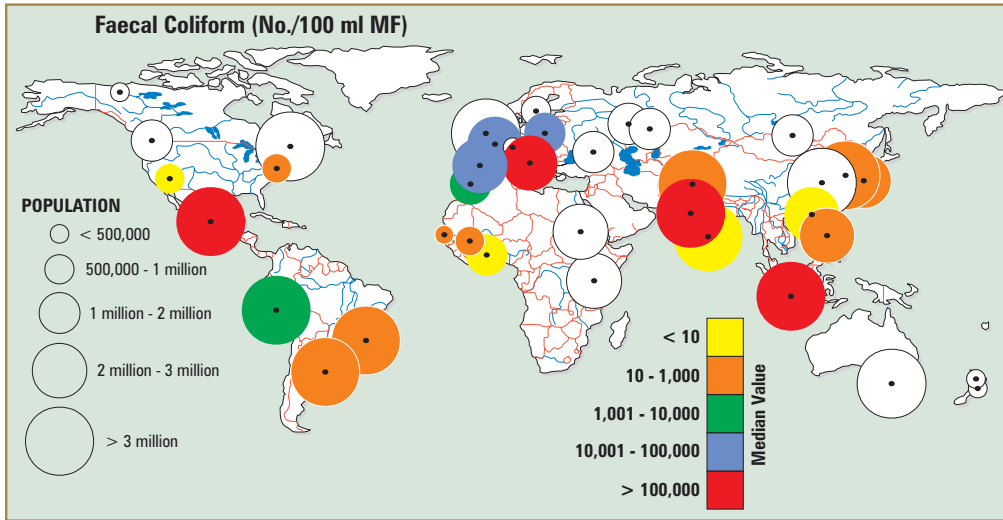
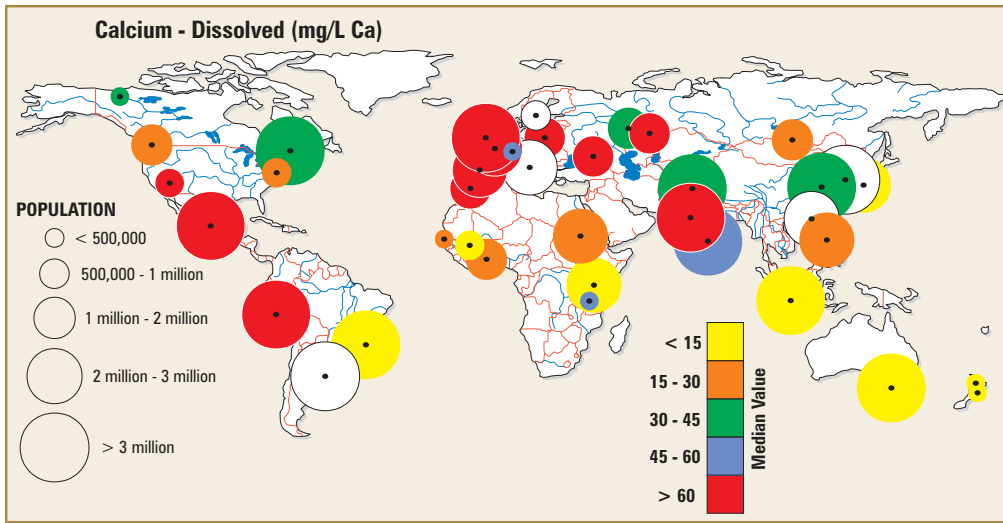
GEMS/Water was invited to chair one of the meeting's sessions. We will provide up-to-date information on the water quality indicators selected (BOD, NO₃+NO₂-N and SS) and graphical presentations. We work with the CBD Secretariat to develop text that more strongly links water quality to biodiversity. Also, the meeting asked us to consider creating a water quality index of the three indicators by, for example, setting start values in 1977 and calculating decadal changes relative to this for each indicator. The mean of the sum of the calculated values for each time period could then be shown as "changes in water quality." Participants included CITES, Ramsar, FAO, UNESCO, UNEP-WCMC, IUCN, WWF, EEA, CGIAR, and other agencies and governments.



LOOKING AHEAD:

- work with UNESCO-IHP and UNSD
- global water quality indicators workshop
- 2nd Technical Advisory Group meeting





Year in Review: Data Integrity (QA/QC)

Results:

Increased reputation as a credible and reliable source for global water quality data and information, to add value to local-level data collection, and appropriate monitoring and observation technology.

Data verification and integrity mean reliable information, but QA/QC work is often more complex and detailed than it appears.



Analytical Methods Guide

The new Analytical Methods for Environmental Water Quality provides an overview of methodologies that are, or were previously, used in laboratories that contribute water quality data and information to both GEMS/Water and the International Atomic Energy Agency's International Hydrology Section (IAEA-IHS). The target audience includes water quality laboratories and other partners of both agencies. The use of documented analytical methods is important for generating reliable water quality data. They also facilitate the production of environmental water assessments at regional and global levels by defining the comparability of data from different sources. The book is organized into two sections, Part A is a key to more than 380 analytical methods codes for over 100 parameters. Part B provides the definition of, and sampling procedures for, environmental stable and radioactive isotopes; and major and noble gases.

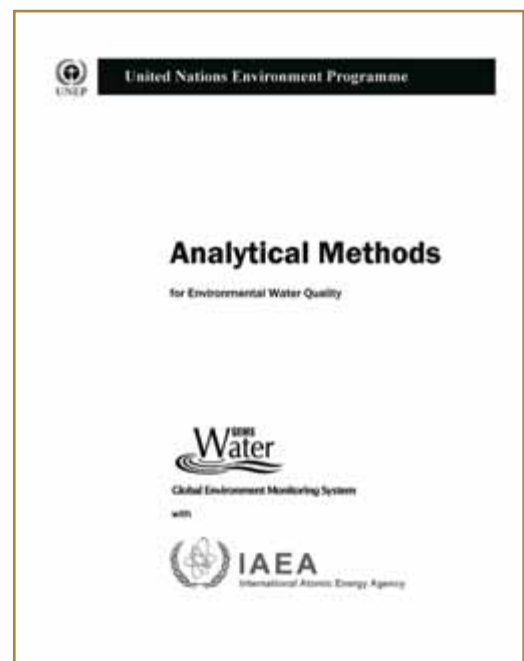
5th Laboratory Performance Evaluation

The fifth Laboratory Performance Evaluation study (PE No. 5) was completed. 68 laboratories from 38 countries received individual performance reports, designed to help laboratories improve their own analytical capabilities. Participation of 14 developing countries was enabled by IAEA, whose support is gratefully acknowledged.

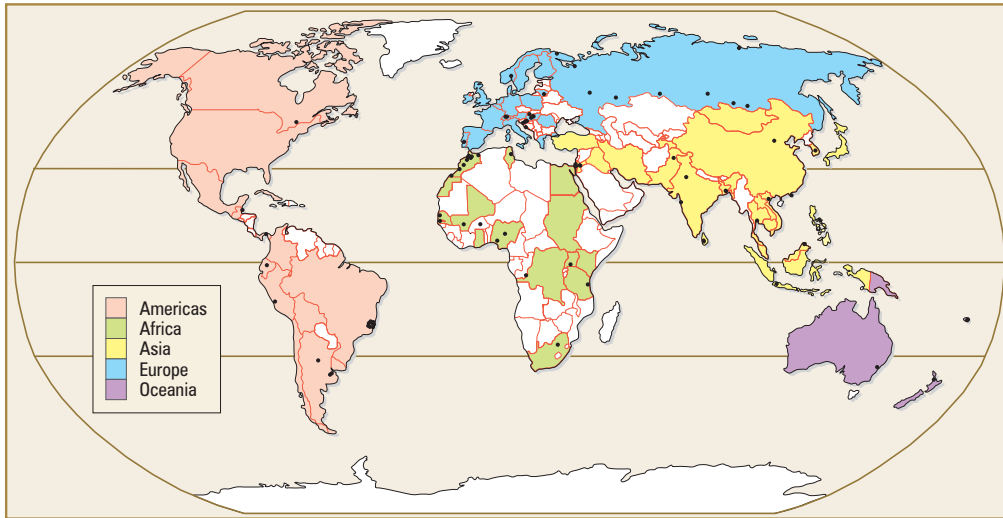
Plans for subsequent studies include progressive increases in scope and participation each year up to 2008. PE Study No. 6 is scheduled for later this year.

LOOKING AHEAD

- alternate data such as indigenous knowledge
- laboratory PE Study No. 6
- new tools and publications

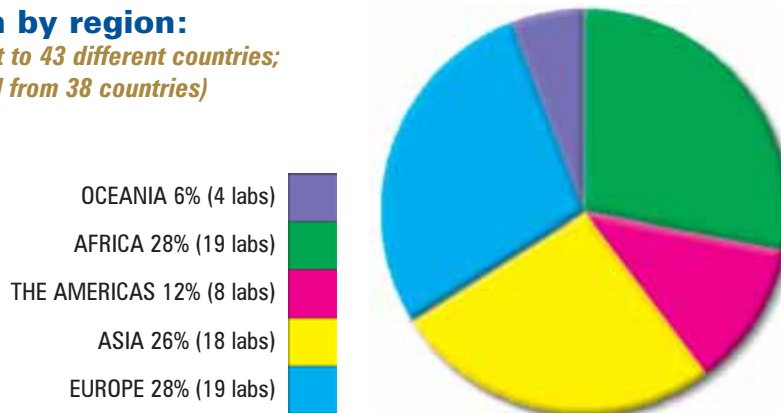


Global Participation in Laboratory Performance Evaluation Study No. 5

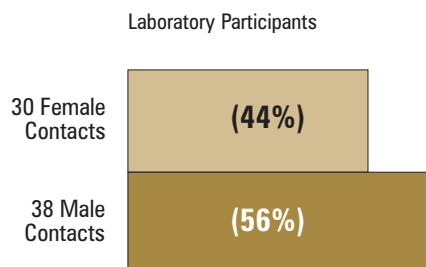


Participation by region:

(samples were sent to 43 different countries; data were received from 38 countries)



PE Study 5 gender statistics:



Year in Review: Building Capacity in Water Quality

Results:

Increased participation or involvement in water quality monitoring, assessment and reporting in developing countries and countries with economies in transition to better achieve MDG/WSSD targets.

Regional Leadership with GEMS/Water-Japan Mekong Shared Waters Initiative

GEMS/Water-Japan (the National Institute for Environmental Studies) and the Kasetsart University are leading a new regional capacity building initiative focused on the Mekong River. The second workshop was held in September, to kick-off regional presence for GEMS/Water in the Mekong region. Participants in the project came from five of the riparian countries which share the Mekong: China, Thailand, Laos, Cambodia and Viet Nam, and other local authorities. Links with private sector partners could contribute to the technical strength of the initiative.

The project aims to provide a new integrated water resource management training programme at the regional riparian level. GEMS/Water-Japan's regional approach could be adopted in every region around the world, to help promote global coverage of water quality and monitoring activities.



Global population growth is cancelling many of the gains already made. Though more than a billion people gained improved sanitation between 1990 and 2002, the population without coverage declined by only 100 million.

Without sharp acceleration in the rate of progress, the world will miss the sanitation target by half a billion people.

Between 2002 and 2015, the world's population is expected to increase every year by 74.8 million people.

From now until 2015, greater effort must be made to reach the poor and those in rural areas, whose deprivation is hidden behind national leverages.

UNEP IETC and Iraq Training Course

Important opportunities for environmental cooperation and peace.

The Iraqi Mesopotamian Marshlands constitute the largest wetland ecosystem in Western Asia. The global community recognizes the ecological and cultural importance of the Marshes, as well as the need to restore them. In response, UNEP International Environmental Technology Centre (IETC) has prepared a series, "Training Courses on Water Quality and Wetlands Management," in cooperation with the International Lakes Environment Committee (ILEC). One course was held in December 2004 in Shiga, Japan. Participants included 28 officials from the Iraqi Ministry of Environment, Ministry of Natural Resources, Ministry of Water Management, provincial and local officials and one NGO. GEMS/Water was invited to give the opening lecture on International Water Governance, followed by a second session on Global Water Quality Monitoring and Assessment. The presentations were well received, including a demonstration of the new GEMStat website.

UNESCO IHP Ecohydrology

The Scientific Advisory Committee for UNESCO IHP VI Ecohydrology and UNEP International Environmental Technology Centre (IETC) Phytotechnology projects met in Paris in May. The purpose was to review ecohydrology and phytotechnology activities for 2003-2004 and determine opportunities for 2004-2005. A new Manual Integrated Watershed Management: Ecology and Phytotechnology, jointly led by UNESCO and IETC has been published in hard and electronic forms. Training courses are being planned for Sudan (Nov 2004), Argentina (Mar/Apr 2005) and Bali (July 2005). GEMS/Water has lectured in past courses on global water resources issues, monitoring and assessment and general limnology. About 20 demonstration sites around the world were selected for possible seed funding. The sites aim to show how ecohydrology and phytotechnology can be used to prevent or remediate environmental impacts on aquatic ecosystems in diverse geographical locations, with the socio-economic benefits.



International Course and Modular Series



LOOKING AHEAD

- workshops tailored to Francophone Africa
- NIES work in the Mekong region
- plans for SIDS, CAS, and Latin America

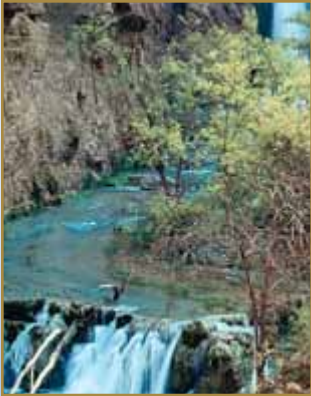
In 2002, 1.1 billion people lacked access to improved water sources, which represented 17% of the global population.

Of the 1.1 billion without improved water sources, nearly two thirds live in Asia.

REGION	MEN	% of Total	WOMEN	% of Total
Africa	17	85.0	3	15.0
Americas	14	77.7	4	22.3
Asia	21	91.3	2	8.7
Europe	19	86.3	3	13.7

Gender and National Focal Points, Collaborating Focal Points and Other Data Sources

Participation with Other Agencies



Member, Scientific Advisory Committee, UNESCO IHP VI Ecohydrology and IETC Phytotechnology

Member, Scientific Committee, International Lake Environment Committee (ILEC)

Member, Scientific Board, International Centre of Ecology, Polish Academy of Sciences

Member, Steering Committee, UNESCO-IHP and IAEA Integrative Science Initiative

Member, Steering Committee, Global Runoff Data Centre (GRDC)

Member, Editorial Board, Aquatic Ecology

Member, Interdisciplinary Committee, World Cultural Council

Member, Advisory Committee, UNEP-DEWA North America

Member, UNEP-GEO Data Working Group

Member, UN Economic Commission for Europe Water Convention's Working Group on Monitoring and Assessment (WGMA)

Member, Science Advisory Group, UNESCO International Sedimentation Initiative

Contributor, UN-Water and World Water Assessment Programme (WWAP)

Editor, SILnews, newsletter of International Association of Theoretical and Applied Limnology

Co-chair, SIL Working Group on Ecohydrology

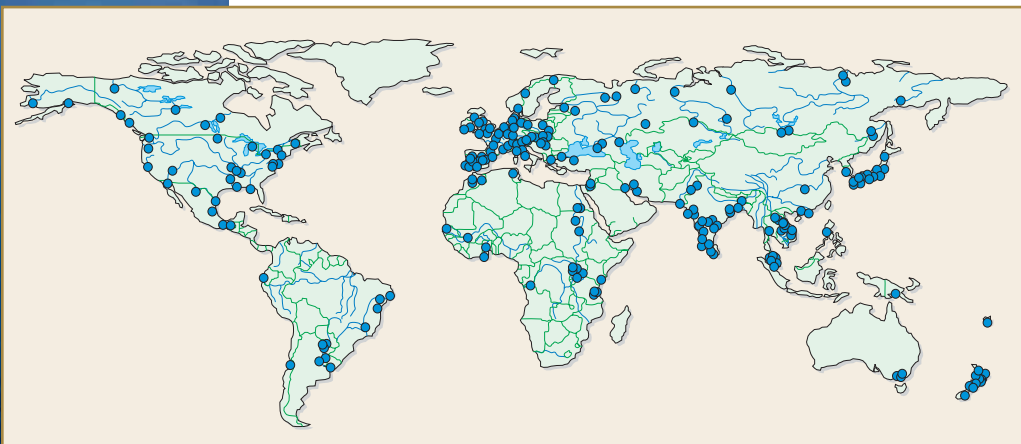
Associate Editor, Canadian Journal of Fisheries and Aquatic Sciences

Science and Technology Advisor, LakeNet

Co-editor, UNESCO Ecohydrology & Hydrobiology

Observer, UN-Water

GEMS-GRDC Common Stations



GEMS/Water coordinates station and data collection issues with our hydrological counterpart, the Global Runoff Data Centre of WMO. GRDC collects water quantity data and information, and maintains and develops a global water quantity database of 6,737 stations. Their primary mission is to obtain, compile and interpret flow data for



major river systems of the world and contribute to the international water assessment programmes of the United Nations. GRDC also carries out external contracted studies primarily with universities.

Publications

Barker, S. 2004. Staying on Target. *Environmental Protection*. **15:** 2. 23-27.

Li, Y.F., A.V. Zhulidov, R.D. Roberts & L.G. Korotova. 2005. Hexachlorocyclohexane use in the former Soviet Union. *Arch. Environ. Contam. Tox.* **48(1):** 10-15.

Pospelova, E.B., I.N. Pospelov, A.V. Zhulidov, R.D. Roberts, O.V. Zhulidova, D.A. Zhulidov & T.Yu. Gurtovaya. 2004. Biogeography of the Byrranga Mountains, Taymyr Peninsula, Russian Arctic. *Polar Record* **40:** 327-344.

Roberts, R.D. 2004. Global monitoring of lakes and reservoirs to assess climate change impacts. Proceedings from the World Water Forum 3, Kyoto 2003. *UNEP Publication Series (in press)*.

Waiser, M.J. & R.D. Roberts. 2003. Photodegradation of DOC in a shallow prairie wetland: evidence from seasonal changes in DOC optical properties and chemical characteristics. *Biogeochemistry* **69:** 263-284.

Waiser, M.J. & R.D. Roberts. 2004. Are productive prairie wetlands with high DOC concentrations net heterotrophic? *Aquat. Microb. Ecol.* **34:** 279-290.

Zalewski, M. & R.D. Roberts. 2003. Ecohydrology - a new paradigm for integrated water resources management. *SILnews* **40:** 1-5.

Zalewski, M. Wagner-Lotkowska & R.D. Roberts (eds.). 2004. Integrated Watershed Management - Ecohydrology and Phytotechnology - Manual. UNESCO Regional Bureau for Science in Europe (ROSTE). Venice, Italy.



GEMS Water Quality News
Volume 2, Issue 2

The Great Water Quality Data Drive
Global Call to Action Seeks Water Quality Data from All Types of Water Resources

Global Environment Monitoring System Water Programme
New 2004 Volume 2, Issue 2

Good News
• More water quality data from 120+ countries in the Great Water Quality Data Drive
• GEMS Water Quality Data Drive
• More water quality data from 120+ countries in the Great Water Quality Data Drive

Results: Great Water Quality Data Drive Online
• More water quality data from 120+ countries in the Great Water Quality Data Drive
• GEMS Water Quality Data Drive

Harmonizing Water Quality Data Reporting
• More water quality data from 120+ countries in the Great Water Quality Data Drive
• GEMS Water Quality Data Drive

GEMS Water Quality News
Volume 2, Issue 2

The Great Water Quality Data Drive
Global Call to Action Seeks Water Quality Data from All Types of Water Resources

Global Environment Monitoring System Water Programme
New 2004 Volume 2, Issue 2

Good News
• More water quality data from 120+ countries in the Great Water Quality Data Drive
• GEMS Water Quality Data Drive
• More water quality data from 120+ countries in the Great Water Quality Data Drive

Results: Great Water Quality Data Drive Online
• More water quality data from 120+ countries in the Great Water Quality Data Drive
• GEMS Water Quality Data Drive

Harmonizing Water Quality Data Reporting
• More water quality data from 120+ countries in the Great Water Quality Data Drive
• GEMS Water Quality Data Drive

Financial Status



As GEMS/Water is functionally part of UNEP, it does not have legal status, and relies on a UNEP General Trust Fund, and Canada's financial and in-kind support. The General Trust Fund for GEMS/Water was established under the auspices of UNEP in 2002, with an initial contribution from Canada of US \$1.0 million over three years. Financial health and prospects are improving, and the number of projects and new partnerships is increasing, and will grow in 2005. Nevertheless, the current positive trend needs to be further strengthened to ensure the successful implementation of our expanding work programme, and to meet the demands of the broader assessment community.

The General Trust Fund is the main mechanism for financing core activities. To implement the current programme of work, GEMS/Water still needs increased contributions from a broader donor base. We are planning to achieve this by building new strategic partnerships, ensuring good quality products, and strengthening local activities.

Financial resources have been gratefully received from sources listed below.

Funds & Resources Summary

Source	AMOUNT (US\$) 2003	AMOUNT (US\$) 2004	AMOUNT (US\$) 2005
In - kind			
NWRI - Environment Canada	30,000	30,000	30,000
	220,000	230,000	230,000
GEMS/Water Japan	15,000		
Sub-total	265,000	260,000	260,000
	AMOUNT (US\$) 2003	AMOUNT (US\$) 2004	AMOUNT (US\$) 2005
Core Funds			
Canada - DFAIT	115,000	118,000	118,000
General Trust Fund	385,000	390,000	390,000
UNEP - Secretariat	50,000	50,000	50,000
Special Projects			
ILEC	5,000		
Un of Nicaragua Water Resources	7,000		
Auditor General of Canada	7,000		
IAEA		13,000	
MRC		1,200	2,800
UNESCO - IHP	8,000	3,000	
UNESCO - SIL		5,785	
Sub-total	570,000	580,985	560,800
Total per Year	835,000	840,985	820,800

Strengthening Groundwater in GEMS/Water Global Network

A total of 1,544 stations in 79 countries form the GEMS/Water global network. There are 1,332 river stations, 98 lake stations and 114 groundwater stations. Eighteen of the groundwater stations have no data, while 96 stations contain 82,143 data points. However, only 52 of the stations have recent data, and many of the stations have very fragmentary data holdings.

We are working to increase our groundwater quality network. Some possible combinations of land-use category and aquifer type are relatively unimportant on a global scale. It is anticipated that 200 to 400 groundwater stations would be required globally. To take proper account of the complex hydrogeology and land-use distribution, 150-250 sampling points are considered necessary to meet primary objectives.

Groundwater Quality Problems

PROBLEM	CAUSES	CONCERNS
Anthropogenic pollution	Inadequate protection of vulnerable aquifers against human - made discharges and leachates from: <ul style="list-style-type: none"> • urban and industrial activities; • intensification of agricultural cultivation 	Pathogens, nitrates, ammonium salts, chlorine, sulphates, boron, heavy metals, DOC, aromatic and halogenated hydrocarbons nitrates, chlorine, pesticides
Naturally occurring contamination	Related to pH-Eh evolution of groundwater and dissolution of minerals (aggravated by anthropogenic pollution and/or uncontrolled exploitation)	Mainly iron, fluorine and sometimes arsenic, iodine, manganese, aluminium, magnesium, sulphates, selenium and nitrates (from paleo-recharge)
Well-head contamination	Inadequate well design and construction allowing direct intrusion of polluted surface water or shallow groundwater	Mainly pathogens

Source: Foster, Lawrence and Morris 1998; UNEP Global Environment Outlook 2002

Distribution of Stations by Regions

REGION	NUMBER OF STATIONS		NOTES ON OMISSIONS (COUNTRIES AND AQUIFERS)
	TOTAL	WITH DATA	
Africa	31	19	None in Burundi, Ghana, South Africa, Uganda and Democratic Republic of Congo
Americas	15	15	None in Bolivia, Brazil, Colombia, Ecuador, Guatemala, Panama and USA
Asia	49	45	None in China, Hong Kong SAR, Republic of Korea, Malaysia, Philippines, Cambodia, Lao People's Democratic Republic, Nepal, and Viet Nam
Europe	14	13	None in Austria, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Russian Federation, and Switzerland
Oceania	5	4	None in Fiji and Papua New Guinea
TOTALS	114	96	

Factors which determine network design

TYPE	SAMPLING POINT	SAMPLING FREQUENCY	CHOICE OF DETERMINANDS
	DENSITY		
Primary Assessment Objectives	Primary Assessment Objectives	Primary Assessment Objectives	Primary Assessment Objectives
Hydrology (complexity)	Hydrology (complexity)	Hydrology (complexity)	Water Uses
	Geology (Aquifer distribution)	Hydrology (seasonal influences)	Water quality issues
	Land Use		Statutory Requirements
	Statistical considerations	Statistical considerations	
Costs	Costs	Costs	Costs

State of the GEMS/Water Global Network

Thank You to Focal Points and Data Providers

National focal points (NFPs) are appointed and funded by member countries and are in charge of national cooperation with GEMS/Water and national coordination of activities related to the GEMS/Water programme of work. Collaborating Focal Points play similar roles as do NFPs, although they are institutionally different; CFPs are non-governmental organizations, universities, and other institutes. Full specifications of the roles of GEMS/Water, NFPs and CFPs are provided in the NFP Specifications.

- *Data for Western Europe are often contributed by the European Environment Agency focal point.*

ALGERIA

Mr. Mohamed Ramdane, Directeur Général
Adjoint
Agence Nationale des Ressources Hydrauliques
Avenue Mohammedi - Bir Mourad Rais
Alger, ALGERIE
Tel: • Fax:
Email: ramdanemo@yahoo.fr

ARGENTINA (AMERICAS)

Sr. Oscar E. Natale, Vice-Director
Instituto Nacional de Ciencia y Técnica Hídricas
(INCYTH)
Centro de Tecnología del Uso del Agua
Casilla de Correo #7 - Aeropuerto Ezeiza
1802 - Ezeiza - Pcia. Buenos Aires, ARGENTINA
Tel: • Fax:
Email: onatale@ina.gov.ar

AUSTRALIA (PACIFIC)

Mr. Bruce Gray, Assistant Director
Water Policy Section
Department of the Environment and Heritage
GPO Box 787
CANBERRA ACT 2601, AUSTRALIA
Tel: +61 2 6274 2526 • Fax: +61 2 6274 2268
Email: bruce.gray@deh.gov.au

Damien Venema
Water Quality Advisor
Water Quality Management Unit
Australian Water Quality Centre,
PMB 3, Salisbury, South Australia, 5108
W: www.awqgc.com.au
Tel: (08) 8259 0232 • Fax: (08) 8259 0299
Email: damien.venema@sawater.com.au

AUSTRIA * (EUROPE)

BANGLADESH (S. EAST ASIA)

Dr. Md. Omar Faruque Khan, Director General
Department of Environment
Poribesh bhaban
E/16, Agargaon
Sher-e-Bangla Nagar
Dhaka-1207, BANGLADESH
Tel: 880-2-81-12461 • Fax: 880-2-9118682
Email: khan@doe-bd.org

BELGIUM (EUROPE)

Mr. Jean Pauwels
Flemish Environment Agency
A. Van de Maelestraat 96
A. Van de Maelestraat 96
B-9320 Erembodegem, BELGIUM
Tel: +32 53 726 443 • Fax: +32 53 711 078
Email: j.pauwels@vmm.be

Mr. Rudy Vannevel
International Water Reporting, Monitoring &
Research Department Flemish Environment Agency
Postadres: Vlaamse Milieumaatschappij (VMM),
A. Van De Maelestraat 96, B-9320
Erembodegem, België
Werkadres: VMM, Dr. De Moorstraat 24-26, B-
9300 Aalst, België
Tel: (+ +32) (0) 53.726.626
Fax: (+ +32) (0) 53.706.344
Email: r.vannevel@vmm.be

BENIN (AFRICA)

(no representative)
Direction de l'Hygiène et de l'Assainissement de
base
Ministère de la Santé
B.P. 882
Cotonou, BENIN
Tel: • Fax:
Email:

BOLIVIA (AMERICAS)

Sr. Guillermo Orozoco, Oficina Regional
Organización Panamericana de la Salud
Edificio 'FONCOMIN', 3er. Piso
Ave. 20 de Octubre #2038
Casilla 2504 - 9790
La Paz, BOLIVIA
Tel: • Fax:
Email: gorozco@kronus.ops.org.bo

BRAZIL (AMERICAS)

Mr. Ivan Estribi Fonseca
Health and Environment Advisor
República Sanitaria Panamericana
Caixa Postal 08-729
70912-970 Brasilia DF, BRAZIL
Tel: (00-55-61) 312-6565
Fax: (00-55-61) 321-1922
Email :

Dra. Lucia Maria Porréca
Instituto Brasileiro do Meio Ambiente e dos Recursos
Naturais Renováveis Gerência Executiva do IBAMA
No Estado do Espírito Santo
Av. Marechal Mascarenhas de Moraes n° 2487
Bairro: Bento Ferreira
Vitória
Estado do Espírito Santo Cep: 29.052-021, BRAZIL
Tel: 27-3324-1811 • Fax: 27-3235-8102
Email: lucia.porréca@ibama.gov.br

BURKINA FASO (AFRICA)

M. Innocent Ouedraogo
Directeur de l'Inventaire de Ressources Hydrauliques
3131, avenue de la Liberté
B.P. 7025
03 Ouagadougou, BURKINA FASO
Tel: • Fax:
Email:

CAMBODIA (S. EAST ASIA)

Mr. Chanrithy Chuon, Deputy Director
Dept. of Natural Resources Assessment and
Environmental Data Management
Ministry of Environment
48 Samdech Preah Sihanouk Ave.
Chamkarmon, PNH, CAMBODIA
Tel: +(855) 23 212 540 • Fax:
Email: Chanrithy_ch@hotmail.com

CANADA (AMERICAS)

Mr. Rob Kent
Water Quality Monitoring Branch
Environment Canada
351 St. Joseph Blvd.
Gatineau, Quebec K1A 0H3 CANADA
Tel: 819-997-1508 • Fax: 819-953-0461
Email: Robert.Kent@ec.gc.ca

CHILE (AMERICAS)

Angel Leiva Campusano
Chief Environmental Laboratory
Dirección General de Aguas
Ministerio de Obras Públicas
Morandé 59, 8° piso
Santiago, CHILE
Tel: • Fax:
Email: dgakab@mop.cl

CHINA (PACIFIC)

(no representative)
Chief, Division of Environmental Monitoring
Department of Supervision and Management
National Environmental Protection Agency
115 Xishimennei Nanxiaojie
Beijing 100035, PEOPLE'S REPUBLIC OF CHINA
Tel: • Fax:
Email:

(no representative)
Program Officer, Division of Monitoring
National Environmental Protection Agency
115 Xishimennei Nanxiaojie
Beijing 100035,
PEOPLE'S REPUBLIC OF CHINA
Tel: • Fax:
Email:

COLOMBIA (AMERICAS)

Sr. Jaime Eduardo Ortíz Varon
Coodinador Red Salud Ambiental
Instituto Nacional de Salud
Laboratorio Salud Ambiental, COLOMBIA
Tel: • Fax:
Email: jeortizv@hemagogus.ins.gov.co

COSTA RICA (AMERICAS)

(no representative)
Research - Water Quality Control
Laboratorio Central de AYA
Instituto Costaricense de Acueductos y
Alcantarillados
Cartago, COSTA RICA
Tel: • Fax:
Email:

COTE D'IVOIRE (AFRICA)

Bamba Siaka Barthélémy
Centre de Recherches Océanologiques
BP V 18 Abidjan, CÔTE D'IVOIRE
Tel: • Fax:
Email: bambasb@hotmail.com

CUBA (AMERICAS)

Dra. Daniela Mercedes Arellano Acosta
Directora, Centro de Hidrología y Calidad
del Agua
Instituto Nacional de Recursos
Hidraulicos (INRH)
Montserrat 213
Ciudad de La Habana, CUBA
Tel: • Fax:
Email:

CYPRUS (W. ASIA)

(no representation of activity at present)
Water Development Department
Ministry of Agriculture Natural Resources
and Environment
REPUBLIC OF CYPRUS

DEMOCRATIC REPUBLIC OF CONGO

M. Willy Etienne Musoyi Bayipoke
Chef d'Evaluation des Activités GEMS/Eau - DRC
Secrétariat Général
Ministère de l'Environnement et Conservation de
la Nature
B.P. 12348
Kinshasa 1
REPUBLIQUE DEMOCRATIQUE DU CONGO
Tel: • Fax:
Email:

Dr. Takoy Lomema
Faculté des sciences
Département de Biologie Labo de Limnologie,
Hydrobiologie et Aquaculture
BP 190 KIN XI
Kinshasa
REPUBLIQUE DEMOCRATIQUE DU CONGO
Tel: • Fax:
Email:

DENMARK (EUROPE)

Hendrik Sandbech, Director
National Environmental Research Institute,
Ministry of Environment
P.O. Box 358
Frederiksborgvej 399
4000 Roskilde, DENMARK
Tel: 4630 1200 • Fax: 4630 1114
Email: HS@dmu.dk

ECUADOR (AMERICAS)

Iván Cisneros, Director Ejecutivo Del CNHR
Av. Eloy Alfaro y Amazonas
Edif. MAG, 3er. Piso
Quito, ECUADOR
Tel: • Fax:
Email:

Ing. Gonzalo Navarrete Bastidas
Secretario General del CNRH Subrogante
Av. Eloy Alfaro y Amazonas
Edif. MAG, 3er. Piso
Quito, ECUADOR
Tel: (593-2)255 4115, 255 4140
Fax: (593-2)255 4171
Email: cnrh-q@nadinanet.net

EGYPT (W. Asia)

Dr. Mona El-Kady, Chairperson
National Water Research Centre
Governor, WWC
Fum Ismailia Canal
P.O. Box 74
Shoubra El-Kheima
Cairo 13411, EGYPT
Tel: (202)4446180 • Fax: (202)4446761
Email: m.elkady@nwrc-eg.org

EUROPEAN UNION

Niels Thyssen
European Environment Agency
Kongens Nytorv 6
1050 Copenhagen K, DENMARK
Tel: • Fax:
Email:

FIJI (PACIFIC)

Mr. Sarabjeet Singh, Director
Water & Sewerage Section
Public Works Department
Nasalivata House (Level 2)
Private Mail Bag
Samabula, FIJI
Tel: • Fax:
Email: sarabjeet@sopac.org

FINLAND (EUROPE)

Dr. Jorma Niemi
Finnish Environment Institute
Kesakatu 6
P.O. Box 140
FIN-00251 Helsinki, FINLAND
Tel: • Fax:
Email: Jorma.niemi@vyh.fi

FRANCE (EUROPE)

M. Pierre Roussel, Directeur
Bureau des Données sur l'Eau
Aménagement du Territoire
et de l'Environnement
20, avenue de Ségur
75007 Paris, FRANCE
Tel: • Fax:
Email:

GAMBIA (AFRICA)

Ms. Amie Jarra
Principal Scientific Officer
Water Quality Monitoring Division
Department of Water Resources
7 Marina Parade
Banjul, THE GAMBIA
Tel: 220 398104 • Fax: 220 225009
Email: declercq@gamtel.gm

GERMANY (EUROPE)

Dr. Martin Keller, Deputy Division Head
Qualitative Hydrology
Bundesanstalt für Gewässerkunde
Federal Institute of Hydrology
Kaiserin Augusta Anlagen 15-17
56068 Koblenz, GERMANY
Tel: • Fax:
Email: keller@bafg.de

GHANA (AFRICA)

Dr. A.T. Amuzu, Secretary
Ghana National Committee for International
Hydrology and Water Resources Programme
c/o Water Resources Research Institute
P.O. Box M32
Accra, GHANA
Tel: 233-21-775351/2 • Fax: 233-21-777170
Email: WRRRI@Ghastinet.gn.apc.org

LUXEMBOURG * (EUROPE)**GREECE * (EUROPE)****GUINÉE (AFRICA)**

M. Balde Mahmoud
Ministère des Ressources Naturelles et de l'Énergie
Direction Nationale de la Gestion des Ressources
en Eau
Conakry, REPUBLIQUE DE GUINEE
Tel: • Fax:
Email:

GUATEMALA (AMERICAS)

(no representative)
Instituto Nacional de Sismología, Volcanología
Meteorología e Hidrología
7a Avenida 14-57
Zona 13, Guatemala, GUATEMALA
Tel: • Fax:
Email:

GUYANA (AMERICAS)

(no representative)
Chief Hydrometeorological Officer
Hydrometeorological Services
18 Brickdam
Staborek, P.O. Box 1088
Georgetown, GUYANA
Tel: • Fax:
Email:

HONG KONG, SAR (PACIFIC)

Cheung Tze-leung, Chief Waterworks Chemist
Water Supplies Department
Immigration Tower,
7 Gloucester Road, HONG KONG, SAR
Tel: • Fax:
Email: tl_cheung@wsd.gov.hk

LAM Lap Kay, Waterworks Chemist/RM(1)
Water Supplies Department
Immigration Tower,
7 Gloucester Road, HONG KONG, SAR
Tel: • Fax:
Email: lk_lam@wsd.gov.hk

CHOW Wo Ming, Waterworks Chemist/T(2)
Water Supplies Department
Immigration Tower,
7 Gloucester Road, HONG KONG, SAR
Tel: • Fax:
Email: wm_chow@wsd.gov.hk

HUNGARY (EUROPE)

Mr. Mihaly Kadar
National Institute of Hygiene
Department of Water Hygiene
P.O. Box 64
H-1097 (Gyáli út 2-6)
Budapest, HUNGARY
Tel: • Fax:
Email: Kadar.oki@antsz.gov.hu

INDIA (S. EAST ASIA)

Mr. R.C. Trivedi, Sr. Scientist
Pollution Assessment Division
Central Pollution Control Board
Ministry of Environment & Forests 'Parivesh
Bhawan'
C.B.D. -cum-Office Complex
East Arjun Nagar
Delhi 110 032, INDIA
Tel: • Fax:
Email: cpcb@envfor.delhi.nic.in

Mr. R.M. Bhardwaj, Scientist 'C'
Central Pollution Control Board
Ministry of Environment & Forests 'Parivesh
Bhawan'
C.B.D. -cum-Office Complex
East Arjun Nagar
Delhi 110 032, INDIA
Tel: • Fax:
Email: scrmb@cpcb.delhi.nic.in

INDONESIA (S. EAST ASIA)

Dr. Dyah Rahayu Pangesti, Director
Research Institute for Water Resources
Development
Ministry of Public Works
Jl. Ir. H. Juanda No. 193
Bandung 40135, INDONESIA
Tel: • Fax:
Email: waterx@vdg.centrin.net.id

IRAN (W. ASIA)

Dr. Hassan Salmanmesh
Department of Environmental Health
Ministry of Health and Medical Education
Tehran, ISLAMIC REPUBLIC OF IRAN
Tel: • Fax:
Email:

IRAQ (W. ASIA)

Dr. Ali Abdul-Zahra Zebon Al-Lami
Director General
Environmental Ministry
PO Box 10062
Baghdad, IRAQ
Tel: • Fax:
Email: allamiaa592003@yahoo.com

IRELAND * (EUROPE)**ISRAEL (W. ASIA)**

Dr. Doron Markel
Lake Kinnevet and Catchment Monitoring Group
Water Commission
Moaza Ezorit Galleel Eloin 12100, ISRAEL
Tel: • Fax:
Email: dmarkel@int.gov.il

ITALY * (EUROPE)**JAMAICA (AMERICAS)**

(no representative)
Permanent Secretary
Ministry of Water
6 St. Lucia Avenue
7th Floor, Island Life Bldg
Kingston 5, JAMAICA
Tel: • Fax:
Email:

JAPAN (PACIFIC)

Dr. Gen Inoue, Director
Center for Global Environment Research
National Institute for Environmental Studies
16-2, Onogawa
Tsukuba, Ibaraki 305, JAPAN
Tel: • Fax:
Email: inouegen@nies.go.jp

Dr. Shigeru Kariya, Research Scientist
Global Environment Forum
National Institute for Environmental Studies
16-2 Onogawa
Tsukuba Ibaraki, JAPAN
Tel: • Fax:
Email: kariya.shigeru@nies.go.jp

JORDAN (W. ASIA)

Mr. Zakaria Tarawneh, Director
Laboratories and Water Quality Dept.
Water Authority of Jordan
Ministry of Water and Irrigation
Amman, JORDAN
Tel: • Fax:
Email:

KENYA (AFRICA)

Mr. John M. Omwenga, Assistant Director
Ministry of Environment and Natural Resources
Water Department
Water Quality and Pollution Control Division
Box 30521
Nairobi, KENYA
Tel: • Fax:
Email:

KOREA (PACIFIC)

Yoen-Tag Rim, Director
Water Environment Research Department
National Institute of Environmental Research
Environmental Research Complex,
Geongsea-dong, Seo-gu,
Incheon 404-170, REPUBLIC OF KOREA
Tel: 82-32-560-7114 • Fax: 82-32-568-2041
Email: rimyt@me.go.kr

**LAO PEOPLE'S DEMOCRATIC REPUBLIC
(S. EAST ASIA)****LITHUANIA (EUROPE)**

Ms. Jurga Arustiene
GEMS/Water Programme Contact Person
State Geological Survey of Lithuania
S.Konarskio 35
2600 Vilnius, LITHUANIA
Tel: • Fax:
Email: Jurga.arustiene@lgt.lt

LIBYAN ARAB JAMAHIRIYA (W. ASIA)**MALAYSIA (PACIFIC)**

Ir. Chong Sun Fatt, Senior Assistant Director
Deputy of Irrigation and Drainage
Bahagian Hidrologi, jabatan Pengairan
dan Saliran Malaysia
KM 7, Jalan Ampang
58000 Ampang, Kuala Lumpur, MALAYSIA
Tel: • Fax:
Email: chongsf@did.moa.my

MALI (AFRICA)

M. Abdoulaye Kone
Laboratoire de la Qualité des Eaux
Direction Nationale de l'Hydraulique et de
l'Energie
Ministère des Mines de l'Energie et de
l'Hydraulique
Bamako, MALI
Tel: 223 221 3824, 221 4877
Fax: 223 221 8635
Email: laboeaux@africone.net.ml

MOROCCO (W. ASIA)

M. Ali Foutlane
Adjoint du Directeur du Laboratoire de la Qualité
des Eaux
Office National de l'Eau Potable (ONEP)
6 bis, rue Patrice Lumumba
B.P. Rabat-Chellah
Rabat, MAROC
Tel: • Fax:
Email:

M. Mohammed El Mghari Tabib
Direction Contrôle Qualité des Eaux
Station de Traitement des Eaux
Office National de l'Eau Potable (ONEP)
Avenue Akkrach
10002 Rabat, MAROC
Tel: • Fax:
Email: onepba@mtds.com

MEXICO (AMERICAS)

Gerencia de Calidad del Agua e Impacto Ambiental
Subdirección General de Administración del Agua
Comisión Nacional del Agua
Av. San Bernabé No. 549
San Jerónimo Lídice
C.P. 10200
Mexico DF, MEXICO
Tel: • Fax:
Email:

J. Eugenio Barrios O. M.Sc.
National Water Quality Monitoring Network
Comisión Nacional del Agua
Av. San Bernabé No. 549
San Jerónimo Lídice
C.P. 10200
Mexico DF, MEXICO
Tel: • Fax:
Email:

MONGOLIA (S. EAST ASIA)

Dr. Z. Batjargal, Director-General
National Agency for Meteorology, Hydrology and
Environment Monitoring
Hudaldaany gudamj-5
Ulaanbaatar-46, MONGOLIA
Tel: • Fax: 976-1-326611
Email:

Dr. Punsalma Batima, Senior Scientist
Mongolia Climate Change Study Team
Institute of Meteorology and Hydrology
Hydaldany gudanmj-5
Ulaanbaatar-46, MONGOLIA
Tel: 976-9924-4946 • Fax: 976-11-318750
Email: mcco@magicnet.mn

NEPAL (S. EAST ASIA)

Dr. Keshari Bajracharya
Ministry of Science & Technology
Department of Hydrology & Meteorology
P.O. Box 406
Babar Mahal
Kathmandu, NEPAL
Tel: • Fax:
Email: hydro@dhm.wlink.com.np

NETHERLANDS (EUROPE)

Mr. A. van Bennekom, Director
Ministry of Transport, Public Works & Water Mgmt.
Institute for Inland Water Mgmt & Waste Water
Smedinghuis
Zuiderwagplein 2
P.O. Box 17
8200 AA Lelystad, THE NETHERLANDS
Email: a.r.vbennekom@riza.rws.minvenw.nl

NEW ZEALAND (PACIFIC)

Mr. Charles Pearson
National Institute of Water and Atmospheric
Research
100 Aurora Terrace, Hillcrest
P.O. Box 11-115
Hamilton, NEW ZEALAND
Tel: • Fax:
Email: c.pearson@niwa.co.nz

Mr. G.G. Bryers
National Institute of Water and Atmospheric
Research
100 Aurora Terrace, Hillcrest
P.O. Box 11-115
Hamilton, NEW ZEALAND
Tel: • Fax:
Email: g.bryers@niwa.co.nz

NIGER (AFRICA)

(no representative)
Direction de Ressources en Eau
Ministère de l'Hydraulique
B.P. 257
Niamey, NIGER
Tel: • Fax:
Email:

NIGERIA (AFRICA)

Mr. P.C. Osuocha, Assistant Director Quality Control
Department of Water Supply and Quality Control
Federal Ministry of Water Resources
Old Secretariat
P.M. B 159, Area I
Garki, Abuja, NIGERIA
Tel: 08033143489, 234 9 23442733
Fax: 234 9 2342895
Email: patosuocha@yahoo.com

NORWAY (EUROPE)

Mr. Håvard Hovind
Laboratory QA Officer
NIVA
Brekkeveien 19
P.O. Box 173 Kjelsaas
N-0411 Oslo, NORWAY
Tel: 47 2218 5100 • Fax: 47 2218 5200
Email: haavard.hovind@niva.no

PAKISTAN (W. ASIA)

Dr. Javed Anwar Aziz
Director and Professor of Environmental
Engineering
University of Engineering and Technology
Lahore-54980, PAKISTAN
Tel: • Fax:
Email:

Prof. Khadim Hussain Ziai, Incharge Laboratories
Institute of Environmental Engineering and Research
University of Engineering and Technology
Lahore-54980, PAKISTAN
Tel: • Fax:
Email:

PANAMA (AMERICAS)

Sr. Ricardo Anguizola
Administrator General ANAM
Apartado 2016
Paraíso, Ancón, REPUBLICA DE PANAMÁ
Tel: 232-5939/232-5940 • Fax: 232-6612
Email: ranguiz@ns.inrenare.stri.si.edu

Sr. Daniel Muschett
Autoridad del Canal de Panamá
Sección de Manejo de Cuenca
Edificio 706, Corozal Oeste
Ciudad de Panamá, REPUBLICA DE PANAMA
Tel: 507 276-2997 • Fax: 507 276-2759
Email: dmuschett@pancanal.com

PERU (AMERICAS)

Luis Leonidas, Chávez Pais
Director General de DIGESA
Las Amapolas 350
Lima. PERU
Tel: 442-8353 • Fax: 442602
Director: 442-01-43-422-2969
Email : llchp@digesa.sld.pe

PHILIPPINES (PACIFIC)

Mr. Peter Anthony A. Abaya, Director
Environmental Management Bureau
Dept. of Environment and Natural Resources
Topaz Building, Kalayaan Ave
Quezon City 1102, REPUBLIC OF PHILIPPINES
Tel: 928-1215, 927-1518 • Fax: 924-7540
Email:

POLAND (EUROPE)

Waldemar Jarosinski, Deputy Director
Dept. of Water Quality Monitoring (DQWM),
Institute of Meteorology and Water Management
Ul. Jordana 10/11
40-056 Katowice, REPUBLIC OF POLAND
Tel: • Fax:
Email:

PORTUGAL (EUROPE)

Dr. Filomena Araujo
Ministry of Health
Alameda D'Afonso Henriques 45
P 1056 Lisbon Cedex, PORTUGAL
Tel: • Fax:
Email: filomena@dgsaude.min-saude.pt

RUSSIAN FEDERATION (EUROPE)

Dr. A. Nikanorov
Director of the Hydrochemical Institute
Stachki Ave. 198
Rostov-on-Don, RUSSIA FEDERATION 344104
Tel: • Fax:
Email:

RWANDA

Mr. Munyanganizi Bikoro
Minister of State in charge of Water and Natural
Resources
Ministry of Lands, Environment, Forestry, Water
and Natural Resources
B.P. 3502 Kigali, RWANDA
Tel: 250 82268 • Fax: 250 82268
Email: dea@rwanda1.com

Mr. John NKONGORI
ELECTROGAZ
Kigali, RWANDA
Tel: • Fax:
Email:

SENEGAL (AFRICA)

Mme Fatoumata Niang née BA
Sous Directeur Traitement des Eaux
Senegalaise des Eaux SDE
Route du Front de Terre Hann.
BP224 Dakar, SENEGAL
Tel: 221 869-30-06
Fax: 221 869-30-10 or 839-37-05
Email: eau@sde.sn

SINGAPORE (S. EAST ASIA)

Head, Strategic Planning and Research Department
Ministry of the Environment
40 Scotts Road, SINGAPORE
Tel: 7327733 • Fax: 7319651
Email:

SLOVANIA (EUROPE)

Ms. Júliana Adámková
Slovak Hydrometeorological Institute
Jeséniova 17, 833 15
Bratislava, SLOVAK REPUBLIC
Tel: • Fax:
Email: juliana.adamkova@shmu.sk

SLOVAKIA (EUROPE)

Ms. Marián Supek, Director General
Slovak Hydrometeorological Institute
Jeséniova 17, 833 15
Bratislava, SLOVAK REPUBLIC
Tel: • Fax:
Email:

SOUTH AFRICA (AFRICA)

Harold van Niekerk, Specialist Scientist
Institute for Water Quality Studies
Dept. of Water Affairs and Forestry
Private Bag X313
0001 Pretoria, SOUTH AFRICA
Tel: • Fax:
Email: VNiekerkH@dwaf.gov.za

SPAIN * (EUROPE)**SRI LANKA (S. EAST ASIA)**

H.L. Susiripala, Director, Laboratory Services
Central Environmental Authority
Ministry of Environment & Natural Resources
Parisara Piyasa
104 Robert Gunawardana Mawatha
Battaramulla, SRI LANKA
Tel: 94 11 2872606 • Fax: 94 11 2872605
Email: susiri@cea.lk

S.M.S. Samarakoon, Chemist/CEA Laboratory
Ministry of Environment & Natural Resources
Parisara Piyasa
104 Robert Gunawardana Mawatha
Battaramulla, SRI LANKA
Tel: • Fax:
Email: samlab@cea.lk

SUDAN (W. ASIA)

(no representative)
National Chemical Laboratories
Ministry of Health
P.O. Box 287
Khartoum, SUDAN

SURINAME (AMERICAS)

Mr. M.A. Amatali
Director, Hydraulic Research Division
Ministry of Public Works

c/o Mr. R. Nurmohamed
University of Suriname
Faculty of Technological Sciences
Dept. Infrastructure, Building 16
POB 9212, Leysweg, SURINAME
Tel: • Fax: 011 597-495005 or 597-462291
Email:

SWEDEN (EUROPE)

Mr. Bert Karlsson
Swedish University of Agricultural Sciences
Centre for Environmental Monitoring
Vallvägen 3
Box 7062
S-750 07 Uppsala, SWEDEN
Tel: • Fax:
Email: Bert.Karlsson@ma.slu.de

Mr. Anders Wilander, Researcher
Sveriges lantbruksuniversitet
Institutionen för miljöanalys
P.O. Box 7050
S-750 07 Uppsala, SWEDEN
Tel: • Fax:
Email: Anders.Wilander@ma.slu.se

SWITZERLAND (EUROPE)

Dr. Adrian Jakob
Head of the Section, Analyses & Forecasts
Federal Office for Water and Geology
CH-3003 Bern-Ittigen, SWITZERLAND
Tel: 41 31 324 7671 • Fax: 41 31 324 7681
Email: Adrian.Jakob@buwal.admin.ch

TANZANIA (AFRICA)

Dr. Hassani J. Mjengera, Head Water Quality
Water Laboratories Unit
Ministry of Water and Livestock
Maji Ubungo
THE UNITED REPUBLIC OF TANZANIA
Tel: • Fax:
Email: dwl@maji.go.tz

THAILAND (S. EAST ASIA)

Dr. Boonchai Somboonsook, Director
Bureau of Environmental Health
Department of Health
Tiwanon Road, Amphoe Muang
Nonthaburi 11000, THAILAND
Tel: • Fax:
Email:

TUNISIA (W. ASIA)

M. Mohamed Bacha / Mme Sondés Kamoun
Laboratoire d'Analyse des Eaux
Direction Générale des Ressources en Eau
Ministère de l'Agriculture
43, rue la Manoubia, Monfleury
1008 Tunis, TUNISIE
Tel: • Fax:
Email:

TURKEY (EUROPE)

Dr. Meryem Beklioglu, PhD, Associate Professor
Department of Biology
W. Asia Technical University
06531, Ankara, TURKEY
Tel: +90 312 210 51 54
Fax: +90 312 210 12 89
Email: meryem@metu.edu.tr

Can Ozan Tan
Department of Biology
W. Asia Technical University
06531, Ankara, TURKEY
Tel: • Fax:
Email: ctan@metu.edu.tr

UGANDA (AFRICA)

Mr. Nsubuga Senfuma
Water Quality & Pollution Control Laboratory -
Entebbe
Water Resources Management Department,
Plot 12 Mpigi Road, P.O. Box 19
Entebbe, UGANDA
Tel: 149 Fax:
Email:

UNITED KINGDOM (EUROPE)

Mr. David Robinson, Statistical Officer
EPSIM 4
DEFRA
Room 5/D13, Ashdown House
123 Victoria St.
London, SW1E 6DE, UNITED KINGDOM
Tel: • Fax:
Email: david.s.robinson@defra.gsi.gov.uk

UNITED STATES OF AMERICA (AMERICAS)

Ms. Yvonne Stoker
United States Geological Survey
10500 University Center Drive, S-215
Tampa, FL 33612, USA
Tel: 813-975-8620 x 133 • Fax:
Email: ystoker@usgs.gov

URUGUAY (AMERICAS)

Pablo Peirano
Dirección Nacional de Medio Ambiente
Departamento de Evaluación Ambiental
Rincon 422 6° Piso
Edificio Federica, URUGUAY
Tel: • Fax:
Email:

VIETNAM (S. EAST ASIA)

ZAMBIA (AFRICA)

G.P. Mukala, Permanent Secretary
Ministry of Energy & Water Development
P.O. Box 36079
Lusaka, ZAMBIA
Tel: 260-1 252011 • Fax: 260-1 252589
Email:

ZIMBABWE

Mr. Zvikomborero Manyangadze
Senior Water Pollution Control and Ecology
Officer
Ministry of Water Resources and Infrastructural
Development
P, Bag 7767, Causeway, Harare, ZIMBABWE
Tel: 263-04-793914, 700596/702015 Ext.219
E-mail: hydro@mweb.co.zw

Mr. V. Choga
Director Department of Water Resources

Statistical Summary of Countries and Areas

Data Submissions as of January, 2005

Countries and Areas	Last Updated	No. of Stations	No. of Parameters	No. of Data Points	No. of Records	Temporal Coverage	Coverage by River Basin	Population	Network Readiness Index	Basin Name
Afghanistan	----	----	----	----	----	----	----	28,513,677	----	
Albania	----	----	----	----	----	----	----	3,544,808	----	
Algeria	2004	----	----	----	----	----	----	32,129,324	87	
American Samoa	2002	----	----	----	----	----	----	57,902	----	
Andorra	----	----	----	----	----	----	----	69,865	----	
Angola	----	----	----	----	----	----	----	10,978,552	99	
Anguilla	----	----	----	----	----	----	----	13,008	----	
Antarctica	----	----	----	----	----	----	----	1000 - 4000	----	
Antigua and Barbuda	----	----	----	----	----	----	----	68,320	----	
Argentina	2000	12	84	9581	787	1979 - 1999	yes	39,144,753	50	Parana, Uruguay
Armenia	----	----	----	----	----	----	----	2,991,360	----	
Aruba	----	----	----	----	----	----	----	71,218	----	
Ashmore & Cartier Islands (Australian)	----	----	----	----	----	----	----	----	----	
Australia	2004	11	102	21121	2053	1979 - 2004	yes	19,913,144	9	Murray-Darling
Austria	2000	6	15	612	57	1995 - 1996	yes	8,174,762	21	Danube
Azerbaijan	----	----	----	----	----	----	----	7,868,385	----	
Bahamas, The	----	----	----	----	----	----	----	299,697	----	
Bahrain	----	----	----	----	----	----	----	677,886	----	
Baker & Howland Islands	----	----	----	----	----	----	----	----	----	
Bangladesh	1998	9	19	4446	438	1979 - 1995	yes	141,340,476	93	Brahmaputra, Ganges
Barbados	----	----	----	----	----	----	----	278,289	----	
Belarus	----	----	----	----	----	----	----	10,310,520	----	
Belgium	2004	51	92	51983	1635	1978 - 2002	yes	10,348,276	24	Schelde
Belize	----	----	----	----	----	----	----	272,945	----	
Benin	----	----	----	----	----	----	----	7,250,033	----	
Bermuda	----	----	----	----	----	----	----	64,935	----	
Bhutan	----	----	----	----	----	----	----	2,185,569	----	
Bolivia	----	2	21	625	33	1979 - 1982	no	8,724,156	90	
Bosnia and Herzegovina	----	----	----	----	----	----	----	4,007,608	----	
Botswana	----	----	----	----	----	----	----	1,561,973	55	
Bouvet Island (Norwegian)	----	----	----	----	----	----	----	----	----	
Brazil	1994	12	67	15805	916	1979 - 1990	yes	184,101,109	39	Parana, Sao Francisco
British Indian Ocean Territory (British)	----	----	----	----	----	----	----	----	----	
British Virgin Islands (British)	----	----	----	----	----	----	----	22,187	----	
Brunei Darussalam	----	----	----	----	----	----	----	365,251	----	
Bulgaria	----	----	----	----	----	----	----	7,517,973	67	
Burkina Faso	----	----	----	----	----	----	----	13,574,820	----	
Burundi	----	1	----	----	----	----	----	6,231,221	----	
Cambodia	2001	5	18	1739	100	1993 - 1995	yes	13,363,421	----	Mekong
Cameroon	----	----	----	----	----	----	----	16,063,678	83	
Canada	2004	70	107	281497	----	1965 - 2004	yes	32,507,874	6	Fraser, Mackenzie, Nelson, St. John, St. Lawrence, Yukon
Cape Verde	----	----	----	----	----	----	----	415,294	----	
Cayman Islands (British)	----	----	----	----	----	----	----	43,103	----	
Central African Republic	2004	----	----	----	----	----	----	3,742,482	----	
Chad	----	----	----	----	----	----	----	9,538,544	102	
Chile	----	3	36	4498	291	1979 - 1988	no	15,823,957	32	
China	2003	12	100	41173	1619	1980 - 1997	yes	1,298,847,624	51	Amur, Hwang He, Xi Jiang, Yangtze
Christmas Island	----	----	----	----	----	----	----	396	----	
Cocos Islands (Australian)	----	----	----	----	----	----	----	629	----	
Colombia	----	3	52	1409	72	1981 - 1988	yes	42,310,775	60	Magdalena
Comoros	----	----	----	----	----	----	----	651,901	----	
Congo, Republic of the	----	----	----	----	----	----	----	2,998,040	----	
Cook Islands (New Zealand)	----	----	----	----	----	----	----	21,200	----	
Coral Sea Islands (Australian)	----	----	----	----	----	----	----	----	----	
Costa Rica	----	----	----	----	----	----	----	3,956,507	49	
Côte d'Ivoire	2004	12	11	131	4	1997-1999	no	17,327,724	----	
Croatia	----	----	----	----	----	----	----	4,496,869	48	
Cuba	1996	3	34	359	18	1993 - 1995	no	11,308,764	----	

Countries and Areas	Last Updated	No. of Stations	No. of Parameters	No. of Data Points	No. of Records	Temporal Coverage	Coverage by River Basin	Population	Network Readiness Index	Basin Name
Cyprus	----	----	----	----	----	----	----	775,927	----	
Czech Republic	----	----	----	----	----	----	----	10,246,178	33	
Democratic Republic of the Congo		1	16	16	1	1984	yes	58,317,930	----	Congo
Denmark	2001	6	17	3335	617	1979 - 1996	no	5,413,392	5	
Djibouti	----	----	----	----	----	----	----	466,900	----	
Dominica	----	----	----	----	----	----	----	69,278	----	
Dominican Republic	----	----	----	----	----	----	----	8,833,634	57	
Ecuador	1997	3	32	1419	111	1979 - 1986	no	13,212,742	89	
Egypt	----	10	15	2284	210	1979 - 1980	yes	76,117,421	65	Nile
El Salvador	----	----	----	----	----	----	----	6,587,541	62	
Equatorial Guinea	----	----	----	----	----	----	----	523,051	----	
Eritrea	----	----	----	----	----	----	----	4,447,307	----	
Estonia	----	----	----	----	----	----	----	1,341,664	25	
Ethiopia	----	----	----	----	----	----	----	67,851,281	101	
Falkland Islands (British)	----	----	----	----	----	----	----	2,967	----	
Faroe Islands (Denmark)	----	----	----	----	----	----	----	46,662	----	
Fiji	2004	1	29	3002	266	1980 - 2004	no	880,874	----	
Finland	2002	12	68	12488	1796	1979 - 1998	yes	5,214,512	3	Kemijoki, Pasvik, Torne
France	2002	20	50	71014	4856	1979 - 1996	yes	60,424,213	19	Garonne, Loire, Rhone, Seine
French Guiana (French)	----	----	----	----	----	----	----	191,309	----	
French Polynesia (French)	----	----	----	----	----	----	----	266,339	----	
Gabon	----	----	----	----	----	----	----	1,355,246	----	
Gambia, The	2004	----	----	----	----	----	----	1,546,848	82	
Georgia	----	----	----	----	----	----	----	4,693,892	----	
Germany	2002	20	50	34791	3273	1979 - 1995	yes	82,424,609	11	Danube, Elbe, Rhine & Meuse, Oder, Weser
Ghana	1997	4	42	2127	208	1991 - 1995	yes	20,757,032	74	Volta
Gibraltar (British)	----	----	----	----	----	----	----	27,833	----	
Greece	2000	6	14	3385	482	1990 - 1995	no	10,647,529	34	
Greenland (Denmark)	----	----	----	----	----	----	----	56,384	----	
Grenada	----	----	----	----	----	----	----	89,357	----	
Guadeloupe (French)	----	----	----	----	----	----	----	444,515	----	
Guam (USA)	----	----	----	----	----	----	----	166,090	----	
Guatemala	----	4	14	459	33	1981 - 1982	yes	14,280,596	86	Motaqua
Guernsey (British)	----	----	----	----	----	----	----	65,031	----	
Guinea	----	----	----	----	----	----	----	9,246,462	----	
Guinea-Bissau	----	----	----	----	----	----	----	1,388,363	----	
Guyana	----	----	----	----	----	----	----	705,803	----	
Haiti	----	----	----	----	----	----	----	7,656,166	100	
Heard & MacDonald Islands (Australia)	----	----	----	----	----	----	----	----	----	
Holy See (Vatican City)	----	----	----	----	----	----	----	921	----	
Honduras	----	----	----	----	----	----	----	6,823,568	98	
Hong Kong SAR	2004	2	21	3296	314	1979 - 2004	no	6,855,125	18	
Hungary	2000	4	71	15513	671	1979 - 1996	yes	10,032,375	36	Danube
Iceland	----	----	----	----	----	----	----	293,966	10	
India	2004	72	28	206610	10,175	1978 - 2002	yes	1,065,070,607	45	Godavari, Krishna, Mahanadi, Narmada, Tapi
Indonesia	1993	22	63	30712	906	1979 - 1994	no	238,452,952	73	
Iran	1993	20	34	6159	463	1980 - 1992	yes	69,018,924	----	Kura-Araks, Tigris & Euphrates
Iraq	----	10	----	----	----	----	----	25,374,691	----	
Ireland	2001	4	18	4249	401	1979 - 1996	no	3,969,558	22	
Isle of Man (British)	----	----	----	----	----	----	----	74,655	----	
Israel	----	2	37	5141	305	1980 - 1981	yes	6,199,008	16	Jordan
Italy	2000	16	21	10352	1051	1979 - 1995	yes	58,057,477	28	Po
Jamaica	----	----	----	----	----	----	----	2,713,130	53	
Jan Mayen (Norwegian)	----	----	----	----	----	----	----	----	----	
Japan	2004	27	271	148946	6051	1979 - 2002	no	127,333,002	12	
Jarvis Island (USA)	----	----	----	----	----	----	----	----	----	
Jersey (British)	----	----	----	----	----	----	----	90,502	----	

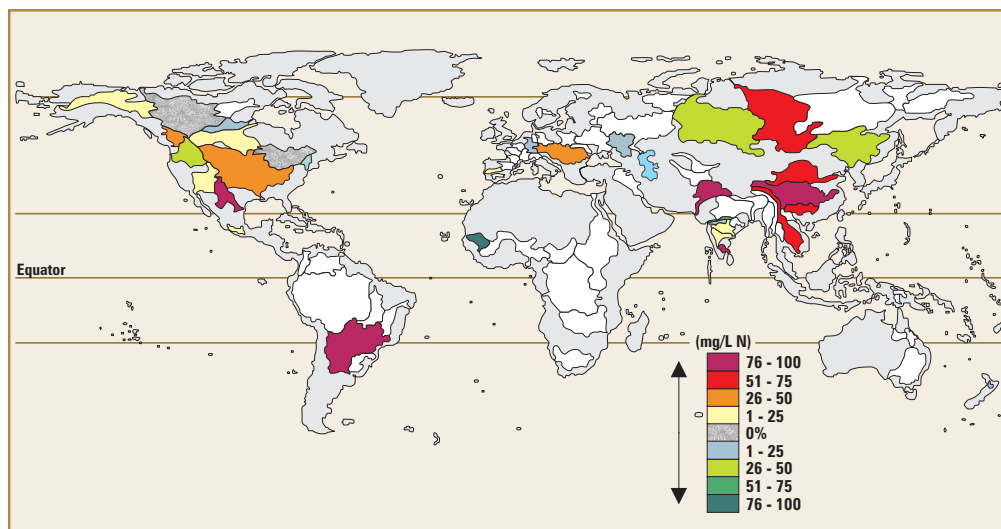
Countries and Areas	Last Updated	No. of Stations	No. of Parameters	No. of Data Points	No. of Records	Temporal Coverage	Coverage by River Basin	Population	Network Readiness Index	Basin Name
Johnston Atoll (USA)	----	----	----	----	----	----	----	396	----	
Jordan	2000	4	59	893	48	1987 - 1999	yes	5,611,202	46	Jordan
Kazakhstan	----	----	----	----	----	----	----	15,143,704	----	
Kenya	----	11	56	2524	242	1977 - 1988	yes	32,021,856	84	Nile
Kingman Reef (USA)	----	----	----	----	----	----	----	----	----	
Kiribati	----	----	----	----	----	----	----	100,798	----	
Korea, Democratic Republic of (North)	----	----	----	----	----	----	----	22,697,553	----	
Korea, Republic of (South)	2004	1	39	9310	478	1982 - 2004	yes	48,598,175	20	Han
Kuwait	----	2	----	----	----	----	----	2,257,549	----	
Kyrgyzstan	----	----	----	----	----	----	----	5,081,429	----	
Lao, People's Republic of	2001	15	21	28872	1502	1985 - 1995	yes	6,068,117	----	Mekong
Latvia	----	----	----	----	----	----	----	2,306,306	35	
Lebanon	----	----	----	----	----	----	----	3,777,218	----	
Lesotho	----	----	----	----	----	----	----	1,865,040	----	
Liberia	----	----	----	----	----	----	----	3,390,635	----	
Libyan Arab Jamahiriya	----	5	----	----	----	----	----	5,631,585	----	
Liechtenstein	----	----	----	----	----	----	----	33,436	----	
Lithuania	2002	4	36	1207	41	1991 - 2001	yes	3,607,899	42	Neman
Luxembourg	2000	1	20	1158	101	1979 - 1995	yes	462,690	14	Rhine & Meuse
Macau (China)	----	----	----	----	----	----	----	445,286	----	
Macedonia, The former Yugoslav Republic of	----	----	----	----	----	----	----	2,071,210	75	
Madagascar	----	----	----	----	----	----	----	17,501,871	92	
Malawi	----	----	----	----	----	----	----	11,906,855	88	
Malaysia	1994	8	80	13723	641	1979 - 1992	no	23,522,482	26	
Maldives	----	----	----	----	----	----	----	339,330	----	
Mali	1997	11	34	1596	81	1987 - 1996	yes	11,956,788	96	Niger, Senegal
Malta	----	----	----	----	----	----	----	396,851	27	
Marshall Islands (USA)	----	----	----	----	----	----	----	57,738	----	
Martinique (French)	----	----	----	----	----	----	----	429,510	----	
Mauritania	----	----	----	----	----	----	----	2,998,563	----	
Mauritius	----	----	----	----	----	----	----	1,220,481	43	
Mayotte (French)	----	----	----	----	----	----	----	186,026	----	
Mexico	1998	16	91	32398	2157	1979 - 1996	yes	104,959,594	44	Balsas, Rio Grande, Rio Grande de Santiago, Grijalva, Usumacinta
Micronesia, Federated States of	----	----	----	----	----	----	----	108,155	----	
Midway Islands (USA)	----	----	----	----	----	----	----	----	----	
Monaco	----	----	----	----	----	----	----	32,270	----	
Mongolia	2004	4	9	212	24	2004	no	2,751,314	----	
Montserrat (British)	----	----	----	----	----	----	----	9,245	----	
Morocco	2001	8	75	15021	607	1985 - 1999	no	32,209,101	64	
Mozambique	----	----	----	----	----	----	----	18,811,731	97	
Myanmar	----	----	----	----	----	----	----	42,720,196	----	
Namibia	----	----	----	----	----	----	----	1,954,033	59	
Nauru	----	----	----	----	----	----	----	12,809	----	
Navassa Island (USA)	----	----	----	----	----	----	----	----	----	
Nepal	----	3	----	----	----	----	----	27,070,666	----	
Netherland Antilles (Netherlands)	----	----	----	----	----	----	----	218,126	----	
Netherlands	1996	15	74	105554	16182	1979 - 1996	yes	16,318,199	13	Rhine & Meuse
New Caledonia (French)	----	----	----	----	----	----	----	213,679	----	
New Zealand	2000	81	87	182521	8798	1979 - 1997	yes	3,993,817	23	Waikato
Nicaragua	----	----	----	----	----	----	----	5,359,759	94	
Niger	----	9	----	----	----	----	----	11,360,538	----	
Nigeria	2004	----	----	----	----	----	----	137,253,133	79	
Niue (New Zealand)	----	----	----	----	----	----	----	2,156	----	
Norfolk Island (Australian)	----	----	----	----	----	----	----	1,841	----	
Northern Mariana Islands (USA)	----	----	----	----	----	----	----	78,252	----	
Norway	1996	18	39	8473	696	1981 - 1993	yes	4,574,560	8	Glama
Oman	----	----	----	----	----	----	----	2,903,165	----	
Pakistan	2004	7	65	32632	1554	1979 - 2003	yes	159,196,336	76	Indus
Palau	----	----	----	----	----	----	----	20,016	----	

Countries and Areas	Last Updated	No. of Stations	No. of Parameters	No. of Data Points	No. of Records	Temporal Coverage	Coverage by River Basin	Population	Network Readiness Index	Basin Name
Palestine	----	----	----	----	----	----	----	3,636,195	----	
Palmyra Atoll (USA)	----	----	----	----	----	----	----	----	----	
Panama	----	3	33	4149	180	1979 - 1986	yes	3,000,463	58	Chanquinola
Papua New Guinea	----	1	6	6	1	1979	no	5,420,280	----	
Paracel Islands	----	----	----	----	----	----	----	----	----	
Paraguay	----	----	----	----	----	----	----	6,191,368	91	
Peru	----	10	27	893	58	1979 - 1983	no	27,544,305	70	
Peter Island (Norwegian)	----	----	----	----	----	----	----	----	----	
Philippines	2004	4	66	4262	483	1979 - 2004	no	86,241,697	69	
Pitcairn Islands (British)	----	----	----	----	----	----	----	46	----	
Poland	2004	8	70	75820	2350	1991 - 2003	yes	38,626,349	47	Oder, Vistula
Portugal	2001	13	66	17577	1245	1980 - 1994	yes	10,524,145	31	Duero, Guadiana, Mino, Tagus
Puerto Rico (USA)	2002	----	----	----	----	----	----	3,897,960	----	
Qatar	----	----	----	----	----	----	----	840,290	----	
Republic of Moldova	----	----	----	----	----	----	----	4,446,455	----	
Reunion (French)	----	----	----	----	----	----	----	766,153	----	
Romania	----	----	----	----	----	----	----	22,355,551	61	
Russian Federation	2004	43	39	138403	23,554	1980 - 2003	yes	143,782,338	63	Amur, Don, Kolyma, Lena, Neva, North Dvina, Ob, Ural, Volga, Yenisey
Rwanda	2004	----	----	----	----	----	----	7,954,013	----	
Saint Kitts and Nevis	----	----	----	----	----	----	----	38,836	----	
Saint Lucia	----	----	----	----	----	----	----	164,213	----	
Saint Vincent and the Grenadines	----	----	----	----	----	----	----	117,193	----	
Samoa	----	----	----	----	----	----	----	177,714	----	
San Marino (an enclave in central Italy)	----	----	----	----	----	----	----	28,503	----	
Sao Tome and Principe	----	----	----	----	----	----	----	181,565	----	
Saudi Arabia	----	4	----	----	----	----	----	25,795,938	----	
Senegal	2001	11	55	777	59	1986 - 2000	yes	10,852,147	81	Senegal
Serbia and Montenegro	----	----	----	----	----	----	----	10,825,900	77	
Seychelles	----	----	----	----	----	----	----	80,832	----	
Sierra Leone	----	----	----	----	----	----	----	5,883,889	----	
Singapore	----	----	----	----	----	----	----	4,353,893	2	
Slovakia Republic	2004	----	----	----	----	----	----	5,423,567	41	
Slovenia	----	----	----	----	----	----	----	2,011,473	30	
Solomon Islands	----	----	----	----	----	----	----	523,617	----	
Somalia	----	----	----	----	----	----	----	8,304,601	----	
South Africa	2004	23	21	172080	13861	1990 - 2004	yes	42,718,530	37	Limpopo, Orange
South Georgian & South Sandwich Islands (British)	----	----	----	----	----	----	----	----	----	
Spain	2001	21	45	17145	1240	1979 - 1995	yes	40,280,780	29	Duero, Ebro, Guadalquivir, Guadiana, Mino, Tagus
Spratly Islands	----	----	----	----	----	----	----	----	----	
Sri Lanka	2004	21	20	1955	105	1979 - 2004	no	19,905,165	66	
St. Helena & Dependencies (British)	----	----	----	----	----	----	----	7,415	----	
St. Pierre & Miquelon (French)	----	----	----	----	----	----	----	6,995	----	
Sudan	1993	4	27	4423	241	1980 - 1992	yes	39,148,162	----	Nile
Suriname	----	----	----	----	----	----	----	436,935	----	
Svalbard (Norwegian)	----	----	----	----	----	----	----	2,756	----	
Swaziland	----	----	----	----	----	----	----	1,169,241	----	
Sweden	2001	15	39	15845	1256	1978 - 1995	yes	8,986,400	4	Dalalven, Klaralven, Torne
Switzerland	2003	7	31	103892	4561	1978 - 2002	yes	7,450,867	7	Po, Rhine & Meuse, Rhone
Syrian Arab Republic	----	----	----	----	----	----	----	18,016,874	----	
Taiwan	----	----	----	----	----	----	----	22,749,838	17	
Tajikistan	----	----	----	----	----	----	----	7,011,556	----	
Thailand	1997	7	54	5574	305	1978 - 1993	yes	64,865,523	38	Chao Phraya
Timor-Leste (East Timor)	----	----	----	----	----	----	----	1,019,252	----	
Togo	----	----	----	----	----	----	----	5,556,812	----	
Tokelau (New Zealand)	----	----	----	----	----	----	----	1,405	----	
Tonga	----	----	----	----	----	----	----	110,237	----	
Trinidad and Tobago	----	----	----	----	----	----	----	1,096,585	52	

Countries and Areas	Last Updated	No. of Stations	No. of Parameters	No. of Data Points	No. of Records	Temporal Coverage	Coverage by River Basin	Population	Network Readiness Index	Basin Name
Tunisia	----	7	15	681	70	1980 - 1982	no	9,974,722	40	
Turkey	2003	14	55	12072	1280	1971 - 2002	no	68,893,918	56	
Turkmenistan	----	----	----	----	----	----	----	4,863,169	----	
Turks & Caicos Islands (British)	----	----	----	----	----	----	----	19,956	----	
Tuvalu	----	----	----	----	----	----	----	11,468	----	
Uganda	----	17	21	2858	538	1978 - 1980	yes	26,404,543	80	Nile
Ukraine	----	----	----	----	----	----	----	47,732,079	78	
United Arab Emirates	----	----	----	----	----	----	----	2,523,915	----	
United Kingdom	2003	28	94	130527	6146	1980 - 1999	yes	60,270,708	15	Bann, Thames
United Republic of Tanzania	1994	9	47	2389	254	1978 - 1993	yes	36,588,225	71	Congo, Nile
United States of America	2004	516	72	61377	8063	1976 - 1997	yes	293,027,571	1	Alabama & Tombigbee, Colorado, Columbia, Hudson, Mississippi, Rio Grande, Sacramento, St. Lawrence, Susquehanna
Uruguay	1994	5	38	3525	156	1981 - 1987	yes	3,399,237	54	Uruguay
Uzbekistan	----	----	----	----	----	----	----	26,410,416	----	
Vanuatu	----	----	----	----	----	----	----	202,609	----	
Venezuela	----	----	----	----	----	----	----	25,017,387	72	
Viet Nam	2002	52	22	84213	4765	1985 - 1995	yes	82,689,518	68	Mekong
Virgin Islands (USA)	2002	----	----	----	----	----	----	108,775	----	
Wake Island (USA)	----	----	----	----	----	----	----	----	----	
Wallis & Futuna (French)	----	----	----	----	----	----	----	15,880	----	
Yemen	----	----	----	----	----	----	----	20,024,867	----	
Zambia	2004	----	----	----	----	----	----	10,462,436	85	
Zimbabwe	2004	----	----	----	----	----	----	12,671,860	95	
TOTALS	----	1544	----	2296814	----	1965 - 2004	----	6,378,903,469	----	

The Networked Readiness Index (NRI) is defined as a nation's or community's degree of preparation to participate in and benefit from information and communication technology (ICT) developments. *World Economic Forum 2004.*

Percent Change of Nitrogen, Nitrate + Nitrite in Selected 82 Watersheds





<http://www.gemswater.org>

c/o National Water Research Institute
867 Lakeshore Road
Burlington, Ontario, L7R 4A6 CANADA
tel: 1.905.336.4919
fax: 1.905.336.4582
email: gems@ec.gc.ca

<http://www.unep.org>

Vision

The only global water quality monitoring and assessment programme, recognized for providing credible scientific information on the state of the world's water quality.

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.

Strategic Goal

Leadership in providing reliable global water quality data to improve decision-making for a healthy planet.

Mission of the United Nations Environment Programme

Is to provide leadership and encourage partnership in caring for the environment by inspiring, informing, and enabling nations and peoples to improve their quality of life without compromising that of future generations <http://www.unep.org>

Vision of UNEP Division of Early Warning and Assessment

Data, information and knowledge about environmental change and environmental trends are readily available to present and future generations in order to foster the broader societal goals of peace and security, development, and human rights and democracy.