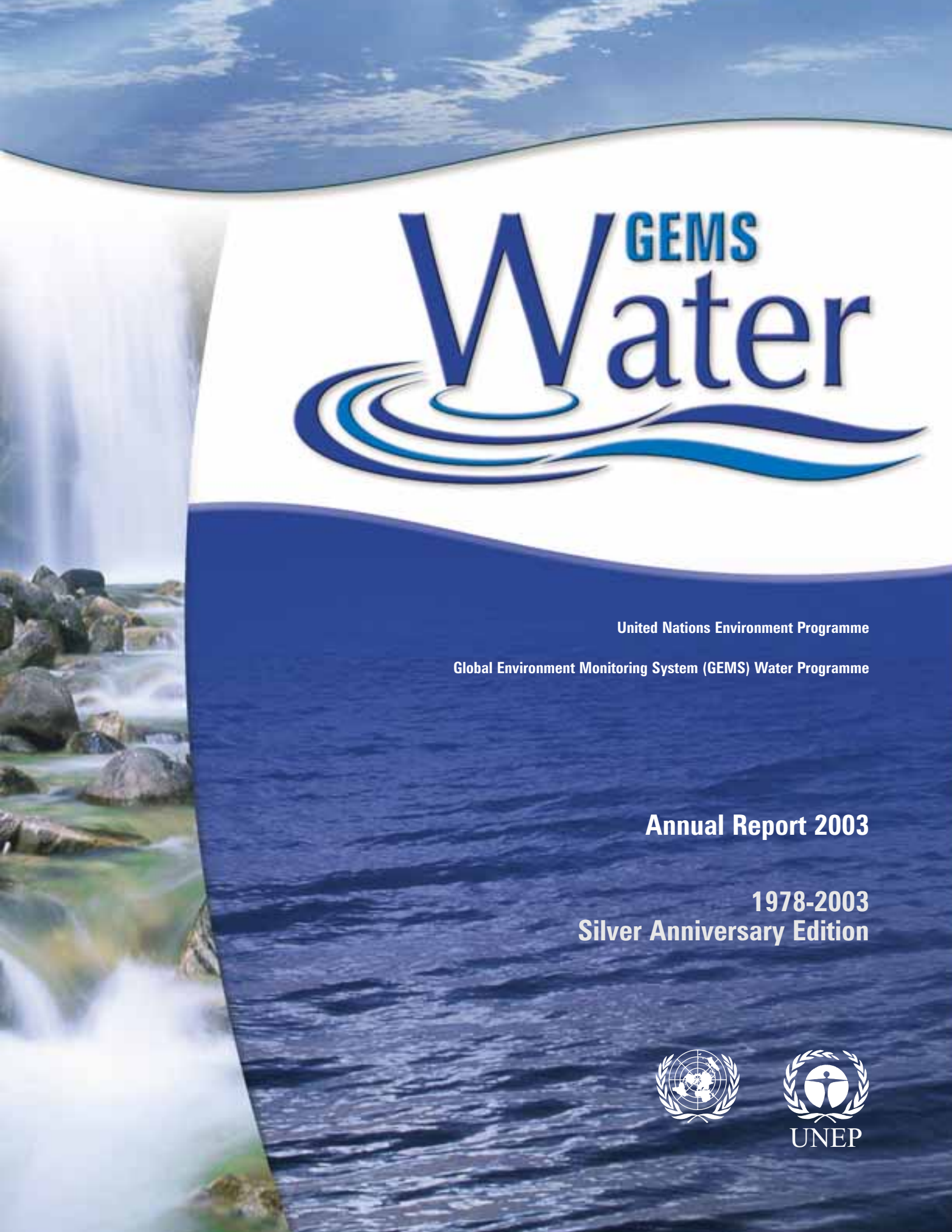

GEMS Water

United Nations Environment Programme

Global Environment Monitoring System (GEMS) Water Programme

Annual Report 2003

1978-2003
Silver Anniversary Edition

UNEP

UNEP GEMS/Water Programme

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.

Annual Report 2003

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GEMS Water

UNEP

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Message from Executive Director of UNEP

I am pleased to note that 2003 marked the 25th anniversary of the UNEP GEMS/Water Programme. Looking forward, there is much work that needs to be done. The world community has agreed to halve, by 2015, the proportion of people living without adequate sanitation and to halve the proportion of people without access to safe drinking water. The target of putting national integrated water resource management plans in place by 2005, is one step towards water and environmental sustainability. The recently declared International Decade for Action "Water for Life" 2005-2015, offers an exciting framework with which the targets and goals can be implemented.

An estimated 1.4 billion people lack safe drinking water, and about two thirds of the world's population could face shortages of clean fresh water by the year 2025. Over 3.3 billion cases of human illnesses and 5.4 million deaths per year are predicted to occur due to poor quality water. Half the world's hospital beds are occupied by people with water-related diseases. Lack of drinking water or adequate sanitation kills 1.7 million people a year, and 90 per cent of them are children.

UNEP GEMS/Water is making a contribution to solving these problems. UNEP offers a number of tools- all hinged on science, assessment and policy linkages- to address water and sanitation issues and the global decline in freshwater quantity and quality. Because of the fundamental relationship between water quality and health, I am pleased that GEMS/Water is in the process of providing data on human pathogens in aquatic ecosystems.

There is general consensus that the scientific basis of UNEP assessment activities needs to be strengthened, and that sound assessments must be based on reliable data. For water quality issues, data quality and quantity need to be improved. A key challenge, particularly in developing countries, is to improve the collection, management, analysis and sharing of reliable water quality data through innovative, cost-effective approaches, enabling countries to manage their water resources better and to participate effectively in international environmental assessments.

A few months ago, UNEP convened the first GEMS/Water Technical Advisory Group meeting focused on improving global water quality monitoring. The recommendations arising from the meeting have influenced GEMS/Water's key activities.

This report reviews UNEP GEMS/Water's efforts over the past year to broaden global data coverage, to improve collection and analysis methods, to promote appropriate approaches and technologies, to contribute to assessments of environmental conditions and threats, and to keep aquatic environmental protection firmly established on the international development agenda. A common thread connects these core activities: the global quest for healthy and sustainable water resources. Judging by the activities in this report, the role of UNEP GEMS/Water – the UN system's centre for water quality, and a key collaborator with the UN water community – will grow even more important in the years ahead as the world wrestles with the increasingly urgent challenge of doing more to protect the water resources on which all humankind depends.

Dr. Klaus Töpfer

Introduction by Director, GEMS/Water Programme

At the World Summit on Sustainable Development in Johannesburg, our main sponsoring country, Canada, issued a friendly challenge: that 35 new countries should join our programme before the end of 2007. I am pleased that since 2002, six countries have begun to participate in global core data collection and data quality activities. Many other countries have renewed their participation. These governments realize that their ability to implement their international water commitments, including the Millennium Development Goals, depends on strong ability to measure and monitor their achievement. A summary of the country participation in GEMS/Water global water quality monitoring is listed at the back of this report.

To enable countries to participate effectively, we offer tailor-made training and capacity building initiatives. Over the past 25 years, GEMS/Water has enjoyed being a partner in helping many monitoring institutions in many countries attain an impressive level of scientific excellence. We must focus on the areas which need the most attention: building monitoring networks across Sub-Saharan Africa, Central Asia, Small Island Developing States, and parts of Latin America. With greater capacity for full and active participation in global monitoring activities, global assessment and early warning will become more rigorous and policy relevant.

This past year, we re-focused our mission and goals, as well as our core business areas. This strengthened strategic direction is helping us to address chronic challenges of quantity, quality and availability of data, and to help us contribute to the broader community as much as possible. For example, in areas where large-scale water quality monitoring infrastructure is not feasible, resources should be channeled to low-cost alternatives and new technologies. Another new directive is to strengthen efforts to develop water quality indicators and other measures, within the context of other indicator initiatives, such as the World Water Assessment Programme.

Strong and meaningful linkages with the UN family are central to the future success of GEMS/Water projects. The ability to respond to the information needs of our UNEP counterparts, such as the GPA, UCC-Water, IETC, and others, is a priority. At the UN system-wide level, our activities are mutually supportive with those of IAEA, UNESCO, WMO, WHO, CSD, UN-Water, and others. Some of our collaborations are highlighted in this report. The GEMS/Water Steering Committee and Technical Advisory Group are acknowledged for their leadership in helping to foster such cooperative actions.

The greatest contribution that we can make at the present is historical and trend analysis, using our 25 years of water quality data. It has been said that, "the farther one looks back, the farther one can see ahead." In looking ahead I envision that GEMS/Water will increasingly play an important role in the international sustainable development agenda, much more than it has in the past. Such a vision depends on all countries supporting global data collection and assessments.

Dr. Richard D. Robarts

Milestones

1972	Creation of Global Environment Monitoring System (GEMS) under the United Nations Conference on Environment and Development (UNCED)
1978	Establishment of GEMS/Water at NWRI, Canada, and first year of activity jointly implemented by WHO, WMO, UNESCO, and UNEP
1992	Agenda 21, Chapters 18 and 40 call to action for governments to participate in GEMS/Water data and information activities
1998	Collaborative MoU with WMO-Global Runoff Data Centre (GRDC)
2000	GEMS/Water-Japan formally established at the National Institute for Environmental Studies, (NIES) Japan
2000	Formal GEMS/Water Programme Review
2001	Approval of Water Policy and Strategy of UNEP
2002	Johnnesburg MoU creating the UN GEMS/Water Programme Office and UNEP General Trust Fund
2003	25th Anniversary

"GEMS/Water is like a fine Bordeaux - it has the advantage of age, with 25 years of rich water quality data"

Dr. Michel Meybeck, IGBP water group

Agenda 21 Chapters 18 and 40 highlight the role for GEMS/Water with a call to action for "All States … to participate, as far as appropriate, in international water quality monitoring and management programmes such as GEMS/Water, [which] should be oriented towards water-quality of developing countries. … Institutional capacity to integrate environment and development and to develop relevant indicators is lacking at both the national and international levels. Existing institutions and programmes such as GEMS … will need to be considerably strengthened."

WaterYear2003

Corporate Update

UNEP continued to increase its capacity to address water quality issues in 2003 with the strengthening of GEMS/Water Programme. In cooperation with several United Nations agencies and other organisations, GEMS/Water is monitoring, assessing and building capacity around the world. A new GEMS/Water strategy to make the network more useful to the UN system as a whole was launched at WSSD and presented to the annual UN agencies meeting on water at The Hague in October 2002. Towards the close of 2003, the GEMS/Water Steering Committee took stock of progress made during the year, guided by a strategic planning process.

The strategic plan identifies five strategic priorities to strengthen both activities and mandate: global coverage; data access for users; key linkages in the UN family; data quality; and financial resources.

The 2003 re-focusing exercise was designed to reflect the evolving *UNEP Water Policy and Strategy*, UNEP Science Initiative, the international water agenda and intergovernmental priorities, such as the Millennium goals, CSD-12 work, governance, and others. In the lead up to the Decade for Action launch in 2005, the strategic plan will likely become an evergreen guide.

There have been several organizational successes achieved over the past year. Results include a new multilingual website, twice-annual newsletter, and media coverage. As illustrated in this report, core operational activities continue to concentrate on strengthening key data issues: geospatial coverage, timeliness of submissions, current information, data access, linkages with UN family for data needs, and technical tools. These and other scientific issues are detailed in the first *Technical Advisory Paper No. 1: Improving Global Water Quality Monitoring*.

Look for in 2004:

- youth-driven activities
- gender-and-development linkages
- strategic partnerships with NGOs, academia and private sector.

GPA Global Programme of Action for the Protection of the Marine Environment from Land-based Activities

UNEP Collaborating Centre on Water and Environment

UCC-Water

Year in Review: Global Water Quality Database

Increasing Global Data Coverage

Region	Number of Stations	Number of Data Points	Physical/ Chemical	Major Ions	Metals	Nutrients	Organic Contaminants	Microbiology	Date Range
Africa	74	12 287	2 024	3 921	970	1 914	4	339	1978-2000
Americas	114	182 852	33 269	35 320	31 316	27 224	3 593	9 389	1976-1999
W. Asia	81	62 094	13 181	16 798	10 691	10 333	366	3 150	1979-2003
Europe	296	815 759	140 836	132 720	145 457	107 930	13 036	24 401	1971-2002
S.E. Asia	189	362 937	84 619	109 300	20 148	58 681	267	18 337	1978-2002
W. Asia/Pacific	148	408 807	63 206	45 587	55 229	73 692	6 649	10 624	1979-2003
Total	**902**	**1 844 736**	**337 135**	**343 646**	**263 811**	**279 774**	**23 915**	**66 240**	**1971-2003**

200 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 6,395 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.

Pathogens 1 Database: Water Quality and Health

A new pathogens database, with data from the United States government, was published in phases over the year. Pathogens are disease-causing microorganisms that can enter water supplies from sources like municipal wastewater and agricultural wastes. Pathogens in surface or groundwater pose a threat to public health, and affect aquatic ecosystem health and biodiversity.

Pathogens 1 aims to provide a baseline dataset on more than 74 known factors that cause disease and death, that are transmitted in water. The data were collected from 500 treatment plants in 290 regions in the United States. The baseline data can be compared with information obtained locally and used as a "yardstick" for other drinking water treatment facilities. This means that communities around the world can find out with greater certainty how clean their water is. This knowledge can be used in turn to determine the most appropriate methods to treat water and to monitor human health impacts.

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:

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

The Global Water Quality Database has over 100 parameters covering chemicals, organics, metals, ions, and biota.

Participating agencies use the GEMS/Water Operational Guide to plan and implement national focal points for data collection and laboratories.

Looking ahead:

- more POPs data
- new technologies and data collection approaches
- broader data sources.

WHO

FAO

Before governments can address water-related environmental problems, they must have accurate information: they need to know precisely what the problem is, where it is occurring, how serious it is, and what is causing it. Such information is necessary for determining cost-effective and lasting solutions to water-related problems. UNEP's goal is to provide better quantitative pictures of current water-quality conditions and trends in water quality and water uses, and to facilitate the identification of emerging issues and future priorities.

-- UNEP Water Policy and Strategy UNEP/GC.22/INF/35

Year in Review: Data Quality (QA/QC) and Technical Tools

Launch of 5th Laboratory Evaluation and Review

In November, water monitoring laboratories around the world were invited to participate in a new performance evaluation, dubbed PE No. 5, an iterative, five-year process. The main purpose of the exercise is to ensure validity of, and comparability between, water quality datasets, which are required for global assessments. The new study has improved over previous ones by being more comprehensive, with more parameters and participants. Plans for subsequent studies include progressive increases in scope and participation each year up to 2008. Target analytes for PE No. 5 cover minerals, nutrients, pH and demand analyses. Additional test samples for solids, metals, and pesticides will be available in future studies. The results of the 5th study will be published in 2004, and will include individual performance reports to help laboratories improve their own analytical capabilities. The International Atomic Energy Agency (IAEA) contributed funding to enable the participation of 15 developing countries.

IAEA
International Atomic Energy Agency

Flux Calculations for Arctic Monitoring

At the request of the Arctic Monitoring Assessment Programme (AMAP), GEMS/Water visited the Regional Centre for Monitoring of the Arctic, in St. Petersburg, early last year. The centre is a primary laboratory for analyzing Persistent Toxic Substances (PTS) in northern Russia, and the project aimed to compute fluxes of PTS from the Pechora and Yenisey rivers discharging to the Arctic Ocean. GEMS/Water provided detailed information on computational algorithms and procedures for quantitative estimation of fluxes to the RCMA. A joint report was the main project output.

Evaluation for the Panama Canal Authority

At the beginning of the year, GEMS/Water specialists finalized a comprehensive review of the Panama Canal Authority (ACP) water quality laboratory and its operational programme. The main goal of the three-week long on-site assessment was to assist in the process of developing improved structures, strategies, and procedures for the benefit of the people of the Panama Canal watershed. This goal was realized by on-site observations and in-depth analysis of water quality monitoring and related operations. The final 80-page report includes 25 recommendations and advice designed to help the ACP fulfill its mandate of conservation and stewardship of the canal watershed. The ACP was very pleased with the evaluation report. The evaluation is a tool for staff learning, and implementing the recommendations will help improve both the laboratory and the field operations. The exercise can be recommended to other governments and watershed authorities.

Forthcoming Analytical Methods for Water Quality Monitoring

This is a "must have" reference resource for any water quality specialist. It aims to document environmental analytical methodology used for water quality testing. The main advantage of the book is that it can be used to check validity and comparability of water quality data, thereby improving reliability of assessments using those data. Complete in one volume, it includes input from over 40 governments around the world, and includes radioisotope methodologies from the International Atomic Energy Agency (IAEA).

With this information, difficulties can be uncovered and the precision, accuracy, efficiency and costs of methods used in different laboratories can be compared. In this way, the book addresses the need to identify and standardize laboratory methodologies.

Year in Review: Global Water Assessments

UNEP's Assessment Activities

UNEP has a major role to play in the areas of, first, freshwater assessments (including freshwater, coastal and marine waters); second, integrated water resource management, including protection of human-valued ecosystems; and also, protection of water quality. Accordingly, GEMS/Water has an important role to play in providing data and information as input to water and environment assessments and reports.

The Millennium Development Goals and the Plan of Implementation of the World Summit on Sustainable Development provide the basis for new types of assessments, focusing on such areas as sanitation, water situations in an increasingly urbanizing world and others. Over the past year, GEMS/Water has participated in a few assessment activities, including UNEP's GEO Yearbook.

There are collaborations within the UNEP Secretariat, including but not limited to the GEO, Water Policy, GRID-Arendal, DEWA-NA, as well as within the UNEP water family, such as UCC-Water, and GPA, in which GEMS/Water provides water quality information. There are regional initiatives, for example with ILEC on African lakes; the Vulnerability of African water resources to environmental change Study, and a new study of the Mekong River.

Looking ahead:

- groundwater vulnerability in Bangladesh
- linkages to marine assessments
- indicators development
- identifying emerging issues.

UNEP study "Vulnerability of Water Resources to Environmental Change in Africa"

Freshwater water quality, quantity and security became major international issues on the agenda of the African Ministerial Conference on Water and related events. Fifty years ago, there was four times more water for each African than there are today. Changes in the quantity and quality of water resources are arguably the most important environmental change issue in Africa, particularly to the arid and semi-arid regions. The results of the vulnerability assessment intend to provide a basis for identifying paths towards integrated water resources management and thus, sustainable use and equitable allocation of water resources in Africa.

The study will move into its second phase in 2004, with the aim of producing a comprehensive statistical analysis of the state of water sources, the impact of extreme events; and identify hotspots and emerging issues across the African continent. With the GEMS/Water Programme coordinating, partners include the Pan-African START Secretariat, the International Geosphere-Biosphere Programme, UNEP and UNESCO. All African Governments were invited to participate.

World Water Assessment Programme

Why do we need global water quality monitoring?

For accurate assessments of the nature and magnitude of water problems in order to prepare for proper policy actions at the international level (UNEP, CSD, MEAs). Some water quality aspects are strongly connected with global issues, for example the nutrient impairment among regions stems from the uneven distribution of demand for, and supply of, food. At the regional level, assessment of the consequences of large-scale development projects for the aquatic environment, and assessments of the impairment of demand and supply, both in time and place. Possible solutions must be obtained in regional agreements and conventions. Water aspects sometimes have a regional component, but regionally different approaches still need a common reference point.

-- UNEP DEIA & EW Technical Report No. 3

South Africa Orientation at GEMS/Water Headquarters

In 2002, South Africa began participating in GEMS/Water, the first country in the South African region. To help implement the new GEMS/Water-South Africa, representatives from the Department of Water Affairs and Forestry visited the Burlington facilities. The visit offered the opportunity to design a data acquisition network that will supply relevant and reliable data, and the submission of data into the GEMS/Water database. South Africa has designated 19 water management areas covering the nine provinces. Catchment management agencies in each region monitor and analyze surface water for a comprehensive set of water quality constituents under five monitoring programs. South Africa also has four national laboratories, which are interested in participating in the QA/QC activities. The visitors were interested in the operations of Canada's National Laboratory for Environmental Testing.

Rotating Flume at NWRI

Training Initiatives with UNESCO

Extensive collaborative partnerships are undertaken under the auspices of UNESCO. The largest activity area involves training with UNESCO-IHP. There are also the International Sedimentation Initiative, the Ecohydrology programme, and the International Science Initiative, all with UNESCO.

UNEP's partner, the International Environmental Technology Centre (IETC), continued to promote the transfer of environmentally sound technologies for freshwater management in 2003. One highlight was the 2nd Asia-Pacific Training Workshop in Ecohydrology: integrating ecohydrology and phytotechnology into workplans of government, private and multinational companies. The workshop was held in several cities and field sites in Indonesia in July, 2003, and brought together twenty-six students from 11 Asia-Pacific countries participated in the workshop. This workshop is one of a series that is supported under the UNESCO IHP VI Ecohydrology and UNEP IETC Phytotechnologies projects. GEMS/Water participated in the UNESCO-MAB and IHP-Ecohydrology workshop on 'Ecohydrology: from theory to action: Incorporation of pilot/demonstration projects in MAB biosphere reserves, wetland sites of international importance and other selected sites in Wierzba, Poland in May 2003. All the courses are designed to give students from developing countries an overview of integrated water resources management, from the catchment to the sea, and the application of ecohydrological principles and phytotechnologies in IWRM.

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

GEMS/Water-Japan and the Kasetsart University are leading a new regional capacity building initiative focused on the Mekong River. The first workshop was held in December, to kick-off regional presence for GEMS/Water in the Mekong region. Participants in the project include governments of countries which share the Mekong, China, Thailand, Laos, Cambodia and Vietnam, and other local authorities such as the Mekong River Commission. Links with private sector partners, in particular Horiba, will contribute to the technical strength of the initiative.

The project aims to provide a new water quality 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.

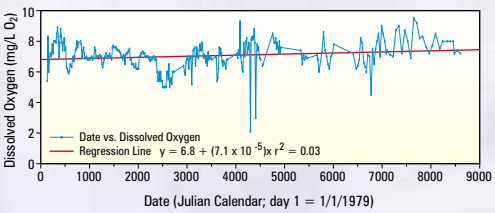
Sedimentation Training in Central America

The Research Centre on Water Resources at the National University of Nicaragua, the Institute of Nicaraguan Territorial Studies, and the Centre for Research on Contaminated Environments of the University of Costa Rica, took the GEMS/Water course "Suspended Sediment Sampling for Water Quality Management" in March 2003. The one-week course uses theory, practice and technology transfer to convey program design, suspended sediment transport, spatial and temporal variability, contaminant interactions, measurements, loads and planning a field campaign. Theoretical sessions are followed by hands-on work at a river site, and at a laboratory. After completing the course, participants planed to implement their San Juan River Basin Project, which seeks to carry out a program of work that will permit the development of a Strategic Action Plan for the long-term development and management of the river basin and its coastal zone. This includes a mass balance characterization of Lake Nicaragua, the largest freshwater lake in Central America.

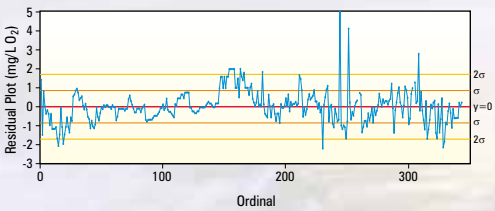
Look for in 2004:

- priority on developing countries
- promotion of new course modules
- new training tools.

Pakistan Date vs. Dissolved Oxygen (08101)
Station 056003



Residual Plot
Pakistan Station 056003 - Dissolved Oxygen (08101)



Financial Status

As GEMS/Water is functionally part of UNEP, it does not have legal status, but relies on 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 2004. Nevertheless, the current positive trend needs to be further strengthened to ensure the successful implementation of GEMS/Water's 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 2004-2005 programme of work, GEMS/Water still needs increased contributions from a broader donor base. GEMS/Water is planning to achieve this by building new strategic partnerships, ensuring good quality products, and strengthening local activities.

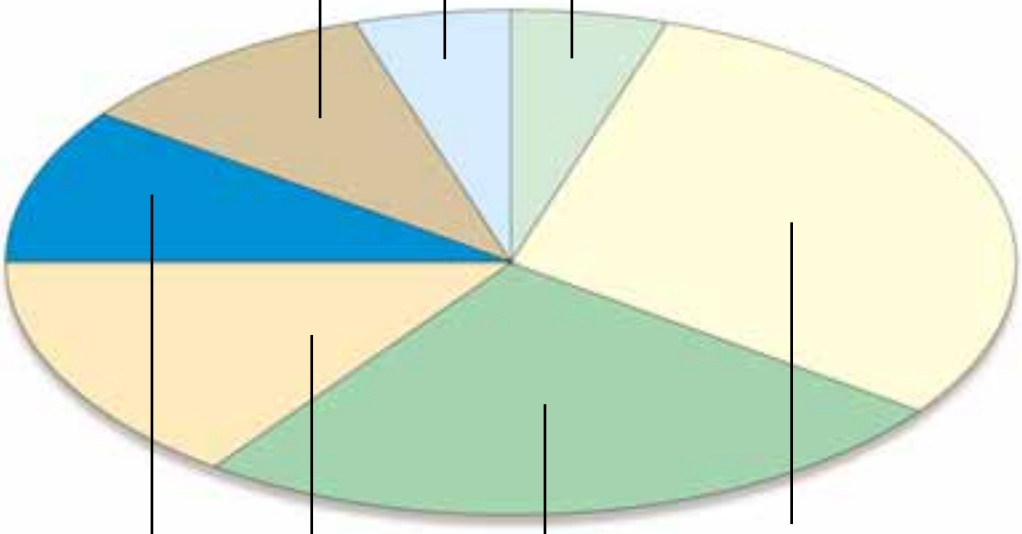
Financial resources have been gratefully received from sources listed below.

Funds & Resources Summary

Source	**Amount ($US) 2002**	**Amount ($US) 2003**	**Amount ($US) 2004**
In-Kind *(approx.)*			*forecast*
NWRI -Environment Canada	$ 30,000	$ 30,000	$ 30,000
	$ 220,000	$ 230,000	$ 230,000
GEMS/Water Japan	n/a	$15,000	n/a
Sub -total	**$ 250,000**	**$ 275,000**	**$ 260,000**
	Amount ($US) 2002	**Amount ($US) 2003**	**Amount ($US) 2004**
Core Funds			*forecast*
Canada – DFA	$100,000	$115,000	$115,000
General Trust Fund	$300,000	$385,000	$385,000
UNEP - Secretariat	$50,000	$50,000	$50,000
Special Projects			*estimate*
IAEA	—	$ 15,000	—
UNESCO-IHP		$ 15,000	$ 15,000
Panama Canal Authority	$30,000	n/a	n/a
University of Nicaragua Water Resources Research Centre	n/a	$ 7,000	n/a
ILEC	$ 5,000	$ 5,000	$ 5,000
OCETA			tbd.
Auditor General of Canada	—	$ 7,000	—
New Initiatives for 2004	—	$ 7,000	$150,000
Sub-total	**$ 485,000**	**$ 599,000**	**$ 570,000**
Total per Year	**$ 735,000**	**$874,000**	**$ 980,000**

Investment Income & Resources

Snapshot on Spending (all funding and in-kind allocations)



5% **Training and Capacity Building:**
Water in IWRM course series;
on-site training

10% **Organization:**
coordination with UN,
technological support,
staff training and development,
administration

5% **Communications:**
Publications, documentation, website

10% **Raising Awareness:**
Media work, presentations,
international meetings, displays

30% **Global Water Quality Database:**
Data gathering; coordination and
outreach with National Focal Points

25% **QA/QC:**
Technical Materials and
support for quality assurance,
coordination with laboratories

15% **Assessments and Interagency Activities:**
Contributions to the UNEP family,
UN extended family,
and other international organizations

Technical Advisory Group with GEMS/Water staff at Burlington offices

Participation With Other Agencies

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

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

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

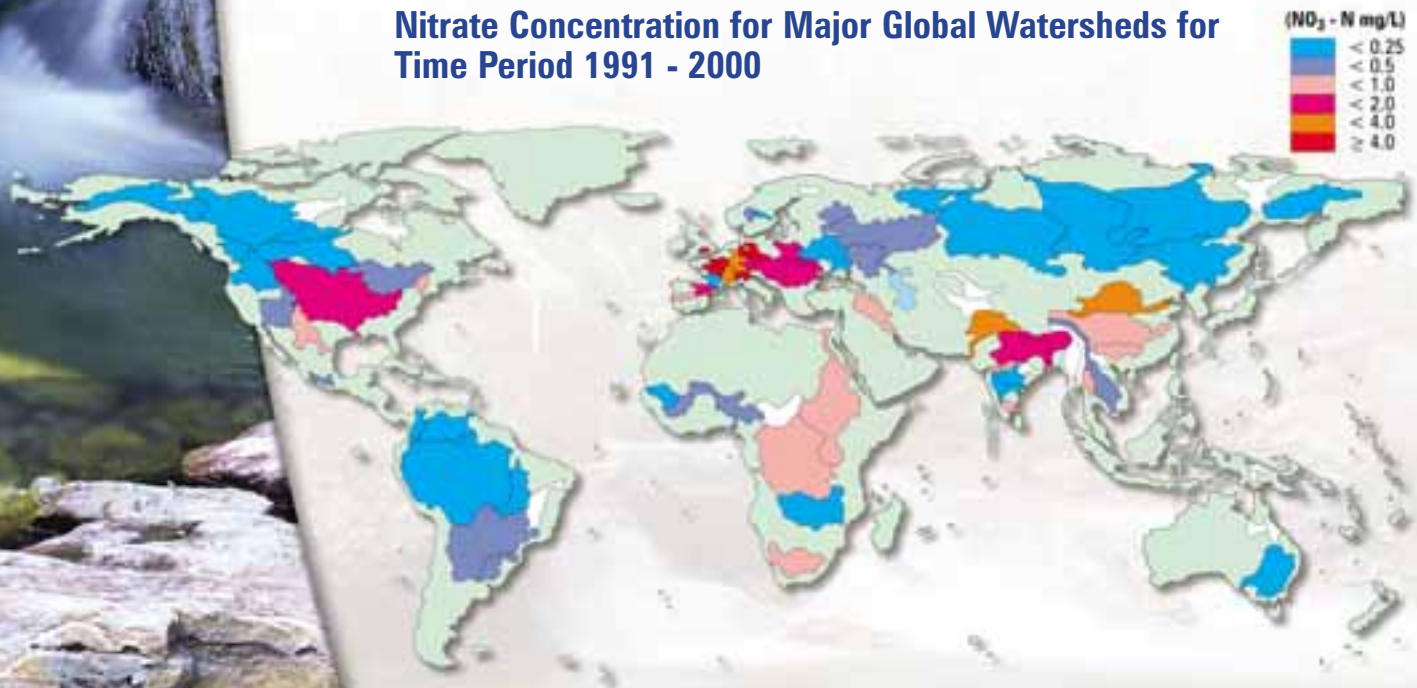
Editor, SILNEWS, newsletter of Societas Internationalis Limnologiae

Associate Editor, Canadian Journal of Fisheries and Aquatic Sciences

Science and Technology Advisor, LakeNet

Co-editor, UNESCO Ecohydrology & Hydrobiology.

Nitrate Concentration for Major Global Watersheds for Time Period 1991 - 2000



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Statistical Summary of Country Participation

as of January, 2004

Countries and Areas	Last Updated	No. of Stations	No. of Parameters	No. of Data Points	No. of Records	Temporal Coverage
Afghanistan						
Albania						
Algeria						
American Samoa	2002					
Andorra						
Angola						
Anguilla						
Antarctica						
Antigua and Barbuda						
Argentina	2000	12	84	9581	787	1979 - 1999
Armenia						
Aruba						
Ashmore & Cartier Islands (Australian)						
Australia		11	92	18483	1919	1979 - 1987
Austria	2000	6	15	612	57	1995 - 1996
Azerbaijan						
Bahamas, The						
Bahrain						
Baker & Howland Islands						
Bangladesh	1998	9	19	4446	438	1979 - 1995
Barbados						
Belarus						
Belgium	1997	14	86	41868	1255	1978 - 1992
Belize						
Benin						
Bermuda						
Bhutan						
Bolivia		2	21	625	33	1979 - 1982
Bosnia and Herzegovina						
Botswana						
Bouvet Island (Norwegian)						
Brazil	1994	12	67	15805	916	1979 - 1990
British Indian Ocean Territory (British)						
British Virgin Islands (British)						
Brunei Darussalam						
Bulgaria						
Burkina Faso						
Burundi		1				
Cambodia	2001	5	18	1739	100	1993 - 1995
Cameroon						
Canada	1999	17	107	46355	2384	1979 - 1997
Cape Verde						
Cayman Islands (British)						
Central African Republic						
Chad						
Chile		3	36	4498	291	1979 - 1988
China	2003	12	100	41173	1619	1980 - 1997
Christmas Island						
Cocos Islands (Australian)						
Colombia		3	52	1409	72	1981 - 1988
Comoros						
Congo						
Cook Islands (New Zealand)						
Coral Sea Islands (Australian)						
Costa Rica						
Côte d'Ivoire						
Croatia						
Cuba	1996	3	34	359	18	1993 - 1995
Cyprus						
Czech Republic						
Democratic Republic of the Congo		1	16	16	1	1984
Denmark	2001	6	17	3335	617	1979 - 1996
Djibouti						
Dominica						
Dominican Republic						

Countries and Areas	Last Updated	No. of Stations	No. of Parameters	No. of Data Points	No. of Records	Temporal Coverage
Ecuador	1997	3	32	1419	73	1979 - 1986
Egypt		10	15	2284	210	1979 - 1980
El Salvador						
Equatorial Guinea						
Eritrea						
Estonia						
Ethiopia						
Faeroe Islands (British)						
Falkland Islands (British)						
Fiji	1994	1	20	2064	208	1980 - 1988
Finland	2002	12	68	12488	1796	1979 - 1998
France	2002	20	50	71014	4856	1979 - 1996
French Guiana (French)						
French Polynesia (French)						
Gabon						
Gambia,The						
Georgia						
Germany	2002	20	50	34791	3273	1979 - 1995
Ghana	1997	4	42	2127	208	1991 - 1995
Gibraltar (British)						
Greece	2000	6	14	3385	482	1990 - 1995
Greenland (Denmark)						
Grenada						
Guadeloupe (French)						
Guam (USA)						
Guatemala		4	14	459	33	1981 - 1982
Guernsey (British)						
Guinea						
Guinea-Bissau						
Guyana						
Haiti						
Heard & MacDonald Islands (Australia)						
Honduras						
Hong Kong	2003	2	18	3045	290	1979 - 2003
Hungary	2000	4	71	15513	671	1979 - 1996
Iceland						
India	2004	72	28	206576	10155	1978 - 2002
Indonesia	1993	22	63	30712	906	1979 - 1994
Iran	1993	20	34	6159	463	1980 - 1992
Iraq		10				
Ireland	2001	4	18	4249	401	1979 - 1996
Isle of Man (British)						
Israel		2	37	5141	305	1980 - 1981
Italy	2000	16	21	10352	1051	1979 - 1995
Jamaica						
Jan Mayen (Norwegian)						
Japan	2004	27	270	135202	5494	1979 - 2000
Jarvis Island (USA)						
Jersey (British)						
Johnston Atoll (USA)						
Jordan	2000	4	59	893	48	1987 - 1999
Kazakhstan						
Kenya		11	56	2524	242	1977 - 1988
Kingman Reef (USA)						
Kiribati						
Korea	2003	1	39	8557	439	1982 - 2002
Kuwait		2				
Kyrgyzstan						
Laos	2001	15	21	28872	1502	1985 - 1995
Latvia						
Lebanon						
Lesotho						
Liberia						
Libya		5				
Liechtenstein						

Countries and Areas	Last Updated	No. of Stations	No. of Parameters	No. of Data Points	No. of Records	Temporal Coverage
Lithuania	2002	4	36	1207	41	1991 - 2001
Luxembourg	2000	1	20	1158	101	1979 - 1995
Macao (China)						
Macedonia						
Madagascar						
Malawi						
Malaysia	1994	8	80	13723	641	1979 - 1992
Maldives						
Mali	1997	11	34	1596	81	1987 - 1996
Malta						
Marshall Islands (USA)						
Martinique (French)						
Mauritania						
Mauritius						
Mayotte (French)						
Mexico	1998	16	91	32398	2157	1979 - 1996
Micronesia, Federated States of						
Midway Islands (USA)						
Monaco						
Mongolia						
Montserrat (British)						
Morocco (Maroc)	2001	8	75	15021	607	1985 - 1999
Mozambique						
Myanmar						
Namibia						
Nauru						
Navassa Island (USA)						
Nepal		3				
Netherland Antilles (Netherlands)						
Netherlands	1996	15	74	111554	16182	1979 - 1996
New Caledonia (French)						
New Zealand	2000	81	87	182521	8798	1979 - 1997
Nicaragua						
Niger		9				
Nigeria						
Niue (New Zealand)						
Norfolk Island (Australian)						
North Korea						
Northern Mariana Islands (USA)						
Norway	1996	18	39	8473	696	1981 - 1993
Oman						
Pakistan	2004	7	65	32633	1554	1979 - 2003
Palau						
Palestine						
Palmyra Atoll (USA)						
Panama		3	33	4149	180	1979 - 1996
Papua New Guinea		1	6	6	1	1979
Paracel Islands						
Paraguay						
Peru		10	27	893	58	1979 - 1983
Peter Island (Norwegian)						
Philippines	2000	4	56	4033	471	1979 - 1999
Pitcairn Islands (British)						
Poland	2002	8	70	61308	2112	1991 - 2000
Portugal	2001	13	66	17577	1245	1980 - 1994
Puerto Rico (USA)	2002					
Qatar						
Republic of Moldova						
Reunion (French)						
Romania						
Russian Federation	2004	42	39	132460	32036	1980 - 2002
Rwanda						
Saint Kitts and Nevis						
Saint Lucia						
Saint Vincent and the Grenadines						
Samoa						
San Marino						
Sao Tome and Principe						
Saudi Arabia		4				
Senegal	2001	11	55	777	59	1986 - 2000
Serbia and Montenegro						
Seychelles						
Sierra Leone						
Singapore						
Slovakia						
Slovenia						
Solomon Islands						
Somalia						
South Africa						
S. Georgian & S. Sandwich Islands (Br)						
Spain	2001	21	45	17145	1240	1979 - 1995
Spratly Islands						
Sri Lanka		4	9	805	97	1979 - 1980
St. Helena & Dependencies (British)						
St. Pierre & Miquelon (French)						
Sudan	1993	4	27	4423	241	1980 - 1992
Suriname						
Svalbard (Norwegian)						
Swaziland						
Sweden	2001	15	39	15845	1256	1978 - 1995
Switzerland	2003	7	31	103892	4561	1978 - 2002
Syrian Arab Republic						
Taiwan						
Tajikistan						
Thailand	1997	7	54	5574	305	1978 - 1993
Timor-Leste						
Togo						
Tokelau (New Zealand)						
Tonga						
Trinidad and Tobago						
Tunisia		7	15	681	70	1980 - 1982
Turkey *(note 1)*	2003	14	55	12072	1280	1971 - 2002
Turkmenistan						
Turks & Caicos Islands (British)						
Tuvalu						
Uganda	17		21	2858	538	1978 - 1980
Ukraine						
United Arab Emirates						
United Kingdom	2003	28	94	124320	6146	1980 - 1999
United Republic of Tanzania	1994	9	47	2389	254	1978 - 1993
United States of America	2002	21	72	61377	8063	1976 - 1997
Uruguay	1994	5	38	3525	156	1981 - 1987
Uzbekistan						
Vanuatu						
Vatican City						
Venezuela						
Vietnam	2002	52	22	84213	4765	1985 - 1995
Virgin Islands (USA)	2002					
Wake Island (USA)						
Wallis & Futuna (French)						
Yemen						
Zambia						
Zimbabwe						
TOTALS		**902**		**1844736**		

note 1: *dataset dates to 1971*

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