



2003

Vol. XV, Nos. 2, 3 & 4
\$15.00

Available in:
Arabic, English, Russian,
Spanish and Ukrainian

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World Ecology Report

Critical Issues in Health and the Environment

Knowledge brings new choices. Education brings new knowledge.

Special Issue

Twelfth International Conference on Health and Environment: Global Partners for Global Solutions

Executive Summary for the Twelfth International Conference on the theme of "Water and Health: Problems and Solutions", April 24th and 25th, 2003, United Nations, New York City

Organized by: World Information Transfer (WIT); Co-sponsored by: Government of Ukraine in cooperation with the United Nations Environment Programme

In marking the UN Year of Freshwater, World Information Transfer has assembled international experts from diverse backgrounds and provided a platform to promote positive change. These experts include medical doctors, epidemiologists, specialists from the United Nations and from governments, as well as citizen activists. The goal of WIT, in holding its 12th International Conference is to increase global knowledge and cooperation on the science based links between human health and environmental degradation.



Dr. Volodymyr Bebeshko, Director General, Scientific Center of Radiological Medicine of Ukraine; Dr. Christine K. Durbak, Chair and Founder, WIT; and Mr. Kenzo Oshima, United Nations Under-Secretary General for Humanitarian Affairs

photo: Irena Jarosewich, Svoboda Weekly



Carolyn Comitta, WIT Regional Director for North America (far left), and Dr. Claudia Strauss, Board of Directors (far right), with WIT interns.



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H. E. Valeriy P. Kuchinsky, Permanent Representative of Ukraine to the UN, said that water is central to poverty alleviation, economic development and increased life expectancy. The challenge facing Ukraine since Chornobyl* has been how to mitigate the residual effects of this catastrophe. It is also a challenge to the international community on its preparedness to deal with a multi-point disaster (ecological, technological and humanitarian) of such scope. The Ukrainian government commits 5-7% of its annual budget responding to the "Black Pain." More specifically, it has continued its priority to alleviate human suffering and promote economic recovery. Currently, the Chornobyl facility is under monitoring by international scientists, but upgrades are needed to increase safety measures and minimize radiation leakage. For the sake of future generations, the recovery efforts need concrete international support and cooperation because Chornobyl has global repercussions which require coordinated, active and continued global action.



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Statement by Dr. Adnan Amin, United Nations Environmental Programme (UNEP) Director, New York, represented by Mr. Werner Obermayer, Deputy Liaison, UNEP, New York, spoke on the relationship between human health and natural ecosystems. Water is an essential ingredient in the most crucial aspects of life, yet all over the world, freshwater is running dry and becoming more polluted. UNEP's strategy has been to combine assessment, management and coordination of actions to provide an integrated, comprehensive and dynamic approach to water issues. The underlying objective is to share water resources fairly for agriculture and industrial usage as well as for domestic consumption. UNEP believes that the poor should not have to pay proportionately more for scarce resources, both in terms of money and labor. UNEP also seeks to protect the environment, which is under continued threat. It is the environment that provides the foundation for the future availability of the Earth's most precious resource; water is indispensable as it enables people to lead a healthy life with dignity. Only through collective, continued actions can these goals be reached.



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H. E. Anwarul K. Chowdhury, United Nations, Under Secretary-General and High Representative for Least Developed Countries, Landlocked Developing Countries and Small Island Developing States. The World Summit on Sustainable Development in Johannesburg and the third World Forum on Water at

Kyoto have played important roles in casting the spotlight on water degradation, especially in the 41 least developed countries that are home to almost 10% of the world's population. Damming and other engineered projects harm the natural environment, damage inland fisheries which in turn causes contamination of the basic food that sustains local populations. The deterioration of water sources also increases diseases, such as dysentery and cholera. More broadly, improvements in water quality and human health are linked to poverty eradication. Enhancing the effectiveness of international and national policies is plainly needed. Governments should work towards the 7 commitments of the Brussels Programme of Action which represents a real chance for those most afflicted to "escape the ugly misery of poverty, ignorance and disease."



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Mr. Kenzo Oshima, UN Under-Secretary General for Humanitarian Affairs and UN Coordinator of International Cooperation on Chernobyl, explained the humanitarian aspect of the Chernobyl tragedy. That tragedy 17 years ago has continued to affect millions of inhabitants in parts of Russia, Belarus and, of course, Ukraine. The people of these poisoned lands have persevered under difficult circumstances in an effort to rebuild their communities and their lives. In the aftermath, the international community came together in a demonstration of humanity and fellowship. However, as time passed, the nature of the problems facing Chernobyl has also changed. UN Humanitarian Affairs found it necessary to alter its approach to tackle these problems. This reorientation of effort must involve empowerment of individuals and communities, and targeted assistance to the most affected people and localities. It calls for an enhanced role of development-oriented agencies such as UNDP, FAO, UNEP, UNSCER, WHO and the World Bank. Only through joint action will we be able to keep Chernobyl on the international agenda until the full range of humanitarian effects of the catastrophe are adequately addressed.



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Dr. Christine K. Durbak, Founder and Chair, World Information Transfer. Finite water resources continue to be a cause of great concern in the world today, and the situation will not improve if current trends persist. History is full of somber lessons regarding the consequences of misuse and mismanagement of water. Polluted water has indisputably damaged human health, although the full impact of contaminated water is still not altogether clear. Lack of access to safe water in developing and least

*Chornobyl-this is the Ukrainian spelling.

developed countries has led to millions of deaths from preventable water-related, waterborne diseases, as well as to the slow progress of development in certain areas. At the same time, it would be misleading to believe that water pollution and water scarcity affect only impoverished areas of the world. Developed nations from the Americas to Scandinavia, from Asia to Africa, face health problems related to water purity and security. Waterborne chemicals, including pesticides and trace elements such as mercury, accumulate over time and severely harm health. Such contaminants are also passed from mother to fetus, making the youngest members of society among its most vulnerable. It would be most imprudent if such problems were ignored and water conditions were allowed to deteriorate, but fortunately, countries all over the world have begun making progress towards addressing water-related health issues. Public-private partnerships, women's education and empowerment, and international cooperation are necessary to successfully address global health problems related to water.



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Mr. Jan Pronk, Chair, International Institute for Environment and Development; UN Secretary-General's Special Envoy for the World Summit on Sustainable Development. My first conclusion was

that an integrated approach to health, water and the other dimensions of sustainable development is necessary, but not sufficient. Poverty eradication requires that the poor themselves get the right to decide about the resources concerned. Second conclusion: The acceptance of the Millennium Development Goals, including on water and sanitation, is a major step forward. But it is not enough. We should focus also on the other half of poverty and not wait until 2015. Third conclusion: Household access to water is essential, but not enough. Access to sanitation is as essential, in order to improve human health. Fourth conclusion: We need a new agenda in the area of water and sanitation. Integrated Water Resource Development is good, but not good enough. Commercial privatization is no solution. Both have to be complimented by local community ownership in order to guarantee access by deprived parts of communities, which otherwise would be forgotten or excluded. These five conclusions are also essential in order to avoid a widening gap in terms of health between people with and without access to resources.



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Dr. Mark T. Olesnicky, President, Medical Society of New Jersey, explained the implications for New Jersey's water safety as threat levels, on the newly implemented Homeland Security Advisory System, change. The events of September 11,

2001, forced different levels of government to adopt an active role in protecting public utilities including protecting water sources from possible chemical, biological and radioactive contaminants. Because of its close proximity to New York, the state of New Jersey is considered a "viable target" for terrorism and its water supply a possible mark for sabotage. There are general and specific protective measures that authorities take up in response to such risks, from increasing security patrols and locking manholes to being on the lookout for possible usage of weapons of mass destruction. The dilution effect of large reservoirs and chlorination are also effective defenses. The Environmental Protection Agency has injected funds to make possible individual risk assessments. Dr. Olesnicky gave details of New Jersey's preparedness to protect its water resources



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Dr. Volodymyr Bebeshko, Director-General, Scientific Center of Radiological Medicine of Ukraine,

shared his findings on present-day effects of Chernobyl. That disaster was the worst nuclear accident to date. It fundamentally changed the way people perceive life, how they sustain themselves and the basic social fabric. Radiation after-effects disproportionately harm the rural underprivileged. Rivers tainted by radionuclides extend the damage by contaminating underground drinking water and soil, and eventually harmful elements such as cesium and strontium are ingested by humans and other organisms and cross contaminate. The delayed effects of the disaster go beyond radiation sicknesses to include psychological diseases. People involved in the cleanup as well as residents continue to suffer from the long-term effects of Chernobyl (various cancers are excessively high among such groups). River pollutants are only hastening the process. Cleanup is badly needed but costly and Ukraine's burden is unlikely to lighten in the foreseeable future. To paraphrase Secretary-General Annan, we would like to erase Chernobyl from memory, but can we?



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Mr. Jay Walker, Founder of Priceline and CEO of Walker Digital, spoke eloquently on the impact of the information age and its most visible ramification: the collapse of distance. Before 1850, 95% of Americans lived and died within 25 miles of their homes, and this is still true in some

parts of the world. As distance increases, people's emotional attachments to problems decrease. Mass media brings the effects of events all over the globe close to home. Radio, television, Internet, and cellular technology have helped to bridge the distance gap. In the process, these communication technologies have and continue to increase awareness about various problems and can play

an invaluable role in creating solutions. The collapse of distance resulting from technological advancement brings together people who NEED help with people who CAN help.



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Mr. Kalman Mizsei, United Nations Development Programme (UNDP) Deputy Coordinator of International Cooperation on Chernobyl, Assistant Administrator and Regional Director, represented by Ms. Gulton Turkoz-Cosslett, UNDP, Senior Program Manager & Team Leader for Europe & CIS, noted that

the 17th anniversary of the Chernobyl disaster was a time for remembrance and reassessment. Unfortunately, there remain many obstacles to regional recovery. The toxicity of the ecosystems of the entire area creates the potential for radionuclides to spread via flooding of the Dnieper River. Moreover, the psychological impact remains strong. The population needs transparent, reliable information regarding current radiation dangers to address ill-founded fears. Many who have suffered the aftermath of the Chernobyl accident are unemployed and underprivileged. Sustainable development must assure the commissioning and disseminating of scientific research findings to help the population and aid in long term policy planning.



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Ms. Vanessa Tobin, Chief of Water and Sanitation, UNICEF presented findings on the correlation between water, sanitation and children's

health. Water-related diseases are a major cause of death in children. An average person requires 40-50 liters of water per day to satisfy health and hygienic needs; currently many areas have great difficulty attaining even half of that. The crucial role sanitation plays is widely acknowledged, but the difficulty is how to implement sanitary practices without adequate water. UNICEF has been working on the following areas with some success: low cost techniques; education; a focus on the most marginalized populace; household water security; rapid reaction to emergencies; and improving facilities in schools. The new strategic focus is on satisfying community needs such as maintaining functional sanitation facilities to prevent diseases. UNICEF not only needs to continue to advocate for efficient monitoring and to present a balance of issues, but also to actively encourage the participation by medical professionals all over the world.



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Dr. Mitchell L. Gaynor, CEO, Gaynor Integrative Oncology, New York City, focused on both the environmental sources of cancer and prevention methods. Cancer does not spontaneously appear in the body, but is a result of gradual, decades-long development, often sparked by environmental pollutants from cigarette smoke, cement kilns, contaminated waterways, and pesticides. The potentially carcinogenic effects of these pollutants must be recognized and dealt with, especially when combined synergistically with other pollutants, or cancer rates will continue to dramatically rise. However, although one can hardly avoid many of these carcinogens, one can combat cancer on a more practical front. Dr. Gaynor suggests limiting dietary fat and consuming foods with natural cancer-fighting agents, including proto-inhibitors and phytoestrogens, found in green tea and soy products, and resveratrol, found in red grape skin. These act to slow the growth and metastasis of cancerous cells in the body. One can take preventative action against cancer by being aware of environmental conditions and of what one consumes. By actively embracing these measures, in addition to pursuing new treatments and cures, it will be possible to drastically reduce cancer rates for the next generation.

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Mr. Ron Good, Executive Director, Restore Hetch Hetchy, Walnut Creek, California, posed the question: why is Yosemite National Park a protected treasure while the picturesque Hetch Hetchy Valley, located on its periphery, is being logged and dammed? Hetch Hetchy Reservoir has been the lifeline of the San Francisco Bay Area since it was dammed in 1923. The battle that ensued, even until today, has centered around the balance between economic necessity and environmental preservation. The Restore Hetch Hetchy Project seeks a win-win solution for both sides of this debate through education, litigation and political activism. In the end, one needs to be continually cognizant of the costs of action versus inaction.

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Dr. Jerrold Ellner, Chair, Department of Medicine and Director, Center of Emerging Pathogens, University of Medicine and Dentistry of New Jersey. Dr. Ellner does not believe the public should panic over possible sabotage of water supply. Dilution, hydrolysis, microbes and activation all make

such attempts a daunting challenge. Public perception over perceived water vulnerability warranted governmental and political responses focused on heightening detection, surveillance and response to reassure the public. Although this information may seem to be good news, it is still possible to contaminate the water supply with the

sole intention of causing panic. The current lack of successful attempts to sabotage water is mainly due to the ignorance of potential saboteurs. The methods of water collection and distribution make the challenges formidable. Water safety must not be reactive.



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H. E. Ms. Madina B. Jarbussynova spoke of the sympathies Kazakhstan has towards Ukrainians, Belarussians and all victims of the Chernobyl disaster. Kazakhstan is in a unique position as both a country which provided help and one which needs it. Not only have tens of thousands of Kazakhs participated in the Chernobyl cleanup, the country also must take on the burden from residual radiation effects. Areas of Kazakhstan were home to top secret nuclear testing in the Soviet era from 1948-1989. This resulted in the contamination of local ecosystems and damage to human health. The rehabilitation and recovery of the Semipalatinsk region are of primary importance to the government of Kazakhstan. Another environmental catastrophe-in-the-making is the rapid desertification of the Aral Sea Basin. International cooperation between international organizations, states, and individuals is urgently needed in order to confront the humanitarian and environmental disasters. The consequences of past nuclear testing pose a serious threat to Kazakhstan and to other states. The degree of damage done to the environment proves the need for international support and action.



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Dr. Robert Musil, CEO of Physicians for Social Responsibility, linked environment, health, and medical expertise with the concern of ordinary citizens. If concerned citizens of the world can combine forces with experts of various fields on a single concern or area of concern, there is immense potential that such actions would force even the most powerful entities (national governments, corporations, etc.) to take notice. It is this potential of such a united force that is the hope to combat the most difficult challenges. The United States is not only a developed country, it is a highly affluent and privileged one, but even here, problems of safe and affordable drinking water exist. Everyone should have the Right to Know what is in their water, and everyone has a moral responsibility to be socially active.

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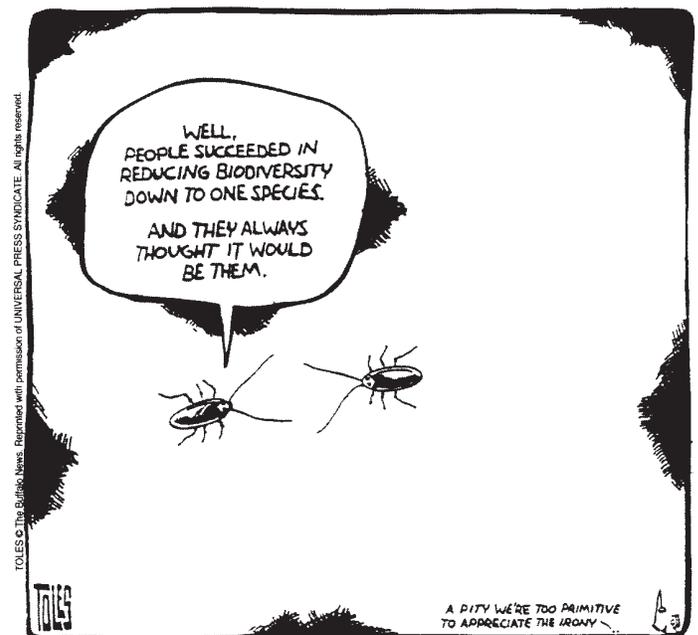
Dr. David Savitz, Chair, Department of Epidemiology, University of North Carolina, Chapel Hill, discussed findings of water-borne infectious diseases from an epidemiological perspective. He explained how epidemiologists work to uncover causal rela-

tionships between individual experience and illness. From this perspective, he stated that the most direct way to ingest chemical toxicants is through drinking water. Livestock and fish can act as secondary transmitting mechanisms for the spread of radionuclides. Depending on source, different waters (surface, ground, etc.) are susceptible to different types of pollutants such as fecal matter, natural chemicals and even water safeguard byproducts (i.e., chlorination). Understanding the pathways by which pollutants are transmitted is key to resolving and preventing further deterioration of human health in catastrophic situations such as Chernobyl. The work is challenging and extremely necessary.



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Dr. Katherine M. Shea, Duke University Medical Center said that the importance of water can be illustrated by the fact that only 0.5% of all water on earth is potentially drinkable fresh water. Chemical byproducts found in water are especially harmful to young children, if absorbed by body (ingestion, inhalation, absorption). Young children's immaturely developed metabolic pathways, high ratio of daily water intake in comparison to adults, long latency periods from higher life expectancies, highly efficient anabolic state combine to make them the most vulnerable targets of chemical pollutants. Such pollutants include agricultural by-products and runoff, heavy metals (mercury, lead) and more recently, a new breed of pollutants has appeared that can be traced to household cleaners and personal care products. Sewage treatment plants are ineffective for such pollutants, and many of them have no established maximum contamination levels as a safety guide.



SOURCE: Tom Toles, The Buffalo News



Effects of Chernobyl on Water and Health

Statement by H. E. Valeriy P. Kuchinsky, Permanent Representative of Ukraine to the United Nations

Today's session is convened in a very special context for my country. Tomorrow, April 26, will mark the 17th anniversary

of the explosion of a nuclear reactor at the Chernobyl nuclear power plant. That day went down in the history of civilization as a sad and tragic lesson of the scientific and technological progress of the 20th century.

Humankind has never before known an ecological disaster of such dimension. Since then we have embarked on a new, post-Chernobyl era, and we have yet to comprehend all the consequences and to take stock of the lessons learned. As a turning point in the life of millions, Chernobyl is not the thing of the past, but the challenge for the present and for the future. It was not only a technological catastrophe, but a test for the international community on its capability to provide adequate response to technological, ecological and humanitarian disasters of that scope. It is a tragedy, which we cannot simply erase from our memory, like we cannot erase Hiroshima and September 11.

I am hopeful that our discussion today could help, at least to a certain extent, provide answers to some questions about Chernobyl. Notwithstanding the fact, that 17 years passed since the Chernobyl accident, the complex of medical, environmental, economic, psychological and social problems continues to represent a tremendous challenge for my country, requiring enormous efforts and resources. For the past decade Ukraine had to bear practically alone the financial burden of alleviating the consequences of the Chernobyl catastrophe, which amounted to five to seven percent of the state budget. Since 1991, the mitigation costs exceeded 6.5 billion US dollars.

Against the background of economic transformations in the country, my Government remains firmly committed to honoring its obligations to those citizens who had been seriously affected by the catastrophe, and it is taking concrete steps to address the recovery needs of the affected population and areas. The priority focus of all mitigation efforts has been and remains a human factor. Probably the most tragic effect of the Chernobyl catastrophe is the constant fear of the people for their lives and health, for the future of their children and grandchildren, for the ecology of the lands and forests, seas and rivers, subterranean waters. In this connection, the Government's efforts are currently concentrated on the social, medical and counter-radiation aspects. A draft law is being finalized on the implementation of "The

National Program of minimizing the consequences of the Chernobyl accident for the years 2003–2005 and till 2010."

The draft is focused on the following areas:

- health care of the affected population;
- strengthening and maintaining nuclear safety barriers, protection of the population living in the contaminated areas, containment of radionuclides from the exclusion zone;
- social protection of the affected population, economic rehabilitation of the contaminated areas.

In the pipeline, there is a yet another draft law concerning the implementation of "The National Program of the comprehensive social and economic development of the contaminated areas and the places of compact resettlement of the affected population for the years 2003–2005 till 2010." This document provides for the rebuilding of industrial and social infrastructure of the contaminated areas, stimulation of innovation activities and creation of competitive industries there, as well as the assistance in increasing the level of labor activity and in ensuring conditions for the productive work of the affected population.

During seventeen years, tremendous efforts and resources have been put into the mitigation of the consequences of the Chernobyl disaster. We are

grateful to many countries, organizations and individuals, who joined Ukraine in this hard work. Ukraine attaches special significance to the role of the United Nations in the strengthening of international cooperation in mitigating and minimizing the consequences of the Chernobyl disaster.

The new United Nations strategy on Chernobyl "A Strategy for Recovery," which was launched in 2002, has provided a constructive framework for reinvigorating international cooperation on Chernobyl. Since the adoption of the new UN Strategy a number of important events took place, which turned the spotlight on Chernobyl. Among them was a remarkable visit by Secretary-General Kofi Annan to Ukraine in June 2002, which specifically drew the international attention to the importance of mobilizing international support for the people still living in the shadow of the Chernobyl tragedy.

A new international Chernobyl web site was created with the support from the Swiss Agency for Development and Cooperation to serve as an international communications platform on the long-term consequences of the Chernobyl catastrophe. This year saw the establishment of the Chernobyl Forum, under the aegis of IAEA, designed to communicate objective, scientifically sound information about the effects of the nuclear accident. A number of other Chernobyl projects within the framework of the new UN strategy are coming up in the nearest future. However, much of the Chernobyl relief and recovery assistance has remained so far unfulfilled.

What the victims of Chernobyl need is concrete help, not

As a turning point in the life of millions, Chernobyl is not the thing of the past, but the challenge for the present and for the future.

rhetoric or exciting projects on paper. We therefore call upon the international community to rethink its response to the Chernobyl accident and to focus on practical assistance. We would like to see more active engagement of the UN agencies, developmental partners and donors in the implementation of the concrete Chernobyl-related projects.

Today, when the Chernobyl recovery assistance is no less needed than 17 years ago, the world community cannot afford weakening its efforts with a job half done, but should maintain the momentum, provided by the new UN strategy and take real action for the sake of present and future generations.



**United Nations
Environment Programme
(UNEP)**

**Statement by Dr. Adnan Amin,
United Nations Environmental
Programme (UNEP) Director, New
York, represented by Mr. Werner
Obermayer (pictured right),
Deputy Liaison, UNEP, New York**

It is a pleasure for UNEP to again be associated with this important event and for me to be able to continue the tradition of UNEP addressing the annual Health and Environment conference organized by World Information Transfer. These conferences have a solid reputation for raising awareness and fostering fruitful deliberations on the important inter-linkages between human health and the health of our environment. The theme of this year's conference is particularly pertinent in this, the International Year of Freshwater.

I will be concentrating my remarks on UNEP's perception of the problems, which you have already been alerted to in the excellent statements made yesterday, and providing some examples of the solutions that the organization is advocating with regard to water and health. You have also heard yesterday all about the commitments made by the international community, including those outlined in the UN Millennium Declaration and the outcomes of the World Summit on Sustainable Development (WSSD), so I am not going to repeat those.

Human and ecosystem health are both fundamentally dependent on the availability and quality of water. Water is an essential ingredient in most crucial aspects of life, from the health of children to the ability to grow crops to sustain growing populations. As the recently released World Water Development Report concluded, "of all the social and natural crises we humans face, the water crisis is the one that lies at the heart of our survival and that of our planet".

Yet all over the world, freshwater is running dry and turning dirty. Pollution, over-consumption and poor water management are decreasing both the quality and quantity of available water. We know that more than one billion people lack access to safe drinking water and that 2.4 billion

people—a third of the planet's population—lack access to adequate sanitation. We know that this robs people of health, dignity and opportunities, yet what are we doing about it?

The urgency of the water crisis was underlined by the more than 100 new commitments towards bringing safe water and sanitation to the world made by delegates to the third World Water Forum in Japan last month. During the Forum, UNEP took the lead in organizing this year's World Day for Water, with the theme 'Water for the Future,' which aimed to inspire political and community action and encourage greater global understanding of the need for more responsible water use and conservation. UNEP will also highlight water during World Environment Day on 5 June, with the motto, 'Water: Two Billion People are Dying for It.' World Environment Day will be celebrated in Beirut, Lebanon this year, in a region where water resources are vitally important, in social, economic and political terms.

At the Johannesburg Summit last year, governments supported the integrated regional and national management of river basins, watersheds, groundwater and other water resources, and made a commitment to halve, by 2015, the proportion of people without safe drinking water and basic sanitation. There are estimates that to achieve this goal will cost around \$40 billion.

Achieving this goal will demand a concerted effort involving a wide variety of partners as well as an inter-sectoral approach—especially across the UN system, where water has not found a home, such as health or agriculture. Perhaps it is better to have a more diverse perspective, water resources are shared among nations and truly belong to us all.

In UNEP, our water strategy combines assessment, management and coordination of actions to provide an integrated, comprehensive and dynamic approach to water issues. For example, the findings of the Global International Waters Assessment (GIWA) feed into initiatives like the Global Programme of Action for the Protection of the Marine Environment from land-based activities (GPA), which is largely implemented through a network of UNEP-supported Regional Seas agreements. UNEP has also revitalized its GEMS/Water programme, headquartered in Canada, which is monitoring, assessing, and building capacity in 69 countries.

Underlying UNEP's strategy is the fair share of water resources, for agriculture, industry, and domestic use; for the poor, who have to pay proportionately more for scarce resources, both in terms of money and labor; and for the environment, whose threatened forests, lakes, wetlands, and coastal swamps are the foundation for the future availability

As the recently released World Water Development Report concluded, "of all the social and natural crises we humans face, the water crisis is the one that lies at the heart of our survival and that of our planet".

of the Earth's most precious resource.

Last November, the United Nations Committee on Economic, Cultural and Social Rights pronounced that, "water is fundamental for life and health. The human right to water is indispensable for leading a healthy life in human dignity. It is a prerequisite for the realization of all other human rights." Jan Pronk stressed this yesterday.

Beyond personal and domestic needs, water is necessary for realizing the rights to adequate food, health and housing. Safe water is especially necessary to reduce the risk of water-related disease, where the burden of disease being borne disproportionately by children. Dr. Durbak focused on the health issues yesterday, and I will not dwell on it again, except to say that a child dies from a preventable waterborne illness about every ten seconds, and that water and sanitation issues are at the forefront of humanitarian needs in times of crisis, as we are witnessing in Iraq and other war torn countries.

"2,400,000,000 in the world today do not have access to adequate sanitation; more than 1,000,000,000 cannot acquire safe water, over 3,400,000 deaths result from preventable water-related diseases each year...."

—World Health Organization

Many women in the developing world spend large parts of their day carrying water from streams and rivers that are often polluted. A new UNEP initiative recognizes that women rarely own or control environmental resources—especially water—and that they need more time for education and productive work. The project 'Empowering Women in Rainwater Harvesting in Kenya,' in partnership with Earthcare Africa Monitoring Institute, was designed to enhance women's participation in decisions about water and its management. The project is providing rainwater harvesting and sanitation facilities to Masai communities in Kenya and is managed by women. It will be a blueprint for similar projects in dry areas in Africa and elsewhere.

In our environmental health related work, we focus on household water quality and availability; hygiene and sanitation; and disease vectors (e.g. malaria-transmitting mosquitoes). We have launched a partnership with the WHO, an example of which is the 'Healthy Environments for Children Alliance' (HECA), which is being developed by UNEP and the WHO into a world-wide alliance to intensify global action on environmental risks to children's health that arise from the settings where they live, learn, play and earn, by providing knowledge, increasing political will, mobilizing resources, and catalyzing action.

When we say "water is life" it reminds me of the old saying that "confidence is the quite assured feeling you have just before you fall flat on your face"—let us realize not only the urgency of the challenge, but tackle it collectively.

New and Emerging Issues

Statement by H. E. Anwarul K. Chowdhury, United Nations Under-Secretary General and High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States



In recent years, the international community's interest in water issues has seen a rapid growth in intensity. Following the United Nations Secretary-General's initiative prior to the World Summit on Sustainable Development in Johannesburg to focus on water as one of the five priority areas and the positive outcome of that Summit last September, the Third World Water Forum in Kyoto played a critical role in looking for solutions to critical water problems in the first decade of the 21st century. The World Water Forum efforts have been commendable in globalizing the water issue and highlighting the universal reality that "water is everybody's issue." I am happy today's Conference provides me an opportunity to bring to your attention how the water issue in its various dimensions touches critically the lives of the ten percent of world's population that inhabit the 49 Least Developed Countries.

Focussing on these Least Developed Countries as identified by the United Nations—and 34 of these are in Africa—I had the honor of submitting to the Kyoto Water Forum a report by the United Nations Office of the High Representative entitled, "Critical Importance of Water Issues for the Least Developed Countries (LDCs)." We are encouraged that the outcome of the Ministerial Conference in Kyoto paid particular attention to the Least Developed Countries and committed to support them.

Deteriorating water quality and dams or engineering works cause loss of habitats and environmental degradation. This affects inland fisheries, which are a major source of protein and other nutrients for a large proportion of the world's population. This in turn produces grave consequences for human development aspects in the Least Developed Countries (LDCs). Therefore, poor water supply and sanitation lead to high rates of water-related diseases such as cholera, diarrhoea and dysentery.

About two billion people, one third of the world's population, depend on groundwater supplies, but issues of groundwater use and quality have received less attention, particularly in the Least Developed Countries. For example in my own country Bangladesh, 73 per cent of total water withdrawal comes from groundwater. In the Pacific Islands,

Even after the United Nations 'Water Decade' (1981 to 1990), millions of people in the LDCs lack access to safe, clean water and to adequate sanitation.

use of polluted groundwater for drinking and cooking had lead to serious health problems.

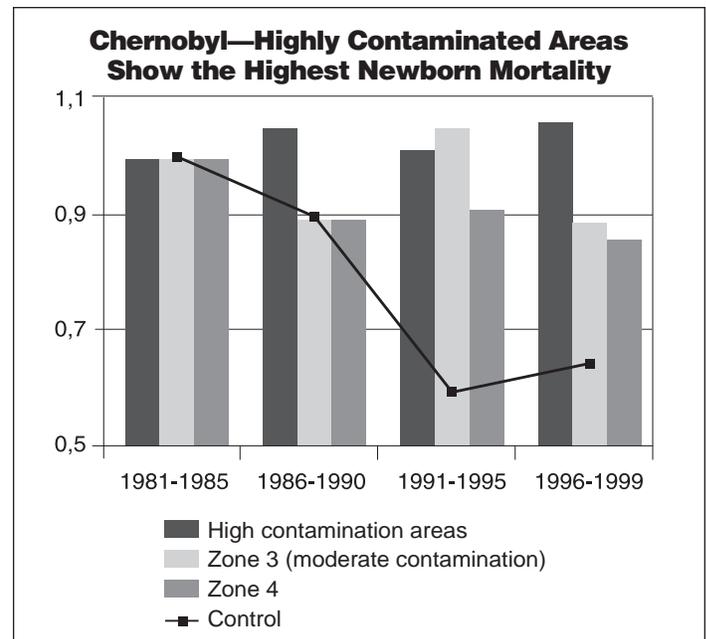
Even after the United Nations 'Water Decade' (1981 to 1990), millions of people in the LDCs lack access to safe, clean water and to adequate sanitation. The conferences in Dublin on water and Rio on sustainable development in 1992 explicitly linked these issues directly to environmental concerns, and the 1997 White Paper of the Department for International Development (DFID) of the United Kingdom further linked water and sanitation to the goal of poverty eradication. LDCs on average use per capita about one to two per cent of the water used, say in Canada. Despite this, they still face formidable obstacles with regard to water availability and safety, and globalization appears to be deepening their vulnerability.

In this context, I must stress that the issue of water is particularly of great concern to the LDCs. Access to clean water for consumption as well as agricultural purposes provides the foundation necessary for development. To enable LDCs to face their formidable development challenges, certain basic necessities must be present, one of these being access to clean water. The poor and the powerless, especially women and children, are the main victims of lack of access to safe water and to sanitation facilities in the LDCs causing a serious setback in their development efforts.

The Programme of Action (PoA) for the LDCs adopted in Brussels in May 2001 is pertinent in addressing these same pressing issues that face LDCs development. The need for clean water underlines the Commitments identified in the Brussels PoA.

In Commitment 3 out of seven contained in the Brussels PoA—that outlines the building of human and institutional capacities—clean water is prioritised in addressing the issues of health, nutrition and sanitation. The Brussels PoA gives priority to strengthening the provision of social services related to health care, including clean water and sanitation as well as increasing the availability and accessibility of safe drinking water, particularly for rural populations. Actions by development partners committed on that Programme involve enhancing ODA and other forms of support, including technical support, for health, safe water and sanitation and supporting LDCs in ensuring access to and availability of safe drinking water by 2015.

Water is also a focus in Commitment 4 of the Brussels PoA—building productive capacities to make globalization work for LDCs. In terms of physical infrastructure, LDCs are encouraged to provide support to the development and strengthening of critical areas of physical infrastructure including water. Furthermore, in terms of enterprise development—particularly the businesses in the informal



sector—the LDCs are urged, inter alia, to improve access to water in addition to energy, land, and credit.

As we all know, water plays a vital role in the agriculture and agro-industries of LDCs. Agriculture is the pivotal sector for these countries, as it underpins food security, foreign exchange earnings, industrial and rural development and employment generation. The Brussels PoA addresses this issue by aiding LDCs in increasing access of the poor, particularly women, to support services and productive resources, particularly land, water, credit and extension services. In addition, the water problem has a direct impact on rural development and food security in LDCs. Our goal should be to strengthen local institutions and enact policies and legislation that provide for more equitable and secure access to ownership and control of natural resources, particularly water.

With more than 615 million people—10% of world population—access to clean water in LDCs is clearly a prerequisite in overcoming many of the impediments to their sustainable development. These challenges could be met most resolutely through effective national and international policies that are anchored more firmly in long-term developmental strategies aimed at the implementation of the Brussels Programme of Action.

I urge all stakeholders to undertake a clear and concrete course of action to give the 615 million people in LDCs at least a worthwhile chance for their survival and development. Civil society organizations like yours have played a significant and awareness-raising role in this regard, and I believe they need to continue and strengthen that kind of involvement for the LDCs. United Nations Secretary-General Kofi Annan in his address to the fifty-seventh session of the General Assembly reminded the international community, "Only by multilateral action can we give people in the Least Developed Countries the chance to escape the ugly misery of poverty, ignorance and disease."

With more than 615 million people—10% of world population—access to clean water in LDCs is clearly a prerequisite in overcoming many of the impediments to their sustainable development.

Statement by Mr. Kenzo Oshima

**UN Under-Secretary-General
for Humanitarian Affairs and
UN Coordinator of International
Cooperation on Chernobyl**



I am privileged to join you here today and am deeply grateful for this opportunity to say a few words on the occasion of the 17th Anniversary of the Chernobyl accident, the worst nuclear mishap that the world has ever known.

As the UN Emergency Relief Coordinator and the Coordinator of International Cooperation on Chernobyl, I have been closely involved in coordinating the relief work of the international community for the victims of the disaster and in long-term planning for rehabilitation of the people of the devastated areas. I am, therefore, keenly aware of the importance of this commemorative event and would like to express my deep appreciation to World Information Transfer (WIT) as well as the Government of Ukraine and the organizing committee, for all the hard work they have put in to make it possible.

A disaster that brings sudden death and destroys the normal life of people is a tragedy that only human beings can fully appreciate. Only they can respond to the grief of others as if it was their own grief. In memory of those who have gone I would like to ask you to stand and observe a minute of silence.

The Chernobyl accident affected a very large area that was home to millions of people. The immediate impact and lingering effects in contaminated territories, with short-term radiation several times above the natural levels, meant that an enormous number of people had to be evacuated. Families were uprooted and the lives of men, women and children were transformed and traumatized. Even today, 17 years after the catastrophe, many of the citizens affected in Belarus, Russia and Ukraine continue to experience the hardships of living in a poisoned land. I had the opportunity to visit the Chernobyl region of Ukraine and Belarus in April last year and see it for myself. The experience they underwent will scar their lives for many years to come. A nuclear disaster, like war or natural calamity, affects not only the living; future generations are not spared either. Many of the young victims were not even born at the time of the accident; but like their parents, they too are confronted with the physical, psychological, environmental and socio-economic consequences.

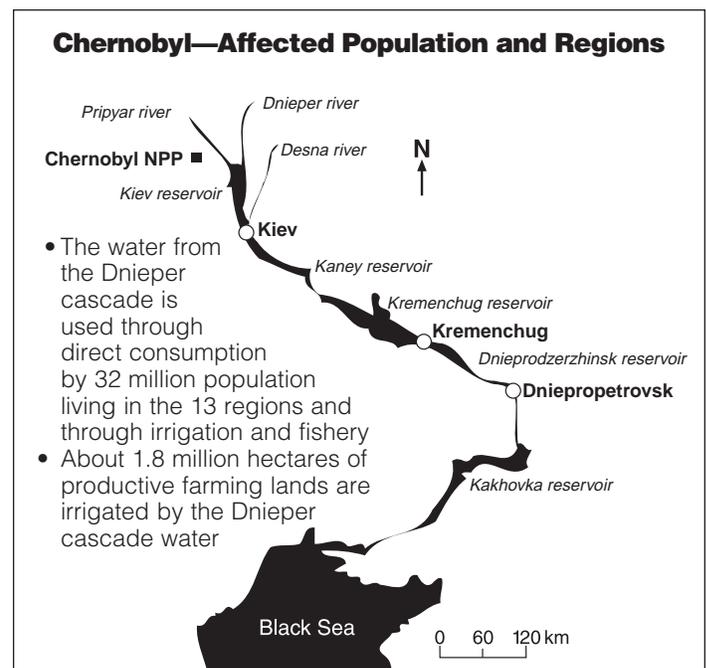
It is a tribute to the people of these blighted lands that, in the face of continuing though invisible danger, they have persevered in their efforts to rebuild their communities and find their way back to normalcy. They have shown enormous courage in their efforts to mitigate the suffering of their neighbors and to help deal with the problems caused by Chernobyl. National Governments, particularly those of the three most seriously affected countries, have continued

to carry enormous burdens, including financial burdens, to address the problems resulting from the accident—this at a time of economic difficulty.

The international community has also responded in a spirit of humanity and fellowship. In the first decade, and certainly ever since Chernobyl was brought to the United Nations in 1990, the requirement was for immediate assistance in the form of emergency relief. And that, appropriately enough, was what the international community and the national governments concentrated on. However, that period for emergency relief is now clearly over and a new approach is needed.

Some may wonder why, 17 years later, the international community is still focusing on Chernobyl. There are, of course, issues related to nuclear plant safety. The Chernobyl Shelter Fund was established and 26 international donors, including the G7 countries, the EU and Ukraine, among others, have contributed to this. But beyond the safety issue, there are also many other pressing concerns that will continue to require attention in the aftermath of the tragedy. The immediate humanitarian crisis that resulted from the explosion has been somewhat mitigated, but its effects continue to linger in a number of areas in socio-economic, environmental, psychological and other consequences of the disaster.

It is important to remember that in dealing with these problems, we must not limit ourselves only to the past or the present. We must also look at the future and that is one reason for the world to remain concerned. Today there are over 400 nuclear reactors in operation around the world. Experts regard the possibility of a similar major accident as rather small. Future designs will doubtless be better and safer. However, we cannot ignore the fact that even the best designs can never assure total safety or preclude all accidents.



As I have said, Chernobyl has affected very large numbers of human beings, including children. Their future prospects have been profoundly influenced by decisions over which they have had no say. The well-being of these people is at stake. The international community cannot abandon them now.

As I mentioned, the period of the immediate emergency relief is now passed, the nature of the problem has undergone a change and has necessitated a shift in emphasis in our approach to the problems posed by Chernobyl. As a consequence, the United Nations has initiated a change process, which places greater emphasis on long-term development perspective for the welfare of the affected people, while continuing to address immediate humanitarian concerns where they exist. This reorientation of effort must involve empowerment of individuals and communities and targeted assistance to the most affected people and localities. It calls for an enhanced role of development-oriented agencies such as UNDP among others.

Another reason for the international community to continue to cooperate in resolving the human problems linked to Chernobyl is more positive. It is the potential that such unique collaboration—involving not only governments and international organizations but also doctors and scientists and ordinary people—has of serving as a model for future emergencies and humanitarian relief work.

This is the background to the UN undertaking. An inter-agency assessment was undertaken in the past two years, which resulted in a report entitled "The Human Consequences of the Chernobyl Nuclear Accident—A Strategy for Recovery", published in February last year. Since this report came out, some new initiatives have been undertaken to start on a few practical actions.

First, a new Swiss-funded international Chernobyl website, operated with the cooperation of the UN, was launched in June last year. I thank the Swiss Government for this initiative, and other active support that has been given to Chernobyl.

Second, the "Chernobyl Forum" has been established. It is led by IAEA. Other participants include FAO, OCHA, UNDP, UNEP, UNSCER, WHO and the World Bank, as well as the authorities of Belarus, the Russian Federation and the Ukraine. The first meeting of the Forum was held in February this year. This body is intended to assess the situation and make recommendations that will contribute to overcoming the widespread disagreements over the long-term impact of the Chernobyl accident. In particular, the Forum will focus on the environmental and health consequences of the accident. I applaud the IAEA for taking this initiative on the Chernobyl Forum.

Third, concerted work is in progress within the UN for the creation of an International Chernobyl Research and

Information Network (ICRIN). It is expected to be launched within the next few months. It will attempt to compile, consolidate and disseminate scientific information. It will commission further studies where required and ensure effective dissemination of its findings. The primary beneficiary of the Network will have to be the people affected in the region. This information will assist in reaching informed decisions on the long-term recovery and management phases and help ameliorate the complex and diverse humanitarian, ecological, economic, social and medical problems of the affected territories. In this way it will support the ongoing international, national and civil society efforts for their sustainable development.

Fourth, a number of pilot projects to support socio-economic rehabilitation, and to improve health conditions of the people in the region, have been developed by the UN agencies. A total of US \$240,000 has been provided as "seed money" to kick start the implementation of these projects in the three countries. My office has also been developing a website and comprehensive database on Chernobyl for further improving coordination and information dissemination.

So, there is a new momentum created by these initiatives. For this momentum to be sustained, some substantial resources are needed. Many countries

have been generous with assistance over the years, and I strongly hope that donors will not forget the human dimension of Chernobyl and continue to be supportive.

Allow me to take this opportunity to stress the crucial role that non-governmental organizations have played in this work—both those NGOs that have brought tangible, material assistance to the affected areas as well those that helped to mobilize and raise awareness of the need for this assistance. Without their help, deep commitment and dedicated hard work, no amount of assistance would have proved adequate.

I come from a city that has known the horrors of nuclear catastrophe only too well. Both in my individual and official capacity, therefore, I am deeply committed to do whatever I can to appeal for the Chernobyl victims and continue to try and mobilize the resources necessary. It is my duty to ensure full implementation of the strategy and to promote the priority projects. Together we must struggle to keep Chernobyl on the international agenda until the full range of humanitarian effects of the catastrophe are adequately addressed. Only through joint action will we be able to achieve that measure of success which will enable us to claim that we have done our best.

The task is challenging, it may even seem difficult, but to empower the victims of Chernobyl and to once again make their villages and habitations places of beauty and bliss is a sacred trust that we cannot ignore or abandon.

Chernobyl has affected very large numbers of human beings, including children. Their future prospects have been profoundly influenced by decisions over which they have had no say.



**Introductory Statement
to the 12th International
Conference on Health
and Environment:
Global Partners for
Global Solutions,
"Water and Health:
Problems and
Solutions"**

**Christine K. Durbak, Founder and
Chair, World Information Transfer**

If oil has been the liquid gold of the 20th century then water will surely prove to be the liquid gold of the 21st century. Due to political and religious stagnation on issues of gender equality, world population continues to increase, while water supplies remain finite, and it is in this deteriorating ratio that we find the seeds of conflict.

UN Secretary General Kofi Annan has warned that future conflicts all over the globe will be fought over water. On the occasion of World Water Day, he observed, "in this new century, water, its sanitation, and its equitable distribution pose great social challenges for our world."

According to the World Health Organization, more than one billion people lack access to safe water supply. WHO

also reports that 40% of the human race, some 2.4 billion peoples, lack adequate sanitation and 3.4 million die every year of water-related diseases.

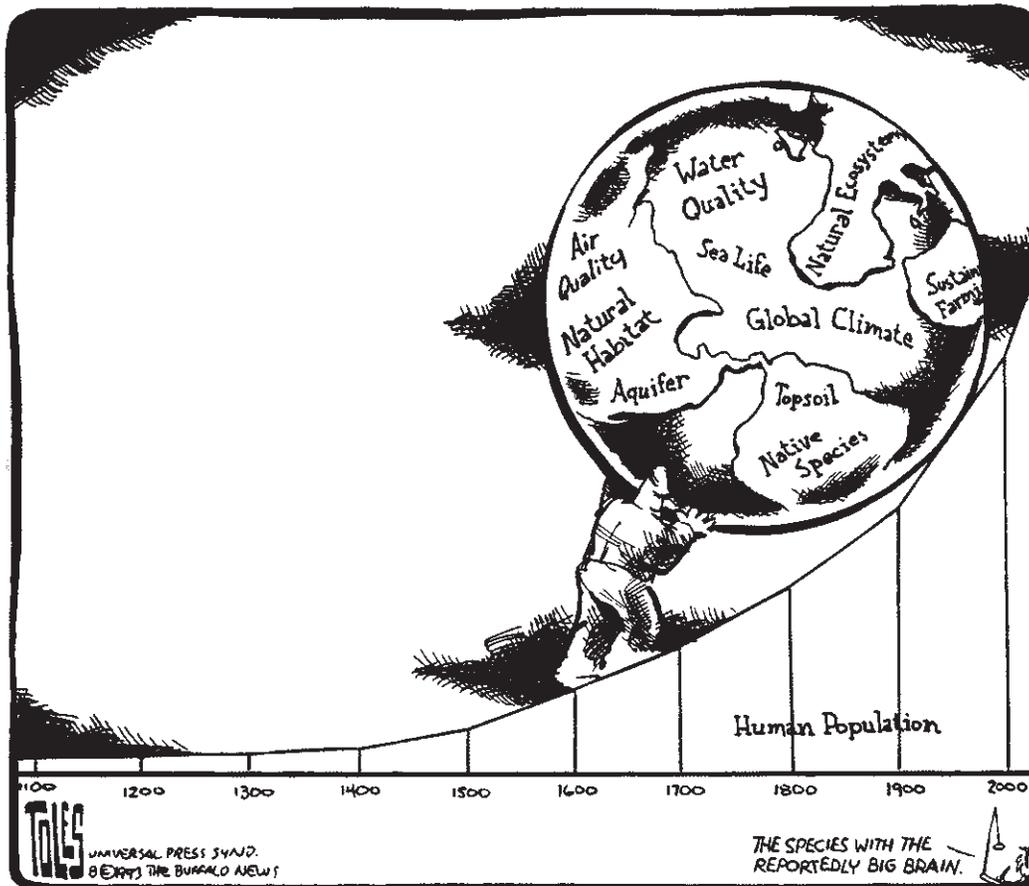
While we in the developed world tend to take access to safe, clean water for granted, one need not be a scholar to see that history provides grim reminders that failure to manage our water resources has caused civilizations to end. Such was the fate of the Mesopotamian civilization in what is now Iran and Iraq.

Turning to today's Middle East, one can see the potential for access to water resources as yet another threat to the region's security. Syria, Iraq and Turkey have ongoing issues concerning damming and access to the waters of the Tigris and Euphrates Rivers which has led the Economic and Social Commission for Western Asia (ESCWA) to emphasize that, "water is a major security issue as water scarcity continues to be and will remain through the near future a leading concern for all water consuming sectors." Seven of the 13 ESCWA member states are among the world's poorest countries in water...with per capita water shares of less than 500 cubic meters per year. The late Prime Minister of Israel, Yitzhak Rabin, who was a water engineer, summed up the potential conflict implicit in water scarcity when he said, "If we solve every other problem in the Middle East, but do not satisfactorily solve the water problem, our region will explode."

Today we will not be specifically discussing the potential

for water to cause conflict, but rather will focus on the toll polluted water takes on human health. Statistics from the WHO and other international and national public health agencies suggest that polluted water is costing us many more lives annually than have most of the world's military conflicts. Consider, for example, the following world estimates of annual morbidity and annual mortality from water related diseases.

- Diarrhea affects two billion people annually and 3.3 million die from complications associated with diarrhea annually.
- Malaria affects 400 million people annually, of which 1.5 million die annually.
- Dengue Fever infects almost two million annually.
- Baneroftian Filariasis, a disease most of have never heard of, is all too well known to 73 million suffers



around the world.

- Intestinal Helminths infect 1.5 billion people every year around the world and every year over 100,000 perish.
- Schistosomiasis infects 200 million annually and one out of every 100 people infected will die from the disease.

And I haven't even mentioned Trachoma, Onchocerciasis (a disease that blinds over a quarter million people annually), Dracunculiasis, and Poliomyelitis. Globally, 15 million children under five are dying every year from polluted water.

It is pretty difficult to miss 304 million souls dying of water-related diseases every year just as it is pretty difficult to miss seeing another 2.7 million people dead from vector borne diseases like malaria annually. It is also hard to see the less obvious ways in which water pollution affects our health.

Each of us has traces of industrial chemicals and pesticides lodged in our bodies. Chemicals like DDT, PCBs, dioxin, furans and mercury enter our bodies through the foods we eat, the air we breathe, and the water we drink. Fish and other animals that we consume are also exposed to these toxins, thus we receive even higher doses of these toxins, an effect called "broad accumulation". Every time we drink contaminated water we add to a growing toxic store held in our fatty tissues. Whenever fat deposits are used (pregnancy, weight loss, nursing, etc.) these chemical hormones reenter the blood stream. (Most people around the world already carry levels of endocrine-disrupting chemicals very close to those levels found in animals with disorders specifically linked to endocrine disruption.)

While these water-borne chemicals affect all humans (in both known and as yet unknown ways), we know that pregnant women and children are the most vulnerable. Children are exposed in utero and via breast feeding at critical stages in their development. In fact, studies have shown that many people receive up to 12% of their lifetime dose of toxic chemicals in the first year of life. Children, unfortunately, are particularly vulnerable because of lower body weights; faster metabolic rates; and less than fully developed immune systems.

The toxic effect of chemicals found in our water supply are not fully understood but a number of links and associations have been established and are being further researched. Certain chemical concentrations in water have now been associated with learning impairment and hyperactivity in children; with lowered sperm count in men; with immune system disorders and with certain forms of cancer. Geneticists are also researching the genetic damage that may also be occurring as a result of the accumulation of chemical pollutants in our environment.

Here are a few examples that I believe point to both the visible and hidden dangers of water pollution to human health in the developed world to say nothing of the daily tragedies of water-borne illnesses in the developing world

and fully 40% of the world's nations have unsafe water for fishing, swimming, or supporting aquatic life.

- Even in America, despite 30 years of progress since the passage of the Clean Water Act, 218 million Americans live within ten miles of polluted water.

- More than 100 people died in Wisconsin from an intestinal virus linked to contaminated water that came from farmland runoff.

- More than 2,000 fish advisories were posted in the Great Lakes regions in one year because of toxic chemicals found in local fish.

- Beach closures are on the rise because of recurring algae bloom and attacks by harmful microbes.

- Epidemiologists in Minnesota have plotted excessive rates of circulatory and respiratory problems as well as muscle and skeletal defects among children born in those counties where the use of pesticides is highest and is reflected in water sources.

- Dutch researchers have found a correlation between dioxin exposure and suppressed levels of disease-fighting white blood cells in children.

The list of examples could regrettably go on endlessly. The point to be made is that we know that polluted water has both a known and an unknown impact on human health.

Fortunately, what is clearly known about the impact of polluted water on human health has sparked remedial programs. During the past decade, a number of countries have started to implement large scale programs to rehabilitate degraded rivers, streams and depleted aquifers. Many of these programs enjoy legislative authority as Thailand's National Water Quality Act or India's Environment Protection Act.

Australia has a particularly impressive record of orchestrating multi-sectoral and multi disciplinary programs aimed at rehabilitating inland waterways. Waterwatch Australia represents a successful collaboration between private industry and national and territorial agencies to both monitor and improve the health of urban waterways.

Throughout Asia and Oceania clean-up campaigns for rivers, canals, lakes and other water bodies have become widespread. Many of these programs have often been successful in improving water quality and, occasionally, have led to the adoption of new water quality standards.

In Japan, 99.8% of water samples now meet standards for heavy metals and toxins. In China, the rate of industrial wastewater treatment is now 94.7%.

Finland has set the international standard for water management in the early 1970's when it became clear to Finnish officials that "eutrophication" (excessive nutrient accumulation in the water) levels in inland waters had become dangerously high. Today, water quality in 90% of the nation's 56,000 lakes is judged as "good" or "excellent". They have

It is pretty difficult to miss 304 million souls dying of water-related diseases every year just as it is pretty difficult to miss seeing another 2.7 million people dead from vector borne diseases like malaria annually.

also been instrumental in forging regional, multilateral water management programs, most notably the 1974 Helsinki Convention which is tackling rehabilitating the Baltic Sea.

The rehabilitation of the Rhine River has been another sterling model for what can be accomplished...particularly when private industry gets motivated. Today, pollution levels in the Rhine have dropped 90% from the levels recorded in the 1970's and the river teems with salmon, trout, and other plant and animal life. Many experts consider the rehabilitation of the Rhine to be one of the most successful feats of environmental protection. Interestingly and contrary to popular belief, this success was achieved as a result of the comprehensive and voluntary protection measures taken by the chemical companies based along the Rhine.

Similar public-private partnerships are also at work to restore both the degraded Black Sea ecosystem involving the 15 countries in the Danube River Basin and the water partners project between Jordan and Israel. The United Nations Development Programme is substantially supporting the legal, policy and institutional reforms that are curbing dumping and trying to restore the fragile ecosystem. Those of you who will be with us tomorrow will hear more extensively about UNDP's programs of rehabilitation of water throughout the world, including the contamination by radionuclides of both Pripyat and Dniiper rivers near Chernobyl.

Clearly, there are many developing responses to the growing scarcity of clean, fresh water. Many of these solutions require cooperation among nations and many require an exercise of political will by the world's governments. Despite the complexity of the problems, history shows that water issues can be handled diplomatically. In the last 50 years, we have seen 37 acute episodes of violence involving water, compared to 150 treaties that have been signed. Cooperation on water dates back to 2500 B.C. when two Sumerian city states crafted a treaty ending a water dispute along the Tigris River.

Today legal agreements on water use and water sharing are proliferating. The Mekong River Commission and the Indus River Commission serve as excellent models.

Our relationship to water is reflected in many old proverbs from many different lands. I would like to share one with you: The Irish say "You never miss the water till the well runs dry."

Among us in this room today and tomorrow are many of the people in the world who know the most about water and how it impacts human life and human health. They have agreed to participate in this Conference to share their knowledge; their concerns; and their commitment to bring

In the last 50 years, we have seen 37 acute episodes of violence involving water, compared to 150 treaties that have been signed. Cooperation on water dates back to 2500 B.C. when two Sumerian city states crafted a treaty ending a water dispute along the Tigris River.

about a world in which all people will have unfettered access to clean and safe water. As we mark the United Nations Year of Freshwater, I hope you will join our speakers and the many constituencies represented by the United Nations to follow through in their commitment to future generations.



**Keynote Address:
"Meeting the Millennium
Development Goals'
Targets on Water and
Sanitation"**

**Jan Pronk
Chair, International Institute for
Environment and Development;
UN Secretary-General's Special
Envoy to the World Summit on
Sustainable Development**

Thank you for inviting me as keynote speaker at the 12th International Conference on Health and Environment with the topic of Water and Health: Problems and Solutions. My address which focuses on "Meeting the Millennium Development Goals' Targets on Water and Sanitation" draws mainly on the work of the International Institute for Environment and Development of which I am chair. The International Institute for Environment and Development (IIED) is an independent, non-profit research institute working in the field of sustainable development.

Health and environment improvement are complementary goals, both of which can claim to be central to sustainable development. However, while environment concerns have been a defining feature of sustainable development from the start, health concerns often seem peripheral. This is unfortunate. A stronger health focus in environmental policy could help ensure that the environmental needs of the poor receive the priority they deserve. A stronger environmental focus in health policy could help avoid an overemphasis on curative measures.

Health experts have added little to our understanding of how, people's health (for instance malnutrition) is affected by environmental risks (for instance land degradation threatening food security). And the institutional base of most health professionals lies in curative rather than preventive care.

Environmental experts, on the other hand, have added little to our understanding of how, for example, bad sanitation affects people's health. And the institutional base of most environmental professionals lies in preventing humans from damaging the environment rather than preventing the environment from damaging humans.

From a sustainable development perspective, this division is problematic. It can foster environmental agendas that ignore many of the most serious, life threatening environmental problems—implying that they are not really environmental issues. It can foster health agendas that ignore the potential health impacts of ecological damage and global environmental change—implying that they are not really health issues.

The institutional base of most environmental professionals lies in preventing humans from damaging the environment rather than preventing the environment from damaging humans.

If sustainable development is about meeting the needs of the present generation without compromising the abilities of future generations to meet their needs, and if the environment is to be one of the basic pillars of sustainable development, then the approach to environmental issues must consider both the needs of present generation as well as those of future generations. This implies taking the environmental burdens currently contributing to the ill health of many of the worlds' poor much more seriously.

The environmental burdens associated with poverty, particularly in low-income countries, tend to be localised: e.g. inadequate household sanitation, indoor air pollution, pressures on local resources.

Bad sanitation may lead to contaminated groundwater and faeces finding their way into the solid waste, onto the open land, into the drainage ditches, and generally into contact with people. Flies may breed in the human and other waste, and contaminate the food. Solid waste may find its way into the drains, causing accumulations of water in which mosquitoes breed. Crowding and poor housing can exacerbate most of these problems.

These are not merely environmental issues. After all, income poverty alone is enough to ensure that poor groups suffer more than the affluent from the ill-health, injury and premature death caused by environmental hazards. Individuals and households without adequate incomes are less able to afford accommodation that protects them from environmental risks—for example, good quality housing, piped water and adequate provision. In their struggle to secure a livelihood, they are liable to undertake work that exposes them (and often their families) to environmental hazards. They live in the poorest countries, on the worst places therein, and with the least resources to cope with illness or injury when they occur. However, it is neither only bad environment, nor specifically ill health, nor purely economic setbacks, which lead to poverty. It is also politics: political decision making, the capacity of the poor to take part in decisions concerning their health, their environment, their resources.

Neither environmental nor health concerns can ensure that the needs of the poor receive the attention that they deserve. However, when these concerns are taken seriously in economic development policy-making they may lead to a more balanced and equitable approach, provided that the political setting ensures that local community initiatives for sustainable development enter the mainstream of local politics and policies, and that people have the right to decide on the use and allocation of resources directly affecting their well-being.

That is my first conclusion: an integral approach towards environment, health and sustainable development will only

benefit the poor if access to resources necessary for survival and life itself is accepted as a human right for all. This also applies to water. Health is a human right. Water is a human right.

The Millennium Development Goals and Water Targets

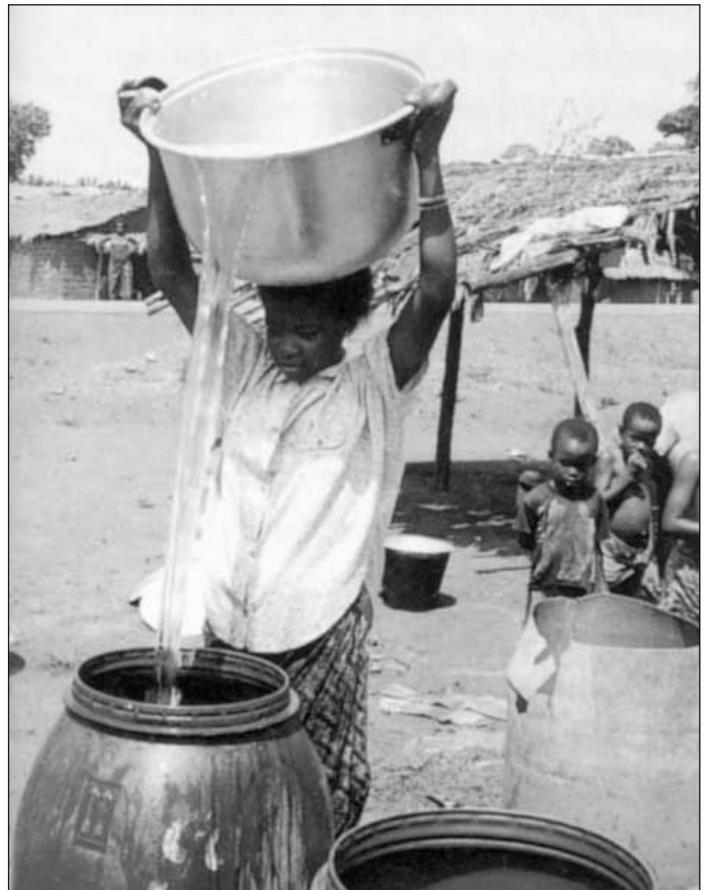
Does the confirmation at the World Summit on Social Development, of the Millennium Development Goals, help to guarantee this human right? Last year, in Johannesburg, we committed ourselves, amongst others:

- To halve, by 2015, the proportion of people without sustainable access to safe drinking water
- To halve, by the year 2015, the proportion of people who do not have access to basic sanitation

These targets are important.

As of 2000, "one sixth of the world's population lacked access to improved water supply and two-fifths (2.4 billion people) lacked access to improved sanitation." And the statistics may underestimate the problem. A significant share of so called "improved" water supplies and sanitation facilities are still likely to be inadequate, at least in urban areas.

Inadequate water supply, water pollution, poor sanitation and lack of hygiene are among the most important global causes of ill health. Halving the share of people without rea-



Payments for water have gone for schools, medicines, draft animals and small business loans.

SOURCE: *Choices*, Vol. 12, No. 1, March 2003

sonable access to adequate water and sanitation to meet their basic health needs would be a major step forward. However, and this is my second conclusion, it would not be enough.

What about the other half? Policies are necessary which arise anyway at creating a perspective for the other half, the poverty of which will not be eradicated by 2015, and that they will get adequate access to water resources very soon thereafter.

That is necessary also for health reasons. Access to drinking water is not enough. Water for sanitation is as important, together with the means necessary to step up hygiene. All that requires capacity building, not merely at the national level but above all at the level of the individual household. Capacity building at this level means awareness creation, dignity, self-respect, knowledge, a good physical condition, less fatigue. It also means that time should not have to be spent on fetching water but on earning a livelihood. These are essential dimensions of human capacity, next to access to resources, including water. All these dimensions are crucial for families and households to live a life beyond mere survival.

This brings me to my next conclusion: we need a new Agenda in the field of water and health. A mere continuation and extension of the Agenda of the nineties is not good enough.

During the 1990's, the two 'new' policies that received the most attention were private sector participation in water and

sanitation utilities, and integrated water resource management. These were not driven by the desire to improve water and sanitation provision in deprived areas. The push for private sector participation was part of a broader neo-liberal agenda that was actually more pronounced in other utility sectors, such as telecommunications, power and transport. Water resource management was part of an environmental agenda mainly concerned with preventing environmental resources from being abused, rather than with improving access for those currently without. In promoting these agendas, however, many over ambitious claims were made concerning the role that

increased private sector participation and integrated water resource management could play in addressing the water and sanitation problems of those groups that currently lack adequate access.

The new water and sanitation agenda should aim at fulfilling the needs of local

communities and households. Water sector reforms are clearly needed, but the role of the private sector and of water resource management should emerge FROM, not DRIVE, local water sector reforms.

A new agenda does not simply imply a return to the idea that water and health ought to be taken care of by the public sector. There was a time when publicly owned and operated utilities seemed to be the ideal route for achieving universal access to adequate water and sanitation. The challenge for the idealised public utility was to plan the best way to pipe the clean water in and drain the dirty water out; and then to implement the plan. Good planning included choosing the appropriate technologies (especially challenging in rural areas), finding the requisite finance (especially challenging in low-income countries), preventing pollution (especially challenging in densely populated areas), and avoiding excessive leakage and over-consumption (especially challenging in dry regions). But once the public sector had helped to achieve near universal coverage in most high-income countries, this also seemed the obvious way to go in other parts of the world.

In the nineties all this changed. Environmentalists were talking of a global water crisis, driven by increasing water demand in the face of limited supplies. Planning was in disrepute. International agencies were debating how rapidly to privatise the state enterprises in formerly planned economies. In Western countries, governments agreed to liberalise markets. From both environmental and free-market perspectives, public utilities came to be seen as part of the water and sanitation problem rather than part of its solution.

The two agendas that responded to these emerging concerns were those of improving water resource management (from the environmental perspective) and increasing private sector participation (from the free market perspective). Terms like Integrated Water Resource Management (IWRM),

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SOURCE: Choices, Vol. 12, No. 1, March 2003

Demand-Side Management (DSM), Private Sector Participation (PSP) and Public-Private Partnership (PPP) began to appear with increasing frequency in international policy documents.

Advocates of both water resource management and private sector participation have made ambitious claims for how well their agendas coincide with the goal of reducing the share of the world's population without reasonable access to adequate water and sanitation. It is often presented as part of a global water crisis, and symptomatic of water resource scarcity and mismanagement.

Such claims should be treated with skepticism. When new policy agendas are being promoted, their benefits tend to be exaggerated. Benefits to groups considered deserving, but not directly represented in the policy arena, are especially prone to exaggeration. Neither water resource management nor private sector participation derives its core support from the desire to extend water and sanitation services. The fact that so many people in regions with plentiful water resources lack reasonable access to adequate water and sanitation does not sit well with the claim that water resource scarcity is at the root of their access problems. Public sector failures may well help explain existing deficiencies, but there is little evidence to suggest that bringing in the private sector will cure these failings, and improve access to adequate water and sanitation for those currently without.

Misinterpreting the global water crisis

Integrated water resource management is necessary, but not sufficient. It is necessary that meeting one demand for water should be balanced against the opportunity costs of not meeting others. The use of water to bear away wastes should be balanced against the impacts this may have on its capacity to meet other human and environmental demands. Managing supplies should be integrated with managing demands, so as to ensure that costly additions to supply are not undertaken when there are less costly opportunities to reduce demands. Environmental demands for water and the relations between water and land use, should be considered alongside human water withdrawals, so as to ensure ecological sustainability.

Water users (and others) often affect the water systems to the detriment of other users, without having to bear the costs. The water-related decisions of one ministry (e.g. agriculture) often has consequences for users outside of that ministry's traditional concerns. Similarly, the water related decisions in one district (or country) often has consequences for people living in other districts (or countries).

So IWRM is necessary, but not good enough. The reasons so many low-income households fail to gain reasonable access to adequate water and sanitation has little to do with the growing global scarcity of water resources. Better management of upstream water resources can be important to



SOURCE: *Choices*, Vol. 12, No. 1, March 2003

achieving sustainable water systems, but will only rarely improve access to adequate water or sanitation among currently deprived downstream residents.

Similarly, avoiding water waste is important, but if water policies focus narrowly on saving water, the water that is saved is unlikely to find its way to the residents who need it most.

Of particular concern, the international promotion of IWRM has been grounded in a misleading narrative of a global water crisis, driven by increasing water demand in the face of limited supplies. The basic message of this narrative is that the world is running out of water, and that the current water problems are just a foreshadowing of the problems to come if the appropriate messages are not taken to heart.

Numerous attempts have been made to measure this growing water resource scarcity. The term water stress has been coined to describe a region or watershed where there is "insufficient water of satisfactory quality and quantity to meet human and environmental needs," and the indication that such conditions are present is most often taken to be

that there are less than 1,700 cubic meters of freshwater resources per capita. On the basis of this indicator, it has been estimated that some 25% of the world's population live in regions facing water stress, and that by

2025 this share will increase to 35%.

If water stress were a major cause of the difficulties so many households face getting reasonable access to adequate water and sanitation, one would expect to find a negative relationship between water stress and the share of households with access to "improved" or adequate water supplies. Recent water access statistics show that this is not the case. For all countries, the average share of the population estimated to have reasonable access to improved water supplies increases with per capita income. However, at each income level, the average share of people with access to water is

Current water problems are just a foreshadowing of the problems to come if the appropriate messages are not taken to heart.

actually higher in countries facing water stress than among those countries not facing water stress.

This finding is damaging to the claim that better water resource management at the water basin level is going to enable the water and sanitation targets to be met. Instead, water resource scarcity as such cannot explain serious water supply problems at the household level. Political, economic and institutional factors can and often do lead to water deprivation even where overall water resources are plentiful. Human settlement with adequate water supply may be located in regions facing water stress. In any case the quantities of water required to meet household water needs are small relative to total water withdrawals. This even applies at world level: supplying three billion people with an additional 50 litres a day would still require less than two per cent of the total amount of freshwater withdrawn for human use, estimated at over 3,000 cubic kilometres a year.

Thus, if IWRM is to take the water and sanitation targets seriously, it cannot treat water scarcity as the pre-eminent concern. It must also address those aspects of water management that prevent a significant part of humanity from gaining access to water even when it is plentiful. We have to get away from both a narrow supply-fix approach investing in large infrastructure projects to tap more distant water supplies, and ignoring opportunities for using local water resources more efficiently as well as from an approach that focuses too narrowly on preventing water resources from being misused, ignoring other opportunities to achieving better water and sanitation provision.

Can 'demand-side management' help? Yes, if it is more than water conservation, and also more than 'economic' water pricing—an approach intended to be more 'demand-responsive, while still preventing water from being wasted or polluted. Demand-side management aims to extend provision to more people, and improve the services water can provide. Indeed, from a health point of view this also implies an emphasis on hygiene education and sanitation, and their potential role in helping people get the most out of their water supplies. From a sustainable development point of view this implies capacity building at the household level.

The local context should be critical to demand-side management. Some, mostly affluent, cities urgently need to conserve water, but have few water-related health problems. Some, mostly low-income, cities have severe water-related health problems, including inadequate provision for sanitation, but abundant freshwater resources. In some cities the most critical demand-side improvements could be achieved through getting water markets and prices right, while in others the key is to help low-income communities organise to address their own water and sanitation problems or make appropriate demands of water and sanitation utilities. But

most urban centres face a variety of water and sanitation problems, and their demand-side strategies need to reflect this.

So, my fourth conclusion is that from the perspective of the water and sanitation targets, the tendency to emphasize only the conservation and economic perspectives is a problem, and demand-side management must pay more attention to:

- Securing better access to water for the poor
- Promoting sanitation and the hygienic use of water; and
- Empowering deprived groups

The 'supply-fix' approach has often favoured affluent consumers over both future generations and the poor. Orthodox demand-side management attempts to address the concerns that are particularly relevant to future generations. To assist the currently deprived, demand-side management must help ensure that those most likely to be deprived (including especially women in low-income households) gain more influence over water and sanitation provision and use.

Overselling private sector participation

My fifth conclusion concerns private sector participation.

Its supporters claim that public utilities are inclined to be inefficient, overstuffed, manipulated by politicians to serve short term political ends, unresponsive to consumer demands, and, particularly in low-income settings, inclined to provide subsidised services to the urban middle class and

leave the urban and rural poor unserved. In many instances, there is at least some truth to these claims.

In the 1990s, private sector participation was promoted as the fresh new alternative to the public utilities. Private companies would bring sorely needed private finance to the sector. They would depoliticise water and sanitation provision, introduce efficiency improvements and reduce costs. They would recognise the economic value of water, and ensure that it was distributed to its most valuable uses. Independent regulation, along with competition for concessions and other contracts, would prevent the abuse of monopoly powers. If necessary, targeted subsidies would be used to assist those households who could not afford to pay the real cost of adequate water and sanitation. But new research indicated that even the poor were usually willing to pay at least for water, and indeed were often already paying more than their more affluent neighbours, who tended to be better connected in both senses of the term.

However, private sector participation and public private partnerships are not actually new, and there is little in the history of private sector water and sanitation provision to suggest that increasing private sector participation will, in itself, help meet the water and sanitation targets.

Even 'innovations' such as public-private partnerships and competitive bidding for water concessions, have existed in various forms for well over a century, and these past experi-

But new research indicated that even the poor were usually willing to pay at least for water, and indeed were often already paying more than their more affluent neighbours, who tended to be better connected in both senses of the term.

ences do not inspire a great deal of confidence.

So as a matter of fact investments in water and sanitation PSP projects have grown rapidly in the 1990s. However, a big part of this came from the public sector and international development banks. The share of foreign direct investment in water and waste infrastructure in low and middle income countries remained small.

Generally, there is little evidence of private companies or lenders wishing to invest in projects providing water and sanitation to the economically depressed villages, towns and squatter settlements where most households without adequate water and sanitation actually live. There seems to be a strong preference for middle income countries and for large cities, preferably with a substantial middle class.

The claim that private sector participation depoliticises water and sanitation provision might superficially seem far fetched, given the political conflicts that have accompanied some of the more contentious private sector initiatives. To be fair, however, the sort of politics that proponents of privatisation claimed it would help avoid was the politics of patronage not that of civil dissent. Many public utilities have ended up providing subsidised services to the middle classes, while leaving the poor unconnected. This may in part reflect the greater political influence of the more affluent residents, and their ability to wield it more selectively. Thus, the population at large may be able to rally around issues such as water prices, but it takes a different sort of political leverage to lobby for extending the water pipes and sewers to a specific neighbourhood. It is quite possible that in many instances low-income residents would be better off if they were at least offered water and sanitation services at their true cost, rather than having them be subject to political as well as economic manipulation.

Unless the public sector creates a regulatory environment that actively prevents patronage politics from interfering with water and sanitation provision, there is no reason to expect private sector participation to make a positive contribution. Indeed, in countries where corruption is rife, public-private collaboration can provide many opportunities for patronage politics. Moreover, many of the urban residents without adequate access to water and sanitation live in settlements where tenure is disputed, and private companies are unlikely to want to invest in water pipes or sanitation infrastructure without unambiguous government endorsement.

Speaking about politics, the vested interests in PSP can cause serious political problems. When international development agencies require PSP as a condition for loans, this is not economics but politics. The fact that services, potentially including water and sanitation, are emerging as an important political issue in international trade negotiations (through the General Agreement on Trade in Services) will not benefit the poor. Decisions on pricing and network extension should

not be left to private water and sanitation operators, since private network operators with the right to set prices would have a strong incentive to use their monopoly positions to overprice water.

But what about the claim that private operators are more efficient than public sector operators? This claim is much too personal. With a poorly designed contract or an inappropriate regulatory environment, there may be no incentive for a private utility operator to strive to reduce costs and increase efficiency. Indeed, under a poorly regulated cost-plus contract, a private operator faces pretty much the same efficiency incentives as the stereotypical public utility operator. Also, the fact that a handful of transnational companies dominate the sector is not only politically controversial, but economically disquieting.

As a matter of fact, debating the relative merits of public and private provision detracts attention from the many reasons why people fail to gain access to water and sanitation that have nothing to do with whether utility operators are public or private. Where extending networked systems is the key to improving access to water and sanitation, many of same challenges need to be addressed regardless of who is operating the utility. If tenure problems can inhibit public utilities from extending provision to low income communities, they can also inhibit privately

operated utilities. If pervasive corruption can subvert public utilities, it can also subvert privately operated utilities. Conversely, if a sound regulatory environment is needed to prevent profit seeking private utility operators from ignoring the water and sanitation needs of the economically and politically deprived, good regulation is also needed to curb similar tendencies among public utility operators.

For a large share of those without adequate water and sanitation, improvements are unlikely to come from conventional water and sanitation utilities in any case. Sewerage systems and piped water networks are ill suited to the dispersed rural settlements where most of them live. Piped networks are generally the least cost means of transporting water around a city, but even in urban centres water-borne sewerage systems are not always the least cost means of disposing of human waste safely. If investment funds are channelled into the networked utilities at the expense of more cost-effective and decentralised options, then, again regardless of the ownership and operation of large utilities, this will not only favour those who are already relatively well served, but will also favour water over sanitation improvements. This is one reason why sanitation improvements lag behind water improvements.

There is also another kind of private sector participation. For many of the more deprived urban dwellers, the most relevant private operators are informal water sellers delivering water on foot or by truck (or in some cases through pipes),

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vendors of water pumps and latrine components, and private latrine and water kiosk operators. The participation of these private operators is not being promoted internationally with the same vigour, however.

Let's sum up. My first conclusion was that an integrated approach to health, water and the other dimensions of sustainable development is necessary, but not sufficient. Poverty eradication requires that the poor themselves get the right to decide about the resources concerned.

Second conclusion: The acceptance of the Millennium Development Goals, including on water and sanitation, is a major step forward. But it is not enough. We should focus also on the other half of poverty and not wait until 2015.

Third conclusion: Household access to water is essential, but not enough. Access to sanitation is as essential, in order to improve human health.

Fourth conclusion: We need a new agenda in the area of water and sanitation. Integrated Water Resource Development is good, but not good enough. Commercial privatization is no solution. Both have to be complimented by local community ownership in order to guarantee access by deprived parts of communities, which otherwise would be forgotten or excluded.

These five conclusions are also essential in order to avoid a widening gap in terms of health between people with and without access to resources.



Water Safety Precaution in New Jersey

Mark T. Olesnicky, M.D.
President, Medical Society of New Jersey

Our water supply is considered a viable target and, as such, our public water administrators were advised to be extremely alert to any unusual or suspicious activity

and to report any such activity to local, state and federal authorities. Identities and activities of contractors working on ventilation, water filtration and security systems had to be under unusually high scrutiny. Plans include:

General Protective measures

- Coordinate necessary security efforts with local law enforcement agencies.
- Take additional precautions for public events.
- Review contingency plans to work at an alternate site or with a dispersed work force.
- Review plans to restrict access to facilities.

Specific Protective Measures

- Announce threat condition (Orange) to all employees.
- Consider full or partial activation of emergency operations centers.
- Review and implement policy to restrict access to build-

Now we are faced with a new challenge. We must be prepared to protect our water supply from chemical, bacteriological and radioactive contaminants.

ing facilities and infrastructure of the water system.

- Conduct periodic (routine and non-routine) inspections of building facilities for potential indicators and irregularities.

It is important to stress that all visible surveillance activity must be consistently inconsistent so that no repetitive patterns limit its effectiveness.

- Increase vehicle, foot and roving security patrols.
- Implement random security guard shift changes.
- Increase visibility in and around perimeters by increasing lighting and trimming of vegetation.
- Implement stringent identification procedures to include hands on checks of security badges for all personnel.
- Remind all personnel to properly display badges.
- Rearrange exterior vehicle barriers to alter traffic patterns away from critical facilities.
- Arrange for law enforcement vehicles to be parked randomly near entrances and exits.
- Approach all illegally parked vehicles in and around facilities. Question drivers and direct them to move immediately. If the owner of the vehicle cannot be identified, have the vehicle towed immediately by law enforcement.
- If possible, institute a vehicle inspection program to include checking the undercarriage, under the hood, rear-seating compartment, and in the trunk.
- Provide vehicle inspection training to security personnel.
- Instruct citizens to report suspicious activities, packages, and people immediately to local law enforcement.
- Inspect briefcases and handbags preferably by x-ray.
- Validate vendor lists for all routine deliveries and repair services.
- Restrict vehicle parking close to buildings.
- Inspect all deliveries and consider accepting shipments offsite.



Wanaque Reservoir, New Jersey

- Require identification, sign in and escort all visitors.
- Enhance mail and package screening procedures.
- Be wary of suspicious unattended packages and articles either delivered or received through the mail.
 - Install special locking devices on manhole covers in and around critical facilities.
 - Review develop and implement procedures for acting on: Threat information, alert notification procedures, terrorist incident response procedures, evacuation procedures, shelter in place procedures, hostage and barricade procedures, chemical, biological, radiological and nuclear procedures, consequence and crisis management procedures, accountability and media procedures.

Potential Indicators of Threats Involving Weapons of Mass Destruction.

- Unusual or suspicious packages or containers, especially those found in unlikely or sensitive locations, such as those found near air intake/HVAC Systems or enclosed spaces.
 - Unusual Powders or liquids/droplets/mists/clouds, especially near air intakes or enclosed spaces.
 - Signs of tampering or break-in to a facility or maintenance area.
 - Reports of suspicious persons or activities, especially those involving sensitive locations within or around a building.
 - Dead animals/birds, fish or insects.
 - Unexplained or unusual odors. Smells may range from fruity/flower to sharp/pungent, garlic/horseradish-like, bitter almonds, peach kernels, and freshly mown grass/hay.
 - Unusual/unscheduled spraying or discovery of spray devices or bottles.

The State of New Jersey's water supply comes mainly from above the ground reservoirs and wells, both municipal and private. Other storage areas include above the ground towers often containing five million gallons of water. Up until we were advised of terrorism's reality in New Jersey, water safety was mainly affected by storms, water main ruptures, and power failures—and sadly by disgruntled employees seeking revenge by harming the public.

Now we are faced with a new challenge. We must be prepared to protect our water supply from chemical, bacteriological and radioactive contaminants. We must be wary of deliberate attempts to harm our water supply. In the case of water towers, 24 hour monitoring with television cameras with improved lighting has been instituted. Our reservoirs are very large and difficult to contaminate since the water treatment plants that follow further decontaminate the effect of massive dilution of harmful agents.

Wells are not so easily poisoned because the underground aquifer moves several feet a day, diluting the contents of the well very efficiently before the water is destined to its final treatment. Single home wells pose a different problem and

are of course the most vulnerable. This is true especially of shallow wells where frequent water analysis is necessary. In the case of towers, it would be necessary to inject hundreds of gallons of liquid contaminant or dilute thousands of pounds of solid agents.

Radiological agents are very hard to handle and so dangerous to the terrorists themselves that they are considered the least likely form of terror. Biological agents pose a greater risk, but it is felt that water chlorination at the front end of the treatment phase eliminates most problems. Chemicals that attack the nervous system are considered most dangerous and through massive dilution often are undetected.

Water is continuously monitored for chlorine, biological activity, pH, electrolyte conductance and turbidity. A sudden change in any of these would trigger an alarm. Continuous analytic water monitoring by the Environmental Protection Agency (EPA) is now in place. EPA funding to US Geological Survey and Rutgers the State University is being provided to further expand monitoring.

Our drinking water is most vulnerable at a service connection where nodes of water supply split off from the mains and supply apartments or residential developments. Poisoning water at these nodes to back up into the mains, under enormous pressure, would do little harm due to the dilutional effect of the critical mass of water flowing. The

real problem is in the water supply of apartment buildings, office towers and residential developments where large numbers of individuals could be harmed downstream from ingesting various pollutants.

The United States Environmental Protection Agency chaired by former New Jersey Governor Christine Todd Whitman is providing over \$1 million to 9 public community water systems serving more than 100,000 people in our state. This money is provided to perform individual Vulnerability Assessments of their water systems and in the development Emergency Response Plans.

In 2002, the State of New Jersey received \$450,600 to fund activities associated with counter-terrorism coordination efforts and technical assistance and training for security of public water systems. These agencies develop and implement preparedness, implementation and recovery strategies among emergency responders, health agencies, environmental laboratories, medical community, and law enforcement on local, state and federal levels.

Vulnerability and emergency response plans were due to be submitted by all systems serving 100,000 or more on March 31,2003. There is excellent compliance and implementation of security enhancements is well on its way.

Our world has changed dramatically. Since September 11, 2001. New Jersey has put into place a successful emergency preparedness task force.

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17 Years After—Health Effects of Chernobyl

Dr. Voldymyr Bebesko, Director-General, Scientific Center of Radiological Medicine of Ukraine

The Chernobyl nuclear explosion is considered to be the most serious of all the accidents which took place in the area of nuclear energy. The accident has caused a complex of radiation induced

and combined health effects together with the dramatic increase of stress-related pathology and a regional demographic crisis.

In the first five to six years after the Chernobyl nuclear explosion, the concentrations of Cesium and Strontium were at their highest, but, following this initial period, long-term sources of Strontium will continue to be found in the Pripjat and Dnieper rivers.

The Dnieper River basin was and continues to be the main route of long lasting radionuclide transfer in the area of Belarussia to the Southern region of Ukraine. Through irrigation and fishery, contaminated water from the Dnieper cascade is used in direct consumption by 32 million people living in 13 regions. About 1.8 million hectares of farmland are irrigated by the Dnieper cascade water, and about 8

million people used Dnieper water as table water.

Radionuclides from the surface of contaminated water polluted bottom sediments and underground water supplies. Because the highest levels of water and land radiation contamination occurred in the region of the Chernobyl power plant, for many years, this section of Ukraine will continue to be one of the main secondary sources of radioactive contamination.

Relevant data show the presence of many kinds of cancers including breast cancer and leukemia. Further study is needed as controversy exists about the frequency of genetically inherited diseases versus those induced by radiation as a result of the Chernobyl nuclear explosion.

The dramatic increase of thyroid cancer in children started to be evident five years after the accident and continues to grow. 2,371 cases were detected in 2002 among those who were children at the time of the accident. The most significant increase in thyroid cancer was detected in 1993,94, 99.

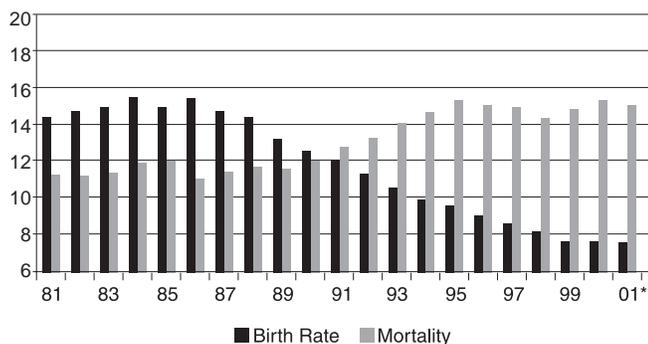
I would like to read one sentence from a speech by Mr. Kofi Annan, UN Secretary General. "Chernobyl is what we would all like to erase from our memory."

Drinking Water Contributed Directly 14% to the Total Collective Dose

| | Relative contribution (%) | | |
|------------------|---------------------------|------------------|------------|
| | ¹³⁷ Cs | ⁹⁰ Sr | Total |
| Drinking water | 1 | 13 | 14 |
| Fish | 2 | 1 | 3 |
| Green vegetables | 0 | 35 | 35 |
| Root vegetables | 1 | 20 | 21 |
| Cereals | 1 | 15 | 16 |
| Cow milk | 1 | 10 | 11 |
| Total | 6 | 94 | 100 |

Chernobyl has Induced a Steady Demographical Crisis in Ukraine

Population has decreased from 52 to less than 48 million



Conclusion

- After Chernobyl the Dnieper basin was the main route of long-lasting radionuclide (RN) transfer from contaminated areas of Ukraine and Belarus to the south regions of Ukraine.
- Counter-measures for prevention of RN water transfer costed tens of millions of US dollars (protective dams with ceolite RN fixation) but enabled decrease of RN transfer from contaminated areas to 50-60%.
- International studies could enable detailed estimates of water protection activities for territory contamination and decrease of collective doses.
- Chernobyl accident has caused a complex of radiation-induced and combined health effects together with dramatic increase of stress-related pathology and demographic crisis.
- Deterministic health effects were detected only in emergency workers.
- In Recovery operation workers a complex action of radiation exposure and other contributing factors was registered with prominent increase of non-oncological morbidity. Laboratory findings revealed increase of radiation exposure markers.
- Preliminary data show presence of late stochastic radiation effects (thyroid cancer, breast cancer, leukemia). Further study is in need.
- Controversies exist on the frequency of genetic and hereditary diseases linked to radiation exposure after Chernobyl.



The Collapse of Distance

**Jay Walker, Founder, Priceline;
CEO, Walker Digital
Luncheon Speech—April 24th**

Today, I am going to talk briefly on a subject that, in a few short minutes, can often help people think differently. I am going to talk about the “collapse of distance” in the history of the world. By considering the “col-

lapse of distance” in the history of the world, we might get a better handle on how to address the kinds of problems we will be facing in the future. The challenges of water are just one of those problems.

About a hundred years ago, distance began to collapse in the western world as travel time began to shrink rapidly in the industrial age. Starting in the 1850s with the advent of the railroad, it became possible to cross distances that for generations people had never traveled. 95% of American citizens lived and died within 25 miles of their home in the year 1850.

If we look at the industrial world, we see that distance began to shrink very rapidly with the revolution in transportation beginning with trains and then, following the invention of the internal combustion engine, with automobiles. Distance began to shrink even more rapidly with mass media. The radio, the first great mass media, began to shrink the idea of how far away things were. You heard a baseball game or a sporting event live on the radio, and you felt like you were there. That idea is so common today that we take it for granted much like electricity. However, it is a new idea in the history of the world that things far away could be very close.

What has happened is that mass media has continued to shrink distance. Television, with CNN, brings events into our homes as if they were happening to us right now. The recent war in Iraq was just another example of the collapse of distance. We had reporters “embedded,” in the battlefields, reporting live about being under attack and fighting in real time. In all of World War II, unless you were in the middle of the fight, and it was happening on your territory, you read about a battle or perhaps saw a news reel about the event. The event was neither real nor immediate. War has moved from the remote, in many cases, to the instant.

This collapse of distance is happening on the Internet as well. Younger children who are of “Internet” age use the Internet all the time, talking to their friends with email and instant-messages. Instant-messaging allows an individual who is doing one thing on a computer to receive a message that pops up on the screen, whether desired or not. Many people can engage in written dialogue at the same time or it is possible to have multiple dialogues at the same time. Not

content with one phone conversation, teenagers now conduct five, ten simultaneous conversations on the Internet. They are permanently plugged in. The distance between young people has collapsed to the point that they are with their friends almost all of the time, not in reality, but over the Internet.

This collapse of distance can be charted as we look out in the next five to ten years. It doesn't take a great deal of imagination to understand that with cell phones, we are almost always in touch with people who need to reach us. Of course we see this phenomenon in the industrialized, affluent world first, but there is absolutely no reason to believe that this same collapse of distance won't move as rapidly as electricity and other inventions of that type moved throughout the entire world. Cell towers have replaced the idea of wire in the underdeveloped world, where you can call two cell phones almost anywhere in the world. Whether it's China or Africa, places are no longer out of the reach of cell phones.

If this were just an academic subject, it would be interesting, but it wouldn't be particularly important. It's very important because, I believe, distance is the major impediment among the peoples of the world who have, to helping the peoples of the world who

have not. Distance allows the peoples of the world who have to ignore the problems of the those who have not. The familiar saying “out of sight, out of mind” has a lot of truth to it.

The example I like to use is this one. If while I spoke, there was a child sitting alone here, crying, what would happen? I would certainly stop speaking, and one of us would give the child some food, some water, and would calm the child, try to find the parents. Because the child is right here, the collapse of distance would completely change the way all of us in this room would deal with that child's problem. That child's problem would no longer be remote, it would be immediate.

In a world where distance collapses, the problems that have been remote and hidden are not going to be so easy to hide. Currently, television images invade our home mediated through the mass media and a fair number of filters, but in the future, we can expect that the filters will be bypassed. There are no filters when I pick up a cell phone to call somebody, no government censoring what I say, no board reviewing my opinions. I suspect that this type of “dis-intermediation” of the filtering system will occur as the explosion of communication and the collapse of distance continues over the next ten to twenty years.

The collapse of distance is the real basis of much change in the world because it enables individuals to directly help other individuals without the necessity of gathering large amounts of capital, or infrastructure or organizations. Large organizations often do nothing but facilitate individual-to-

In a world where distance collapses, the problems that have been remote and hidden are not going to be so easy to hide.

individual connection. I suspect strongly that the future of a people of good will, the future of a people who seek to improve the human condition, is the future where the collapse of distance changes the rules and changes the tools to help others make differences on individual levels.



United Nations Development Programme

Statement by Mr. Kalman Mizsei, UN Deputy Coordinator of International Cooperation on Chernobyl, Assistant Administrator and Regional Director, Delivered by Ms. Guldun Turkoz-Cosslett

I am very pleased and honored to be here and to have an opportunity to address you today on behalf of UNDP and the United Nations Deputy Coordinator of International Cooperation on Chernobyl, Assistant Administrator and Regional Director, Mr. Kalman Mizsei.

Unlike some anniversaries, the 17th anniversary of the Chernobyl nuclear disaster is anything but a pleasant memory. On a chilly April morning 17 years ago a routine test of nuclear reactor #4 went unforeseeably and incredibly wrong. So wrong that no one could grasp the proportions of the disaster at the time. A disaster that would encompass millions of people within a radius that is still debated today. Today, we are here commemorating a tragedy and remembering all those brave people who gave their lives, selflessly, to ensure that many others would not be subjected to further harm.

Anniversaries also force us to look back and assess what has been done to alleviate the consequences of such a disaster. Until very recently the main focus was on the emergency efforts and immediate humanitarian assistance. Indeed, massive tasks to contain the spillover of radiation and the clean up of the fall-out as well as meeting the immediate needs of those affected by the accident in one way or another were priorities. However, with those tasks attended to, we are now emphasizing much more the human dimension of the consequences of Chernobyl.

Presently, there is a substantial population living in the 'contaminated territories', yet what is more shocking is that there are people who are still living in severely contaminated areas. Most of this population is made up of unemployed resettlers, people whose health is directly threatened every day.

This group is at the core of the multi-faceted tragedy that is Chernobyl. Focusing on their needs, helping them to take control of their own destinies is our highest priority. But, our work does not stop there.

It is essential that the population at large be given clear, transparent information and advice of what the real risks are associated with the kinds of exposure to radiation.

There are hundreds of thousands of people whose lives have been significantly affected. There are those fortunate enough to have found work and resettle and are financially supporting themselves and their families. However, there are also those who have been less fortunate. As a priority it is these people who need to be reintegrated into the society as a whole, so that their needs are addressed.

To date, more than 2,000 people exposed to radioactive iodine in April and May 1986, have been diagnosed with thyroid cancer. Conservative estimates are that over the coming years, this figure will rise to eight to ten thousand people. While early-diagnosed thyroid cancer can be treated, all of these people will need medical attention for the rest of their lives.

The International Atomic Energy Agency study established that in the Chernobyl 'exclusion zone' over 20 million Curies (measurement) of emitted radioactivity still remains. This large accumulation of radionuclides creates a potential problem of spreading. During high floods, the water levels of the Dnieper (Dnyepyr) River reach these highly contaminated areas and wash away considerable levels of radioactivity from the surface. The Dnieper (Dnyepyr) River, complete with its water reservoirs, is the main source of water supply for approximately 30 million residents of Ukraine.

Chernobyl had another largely unrecognized impact on the societies of the three affected countries—this was the psychological impact. The fear that the environment is contaminated: that the water is not safe, that the grass that the milk-producing cows eat is also radioactive—these psychological elements were not taken into consideration or underestimated at the immediate onset of dealing with the consequences of Chernobyl. It is essential that the population at large be given clear, transparent information and advice of what the real risks are associated with the kinds of exposure to radiation.

The United Nations Report published in February 2002, entitled "Human Consequences of the Chernobyl Nuclear Accident—A Strategy for Recovery" called upon various needs to be addressed. These include:

- the need for authoritative opinions on these issues and
- properly designed impartial research carried out in critical areas of health and environmental risk.

Local authorities have to be given the tools and the ability to be able to promote a balanced understanding of the health effects of radiation on the public, many of whom at present suffer distress as a result of ill-founded fears.

In response, an International Chernobyl Research and Information Network (ICRIN) is being created. Its objective would be to support the ongoing international, national and civil society efforts toward the sustainable development of the affected territories by compiling, consolidating and coordinating relevant scientific research, commissioning further research, and making available and ensuring the effective dissemination of its findings. These findings should serve to permit informed decision-making on the long-term recovery and management phases with a view to improving the complex and diverse humanitarian, ecological, economic, social and medical situations in these territories. Equally,

For humanitarian assistance to be effective, sustainable, long-term development planning and action must follow it.

ICRIN would serve as a knowledge tool promoting a degree of assurances to the population that inevitably remains fearful of their surrounding environment.

The findings of "A Strategy for Recovery" Report indicate that resources should be concentrated on those most at risk—people living in contaminated areas and growing and gathering their own food. The report also asserts that there must be strengthened efforts to revive the economies of the affected areas in ways which are compatible with the continuing radiation hazard. The primary requirement for rebuilding the communities affected by the accident is the promotion of economic development. These steps need to be supplemented by initiatives specifically designed to strengthen social interactions and promote community leadership in towns and villages. Measures to support employment creation at the village level are needed—so are vigorous efforts to promote the rebuilding of community structures to replace those which were lost in the process of evacuation and as a result of the breakup of the Soviet Union. Again, forward-looking work for the victims of Chernobyl very much overlaps with the general needs of decentralizing reforms.

For humanitarian assistance to be effective, sustainable, long-term development planning and action must follow it. UNDP's approach is aimed at giving individuals and communities control over their own futures. Economic development of the areas could be in the hands of the local governments and communities as soon as deregulation and decentralization take place. Small and Medium Enterprise (SME) development and job creation would be much faster and more efficient and would bring more opportunities to the population in the affected areas.

Since the beginning, Chernobyl recovery assistance has been offered by a range of international bodies, both public and private. This has not only contributed to resolving health care problems and delivering improvements in its provision, but has also helped to tackle the sense of abandonment that many of those affected by the disaster have described.

Within the framework of UNDP Chernobyl Programme, a technical and financial feasibility study of a preventive dike of the Prypyat (Pripiat) flood areas of the 'exclusion zone' was conducted. As a result of the findings of this study, a report was published, which became the basis for the dike design revision and development of its final construction. Based on this, it was recommended that such a dike be built along the flood plains near the power plant to minimize the water levels during the River's flooding period, hence minimizing the potential for contamination.

Furthermore, UNDP has been involved with radioactive monitoring along the Prypyat River in efforts to keep underground water from being contaminated. Such measures under UNDP's Chernobyl Programme provide a basis for

key elements in monitoring and control of the water supply system. Moreover, such activities contribute to the protection of the Dnieper River from being contaminated during flooding thus ensuring the health and well-being of millions of people who live along the river.

UNDP, together with its partner UN agencies, is currently focusing on mobilizing internal resources within the three affected countries and raising funds from foreign governments and non-governmental organizations. Our goal is also to develop a stronger partnership with the private sector (both at national and international level). The UN Secretary-General's Global Compact could be one vehicle to launch and promote these kinds of partnerships. Certainly, as we come to better understand the need to reach diverse players to join the international development circle, it becomes increasingly clear that together we can ensure that people have the capacity to help themselves.

The international community, concerned about security in this region, pledged USD 765 million to build a new sarcophagus in Chernobyl, thereby mitigating the international radiation hazard. If only 10% of these funds were to be allocated to effectively support the development of the affected areas, it would go a long way to leave the effects and legacy of Chernobyl behind and allow normalcy to set in for the victims of this tragedy as well as their children.

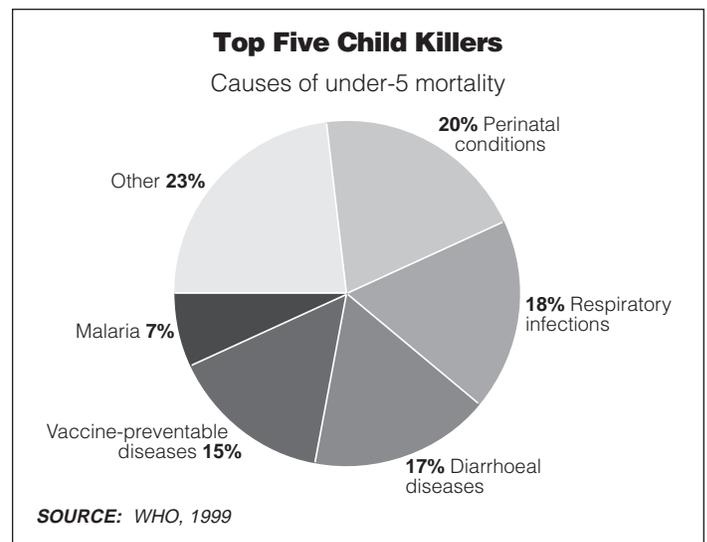


Impact of Water and Sanitation to Children's Health

Ms. Vanessa Tobin, Chief of Water and Sanitation, UNICEF

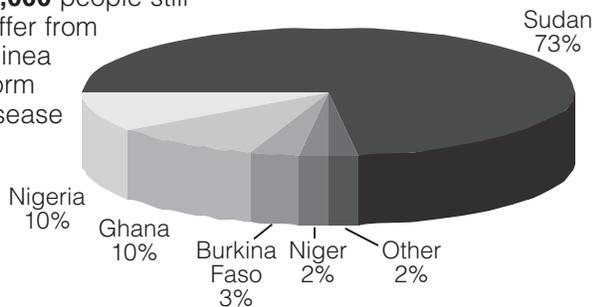
The Problem: We are very clear on the statistics relating death to poor water quality and unhygienic environments, but the economic and social impact

of unsafe water and unsanitary conditions is enormous. As



Disease and Disability

- Fluoride, arsenic and other water quality problems affect **tens of millions**
- In 2000, **more than 75,000** people still suffer from guinea worm disease



was stated this morning, water is a human right, and thus contaminated water and unsanitary conditions are an affront to human dignity as well as a violation of children's rights. Statistics show that of the 2.1 million deaths per year from diarrhea, 80% are children. Additional deaths from other water and sanitation-related diseases include increasing cases of cholera and malaria. We are concerned about the rise of cholera and typhoid cases since 2000, especially in Central and Eastern Europe, the Commonwealth of Independent States, regions of Africa, the Americas, Asia, and the Middle East.

Disease and Disability. There are 4 billion cases of diarrhea each year, 10% of the developing world is suffering from intestinal worm infections. Six million are blind from trachoma, and 200 million in the world infected with schistosomiasis. In China alone, 200 million have roundworm. Arsenic contamination is now beyond Bangladesh and is impacting Nepal, Vietnam, Cambodia, China. Fifteen countries show emerging arsenic problems. The problem of fluoride in India and China affects tens of millions.

One of the success stories is the elimination of guinea worm disease, which is now prevalent only in Africa. It is a disabling water related disease.

Ability to learn at school. Considerable attention needs to be given to the fact that children in developing countries still suffer from roundworm, whip worm, hook worm—all of which have a debilitating impact on their ability to learn and on their nutritional status. This graph shows the absentee rates in Jamaica, which result from whip worm infection.

The Challenge. More than one billion do not have access to water, but more than that do not have access to water of adequate safe quality. Our ability to monitor water quality needs to be strongly considered in the coming years. It isn't enough to provide 20 liters of water per person per day, at a distance of 1.6 km or 1 mile from the house. 45-50 liters of water per person each day is needed if we are going to have an impact on health. Sanitation is also essential when nearly half of the world's population does not have

access to a safe means of excreta disposal.

Gender Perspective. For UNICEF, water and sanitation have a great impact on women and on girls in particular who need access to safe, clean and private facilities. Girls miss out time at school because they have to fetch water, and when family members fall sick, they are likely to be kept home to help. Thus health education is also important.

For UNICEF our four top priorities are:

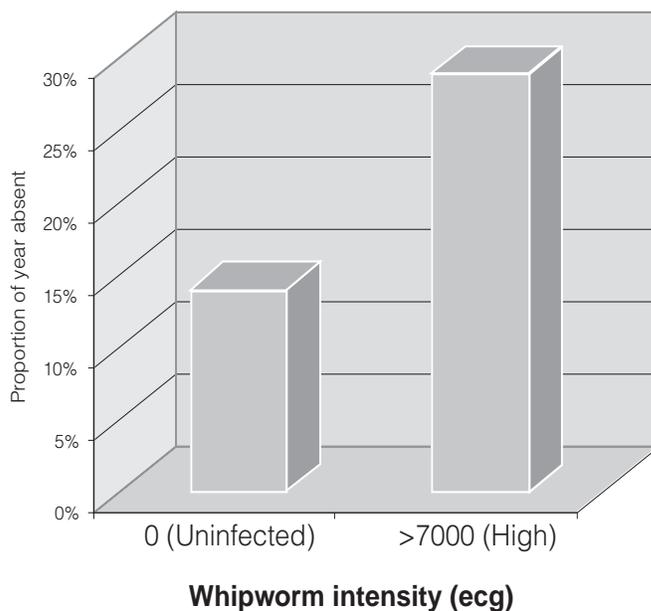
- Focusing on the poor and marginalized.
- Focusing on sufficient water quality and providing low-cost technologies in every household.
- Rapid response to emergencies, as in Iraq at the present.
- Focusing on schools, in particular on early child development in the areas of water, hygiene, sanitation, nutrition and child protection.

UNICEF is supporting a hygiene improvement framework for action, which is involves increasing hygiene awareness along with access to services.

There are two alliances that are important for UNICEF: Healthy Environments for Children Alliance and the Water Supply and Collaborative Council. The former is supported by WHO with UNEP, UNDP and non-governmental partners and has advanced in the following areas: household water security, sanitation and hygiene, indoor air pollution, accidents and injuries, chemicals, and vector-borne diseases. The Collaborative Council has launched an initiative called WASH campaign—Water and Sanitation for Health in schools. Only thirty percent of the schools in the developing world have adequate facilities for water and sanitation.

All of this work must be targeted if we are to achieve the Millennium Development goals as well as universal access to safe water and sanitation by the year 2025.

School Absenteeism and Helminth Infection



SOURCE: Case study, Nokes et al, 1992

Lessons Learned

- Combine provision of hardware with hygiene education
- Aim at "hygiene improvement," not just service coverage increase
- Focus on families and schools for behavior change
- Disseminate simple but effective messages, e.g., hand washing
- Promote low-cost technologies

Carcinogens, Water and Health

**Dr. Mitchell L. Gaynor, CEO,
Gaynor Integrative Oncology,
New York City**



We are living in a country where one in three Americans are one day going to hear the words, "You have cancer." Everyday 1500 Americans die of cancer. There has been a tremendous focus in the last few years on a "war on cancer" with tens of billions of dollars spent on new drugs and better therapies once cancer develops. I believe a war on carcinogenesis, actually looking at what causes cancer, is also needed.

The Precautionary Principle is important because it states that "we must act on the best scientific information we have. This does not mean that we should sit back and wait until we have 100% of the evidence. When the health of people is at stake, the risks can be so high and the cost of corrective action so great that prevention is better than cure. We must analyze the possible benefits and costs of action and inaction, and where there are significant risks of damage to the public health, we should be prepared to take action against those risks even when the scientific knowledge is not conclusive".

For years, many industrial polluters have been preaching the philosophy that "dilution is the solution to pollution". The argument has been that if, for example, you put persistent organic pollutants (POPs), many of which are probable human carcinogens, into the environment at low enough concentrations, they will not harm you. This has been disproved because humans eat from the top of the food chain, and POPs, like dioxin, benzene and toluene, bio-accumulate in the human body causing a number of effects.

Cancer very often takes decades to develop. It can start with a pre-carcinogen, that is actually a chemical, (cancer-causing chemical very often). This chemical can become more active inside the human body and can damage DNA, knock out tumor suppressor genes, as well as a whole host

of things that will lead to an altered cell. When the altered cell divides and has a growth advantage over other cells, it then causes clinical cancer.

If you have a carcinogen in your body that has not been detoxified, DNA mutations can cause problems with DNA synthesis and repair. For example, the tumor suppressor gene, P-53, is knocked out by benzo-pyrene, which is found in cigarette smoke and other environmental pollutants. There is a bright side to this as there are a number of nutrients which can actually interrupt the carcinogenic processes.

The nurses health study from Harvard showed that the subjects from that study who were taking a folic acid supplement had a 67% reduction of the incidence of colorectal cancer. People can limit dietary fat and get sufficient antioxidant vitamins. Certain foods and nutritional modalities can affect the process of cancer, from protease-inhibitors to phyto-estrogens found in soy. Green tea inhibits blood vessel formation around cancer cells, blocks tyrosine (cyclo-oxygenase) and cyclo-oxygenase, all important enzymes that contribute to cancer development.

Detoxification is very important. We all have enzymes in our bodies which break down carcinogens. Antioxidants and nutrients found in garlic and green tea can increase levels of detoxifying enzymes. These enzymes are detected in almost all tissues. They are inducible by a variety of nutrients, mentioned above as well as Omega-3 fatty acids. There is inter-individual variability in our levels of these enzymes due to genetic factors and not everybody is equal. A study by Kathy Helzhauer at Columbia School of Health, compared women with and without breast cancer and found that women with breast cancer had approximately 25% lower levels of certain detoxifying enzymes.

Benzo-pyrene, which is found in cigarette smoke and some industrial pollutants is converted to benzo-pyrene epoxide. That is actually the "smoking gun" (according to a Johns Hopkins University study) for the cigarette industry because we found that this particular compound bound to the DNA and knocked out the tumor suppressor gene, P-53, which leads to lung cancer. There are a number of things we can do to enhance the detoxification of benzo-pyrene, but this finding also provides another parallel.

There are a number of pollutants found in urban areas which spread thousands of miles to desolate places. These pollutants do not act by themselves. The concept of synergy

The Precautionary Principle is important because it states that "we must act on the best scientific information we have. This does not mean that we should sit back and wait until we have 100% of the evidence. When the health of people is at stake, the risks can be so high and the cost of corrective action so great that prevention is better than cure.

Breast Milk Contaminants Which are Endocrine Disruptors

- heptachlor
- chlordane
- endrin
- aldrin
- dieldrin
- dioxin
- benzene
- toluene
- chloroform
- styrene

Aronson, K. J., et al, Queen University, Ontario, "Breast adipose tissue concentrations of PCB's and other organochlorines and breast cancer risk", *Cancer Epidem, Biomarkers and Prev*, Jan. 2000

in carcinogenesis is very important. We are finding that many of these environmental carcinogens are not just additive, they are exponential in terms of their ability to cause diseases like breast cancer and their ability to induced proliferation in breast cancer cells. The best example of synergy comes from smokers. Someone who smokes has eleven times the risk of getting lung cancer as a non-smoker. Someone who has been exposed to asbestos has five times the risk of getting lung cancer as one never exposed. Someone who smokes and has been exposed to asbestos has a risk of getting lung cancer that is 55 times greater. This is one illustration of the fact that many of the carcinogens to which we are exposed in our water and air supply, act synergistically. Very little research is being done to look at this as part of human exposure.

We are finding that many of these environmental carcinogens are not just additive, they are exponential in terms of their ability to cause diseases like breast cancer

Mary Wolfe, from Mount Sinai School of Medicine, has shown that increased serum levels of DDE and PCB is associated with a four fold increase in breast cancer. Organic chlorine pesticides, such as (hexochlorocyclene) hexane, DDT, DDE, which is a byproduct of DDT, has also been found to occur in significantly higher levels in the fatty tissue of women with breast cancer than those without and many of these work as endocrine disruptors. They act as weak estrogens. Rachel Carson, in 1967, wrote *Silent Spring*, where she noticed that songbirds exposed to DDT were dying and experiencing developmental defects. She raised the possibility that this would have the same effect on humans, and she was viciously attacked by the chemical industry, who assured us that, although DDT and DDE were being found in breast tissue world-wide, DDE is such a weak estrogen no human harm was possible. What they didn't say, however, was that the half life of DDE and DDT in the human body was 47 years, as opposed to a few hours for endogenous estrogens. This means that it takes 47 years for half of the DDT to be detoxified in your body.

Dr. Devra Davis, (of the Heinz School of Public Health, Carnegie Mellon University) noted in a paper published in 1994, that men and women born in the 1940s had twice as

much and 30% more non-smoking related cancers than did their ancestors born in the 1890s, and she believed that environmental toxins played a partial role in this trend.

Since 1976, the US Environmental Protection Agency (EPA) has been measuring toxins from fatty tissue samples, from both elective surgery and autopsies. They found 20 toxic compounds, including dioxins, styrenes, dichlorobenzene, xylene, toluene, DDE and PCBs. All these are known as probable carcinogens for humans. They were found in over 70% of samples, and what is even more alarming is that emerging scientific literature suggests that there are synergistic effects to these. In fact, there's a disease, which was rarely seen until 25 years ago. It is called endometriosis and occurs in women. It has been found that just 25 parts per trillion of dioxin in monkeys can lead to endometriosis. I suspect the increasing incidence over the last 30 years is due to ubiquitous POP exposure.

So how are children in the world being exposed to what is called persistent organic pollutants (POP's). In six months of breast feeding, 20% of a mother's fat-stored dioxin is

transferred to the infant and 10% of women carry enough mercury in their blood to damage the fetus, should they become pregnant. The following chemicals are just some from a long list of contaminants which have been found in

breast milk: heptachlor, a number of herbicides, pesticides, dieldrin, dioxin, benzene, toluene, chloroform, styrene have all been found in breast tissue. That partially explains the fact that in 1940, a woman's chance of developing breast cancer was 1 in 22. Today, it is 1 in 8. And it is also quite alarming because in the early 1990s, Tufts University researchers found that a chemical commonly used in plastics, p-nonaphenol, was leaching from the polystyrene cells, in which they kept their cultures and caused breast cancer proliferation in the culture medium.

Simezene, another herbicide recently banned by the EPA, was used in swimming pools and hot tubs and they cited "non-acceptable cancer risk to children and adults." In another study, Simezene was fed to female rats and they showed a marked increase in tumors. Again, many of these chemicals can act synergistically.

A 1976 study by US EPA found PCBs in 90% of breast milk. 25% of those samples contained PCB levels which exceeded the legal level in milk of 2.5 ppm. What that means, is that if you had that same level of PCBs in cow's milk, it would not be allowed to be sold. It also means that the infants who are taking that milk are getting at least 5 times the allowable amount of PCBs.

Dioxin is another carcinogen. It is released from a variety of sources including combustion and incineration. A lot of dioxin comes from burning hazardous waste in highly populated areas, but we will talk about that later. The US EPA estimates that 500 people per year get cancer from eating

fish from the Great Lakes contaminated with dioxin, PCBs and pesticides. These toxins travel from a kiln burning hazardous wastes over great distances, contaminating the grass and the water that cows consume. It is now estimated that over two-thirds of the dioxin found in people come from beef and dairy because the cows drink the contaminated water, people drink the milk and eat the beef. Dioxin like other persistent organic pollutants, bio-accumulates in the body since we eat from the top of the food chain.

The National Cancer Institute compared blood samples from people with lymphoma and age-match controls. Those with the highest levels of persistent organic pollutants had a 5 times increased risk of lymphoma compared to those with lower levels.

Cement kilns account for 20% of the dioxin concentration in the United States and are the third largest source of dioxin in the nation. How is that possible? Many cement kilns exploit a glaring EPA loophole, allowing the kilns to burn hazardous waste, like used paint thinners, dry cleaning solutions, industrial solvents, old tires, which are blended with other fuels and are burned in the kilns. The reason they are able to get away with that is because it is called "recycling." And when we look at the consequences of this, we find alarming trends. Children do not smoke, they don't drink, they don't work in chemical factories, yet, childhood lymphoma has increased 30% since 1973, childhood lymphoblastic leukemia has increased 20% over the last 30 years, and childhood brain tumors have increased 21% since the 1970s.

The New York State Department of Health publishes a list of counties which have 100% greater incidence of lung cancer than is expected in Manhattan or Staten Island. Many of these counties are in upstate New York, down stream from old coal-burning power and cement plants. One of these cement plants continues to burn hazardous

History of PCBs in the Hudson River

Waste discharge into the Hudson River by GE plants in the Fort Edward-Hudson Falls area:

- Loading of PCBs downstream of Fort Edward is highest of any major river system the U.S.
- Researchers feel the historic PCB discharge in the Hudson River from GE plants constitutes the world's largest PCB spill. The entire river has been designated a federal Superfund site.
- Most PCBs in the Hudson River came from the GE capacitor plants at Fort Edward and Hudson Falls released 500,000 to 1,300,000 pounds between 1946 and 1977.
- GE received no prior authorization or permit was given prior to 1975, continuing seepage into the river from GE plants is currently not authorized by any permit; and certain of GE's discharges both before and after 1975 have been unlawful.

waste and tires in its kiln. Since the 1950s, all the trout in Lake Ontario have been eliminated largely because of dioxins and other persistent organic pollutants. Wildlife officials tried to reintroduce the trout for many years, but they die out after the first hatching as many of these pollutants last for decades. Gull eggs from Ontario and the Saint Lawrence River continue to have high levels of myrex and dioxin, according to an EPA study. Snapping turtle eggs, collected at two Lake Ontario sites have the highest levels of polychlorinated dioxins and also detectable furane, which are related compounds. These POPs also result from the burning of hazardous waste and coal. Eggs with the highest contaminant level also showed the poorest levels of developmental success. Abnormal development of snapping turtle eggs from 1986-1991 were the highest at all four Lake Ontario sites, compared to all other sites studied.

We need to ask whether it is any coincidence that these

Facts about dredging Hudson River of PCBs

The Hudson River is not "cleaning itself" of PCBs. Only 10% of PCB mass has been reduced by dechlorination over the past 29 years.

The EPA states most instances dechlorination of a PCB molecule yields a different PCB molecule.

very high rates of lung cancer occurring either downwind or downstream from the origins of persistent organic pollutants are related. Breast cancer is the second leading cause of death of women in this country. It's the leading cause of death for women age 35 to 54, and I think there are a lot of preventable things we can do to change those statistics. PCBs, or polychlorinated biphenyls, are odorless, tasteless, sightless, but very toxic and largely undetectable pollutants. They take decades to break down. They pollute a number of waterways including the Hudson River, which goes through much of New York State. After breakdown, PCBs convert to a possibly a more dangerous compound, which is a lower chlorinated PCB. This is the reason that people argued for years that the Hudson River did not need to be cleaned up because the PCB's broke down. However, the breakdown product was equally toxic.

The General Electric Company is responsible for a large proportion of the PCBs found in the Hudson River in the Ford Edward Falls area. The loading of PCBs downstream from Fort Edward is the highest of any major river system in the United States. PCBs were banned in the United States in 1979. However, in 1984 the EPA issued a report called "No Action, No Clean-up," despite the fact that they continued to issue warnings about the dangers of eating Hudson River fish. We have found PCBs traced all the way to Kingston, New York, 100 miles away from the source. 500 pounds of PCBs flow over the Federal Dam in Troy, NY, each year and disperse down river. It is important to remember that only a few parts per trillion can cause endocrine disrupting effects.

We have finally had a ruling that the Hudson is going to be cleaned up, and the proposal includes dredging 100,000 pounds of the potent toxin from the river sediment over a number of years. In the clean up operations in the Hudson River will be enclosed, and no farmland will be used for processing. Work is to be completed in five years from the start of the project and the river will be open to the public.

PCBs are designated as carcinogenic, and they also cause neurological and endocrine problems. In California, for instance, as in many other states, the rate of autism has increased about 400% in the last 15 years. Learning disabilities and behavioral problems such as ADD and ADHD have increased at a rapid rate in this country. I think the role of persistent organic pollutants needs to be closely examined.

A North Carolina study over a couple of years, looked at the children of 888 mothers exposed to PCB levels. They found higher levels of PCBs in mothers of children who showed psychomotor developmental delays. A study in Taiwan looked at 169 mothers who accidentally ingested

PCB contaminated rice oil, again they saw a high incidence of developmental delays, behavioral problems, IQ deficiencies, and hyperactivity.

There are a number of things that people can do. I think it is very important that people know the role of nutrition in cancer prevention. Many nutrients including soy, green tea, garlic, anti-oxidant vitamins literally can affect the process of cancer on every level. And in 1993, the American Public Health Association, asked for a fundamental change in policy in the assessment of 65,000 industrial chemicals. The APHA

represents more than 10,000 public officials and in statement 9304 said this: "Virtually all chlorinated compounds studied exhibit at least one of a wide range serious toxic effects, such as endocrine disruption, developmental impairment, birth defects, reproductive dysfunction, infertility, immuno-suppression and cancer, often at extremely low doses". These are the types of issues that are critical to start addressing. It is really not fair to leave our children with a legacy of one in three people hearing the words, "You have cancer."

I think it is very important that people know the role of nutrition in cancer prevention.



**Hetch Hetchy Valley:
Yosemite's Twin**

**Ron Good, Executive Director
Restore Hetch Hetchy, Walnut Creek, CA**

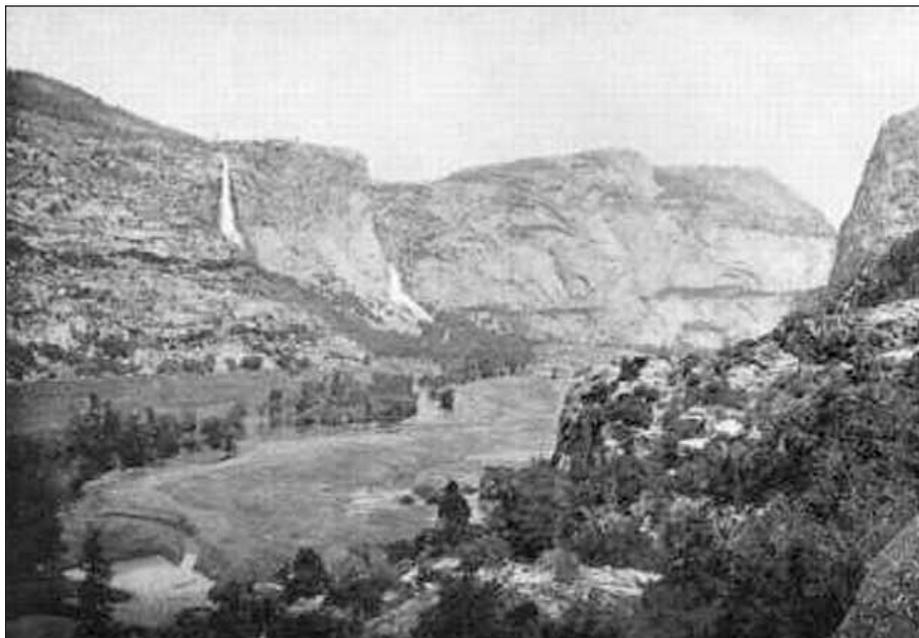
Mention Hetch Hetchy Valley to the visitors at Yosemite National Park, and their response is immediate: a heartfelt feeling of sadness for what has been lost, and a fervent hope that what has been lost can somehow be regained.

John Muir, often called the father of American National Parks, described Hetch Hetchy Valley as "a wonderfully exact counterpart of Yosemite Valley...a grand landscape garden, one of Nature's rarest and most precious mountain temples." Restoring the Hetch Hetchy Valley symbolizes the historical significance of America's environmental movement.

Following a fierce nationwide debate led by renown conservationist John Muir, the City of San Francisco was authorized by the U.S. Congress, in the Raker Act of 1913, to construct a dam and reservoir on the Tuolumne River in the Hetch Hetchy Valley located in Yosemite National Park. The O'Shaughnessy Dam was completed in 1923, and after the necessary pipelines and power houses were completed, San

Francisco began using water from the Hetch Hetchy Reservoir for its water supply and electrical power generation.

The goal of RESTORE HETCH HETCHY is to accomplish a "win-win" outcome for Hetch Hetchy Valley, and for the cities of the San Francisco Bay Area and that rely on Hetch Hetchy water and power. A talented group of people—including naturalists, restoration ecologists, engineers, attorneys, and economists—have been working to accomplish the goals of RESTORE HETCH HETCHY, which is spearheading the effort to restore Hetch Hetchy Valley.



Hetch Hetchy Valley, California



Bio-defense and the Water Supply

**Dr. Jerrold Ellner Chair,
Department of Medicine and
Director, Center of Emerging
Pathogens, University of
Medicine and Dentistry of
New Jersey**

I have been involved in various issues related to clinical and infectious diseases and interna-

tional health and since coming to work in New Jersey with emerging pathogens and bio-defense.

Has water ever successfully been sabotaged? It turns out that there is no evidence that this has happened. However, there have been several attempts. In 1973, a biologist threatened to dump anthrax spores into the water supply, and he requested a ransom of about \$8.5 million. He was also going to put in some botulinum toxin, but he was apprehended, and this never happened. I am not sure it was a serious threat. In 1992, a Kurdish rebel tried to poison water supplies in Turkey with potassium cyanide, and this too failed. In 2002, there was an attempt in Italy to dump a cyanide compound into Rome's water supply; apparently the U.S. embassy was a target. However, it turned out that the intended compound to be used was seized, analyzed and was a nontoxic form of cyanide. The idea of contaminating water intentionally has not escaped a fringe element, but so far we have been protected largely by ineptness not necessarily because we have been vigilant. In the wake of September 11, we have to be prepared for the unexpected.

How safe is the water? It depends a bit on your perspective. There is a perception in the U.S. public, which has been surveyed, that there is vulnerability. The reality is that the two factors most in the favor of water safety are the size of water pollution effects and the impact of chlorination. However, there are residual areas of vulnerability. For one, there are a huge number of small systems in small communities, in rural areas, and small parts of large systems. Secondly, the chlorination facilities themselves could be tampered with.

What are the obstacles to biologic and other contamination? Dilution, hydrolysis, microbes and activation and limited contaminants ingested by an adult person. The dilutional affect is obviously related to the size of the reservoir and the storage facility. Hydrolysis and microbes particularly occur in exposed reservoirs and are less effective in ground water and wells. Obviously, the quantities are small enough so that if you are going to contaminate, you have to make sure the contaminant will reach the potential target. A few more risks about dilution:

In the environmental literature, it is pointed out that you

need 400 metric tons of hydrogen cyanide to contaminate the reservoir which feeds San Francisco, and this quantity would allay concerns. However, the public health literature pointed out that 2 ounces of botulinum toxin could be lethal to all of the inhabitants of North America, so there are threats with a very high specific toxicity, where a few molecules could cause a great deal of damage. We also have numerous examples when small amounts of sewage or fecal contamination lead to outbreaks. 20 grams of feces can contaminate a large water supply with certain organisms, for example Hepatitis A—again a gradient of concern.

98% of the US's surface water supply is chlorinated, however, for reasons related to the taste of the water and possibly to prevent toxicity from too much chlorine, the concentrations that are maintained are marginal, at the minimum threshold of the governmental standards, which be less effective against some organisms we are talking about. Nonetheless, the chlorination of water probably has been the biggest health measure taken, and it has led to control of tremendous scourges—cholera, typhoid, dysen-

tery, and Hepatitis A. We have been very effective against the common human pathogens which are still problematic in many developing countries in the world, and chlorina-

tion is active against many so-called class A and B listed agents. These are agents which seem to be potential bio-threats. Class A would be anthrax, class B less so and class C even less. However, chlorination is inactive against a few.

Ground water as opposed to surface reservoirs may be an additional point of vulnerability. 58% of the drinking water in the U S comes from ground water supplies where there is little exposure to sunlight, aeration by microbes, and no chlorination or other treatment. Repeatedly, in the history of this country and other countries, groundwater has been a major source of outbreaks.

Where are the biological threats? A very large threat, not just because it has a potential use in bio-terrorism, but because it easily contaminates water without any one specific intent is cryptosporidian, which is a protozoan parasite causing diarrhea, and in immune-suppressed patients with AIDS can cause the disease to become a progressively untreatable. In most relatively normal hosts, the diarrhea becomes self-limiting over time. This protozoan requires very few organisms to cause infection. It resists chlorination and other disinfectants and survives for long periods of time in water. These are the main characteristics of what would be an effective biological threat. Unfortunately, there are other potential threats on the A and B list of agents, which are either resistant or relatively resistant to chlorine or resistant to chlorine at low doses or are stable in water, or both.

- Potential threats include: bacillus anthracis, f. tularensis, shigella, vibrio, cholera, salmonella, the Norwalk Agent,

Prevention and control have three components: (1) detection, (2) surveillance, and (3) response.

Yersinia pestis, the cause of plague, botulinum toxin, Aflatoxin, ricin, staphylococcal enterotoxin. In many ways bio-terrorism is partially a psychological threat with small numbers of cases as we have experienced here. Yet, this changed the world as we know it.

- **Outbreaks.** If you are going to argue that the water supply is safe, then you would expect that we wouldn't be seeing outbreaks of infectious agents causing widespread disease. In fact, outbreaks and their rapid investigation are good surrogates for a bio-terrorist event and allow us to test many of the principles. In 1993, it rained a lot in the Midwest, and therefore, there was more runoff into groundwater from fields where cattle were grazing. This led to a huge outbreak of cryptosporidium. Approximately 403,000 people were infected, 4400 hospitalized and 54 deaths. Cryptosporidium, again and again, is found in a very modern water system and is a potential threat when floods and other natural events lead to the contamination of ground water.

- **Typhoid fever.** In Tajikistan, in 1996, there was no funding left for public health. A decision was made to save some money by not chlorinating the water, and the result was an outbreak of typhoid fever with 8900 cases and 95 deaths.

We must realize that biologic threats exist throughout the world in societies and cultures that may be less able to protect the water than in the U.S. The Norwalk Agent is a virus like particle, which causes gastroenteritis, that is nausea, vomiting and diarrhea to an extent, and is usually seen in outbreaks on college campuses. It spreads very aggressively from person to person. In Italy, in 2002, there was an outbreak of Norwalk Agent traced to water contamination with 344 affected individuals. But it was 2002, the vigilance was high, and there was rapid recognition of the outbreak and identification of the source. People stopped using that water, and this led to the small number of cases. Additional outbreaks related to drinking water are exposure through swimming and similar recreational acts to cryptosporidium, hemorrhagic *E. coli*, and leptospirosis, all potentially serious infectious diseases.

Could the microbes that cause outbreaks be intentionally used to contaminate the water supply, since it is already clear that they are stable in water and evade the usual attempts to detoxify water. There are some simple things we can do, but they may not be sufficient. We can try to provide multiple barriers in the supply, treatment, and distribution sites; real time detection of chemicals, ozonation to complement chlorination. Secure particularly the chlorination systems to be sure that they are not tampered with, and as was already said, tamper-proof manholes, cover and lock water tanks, etc.

Prevention and control have three components: (1) detection, (2) surveillance, and (3) response. (1) Detection: The approaches that have been taken and are being developed very rapidly are molecular detection systems based on detecting DNA of organisms, for example, using polymerase

chain reactions and mass spectroscopy. Because of the interest in environmental samples, these attempts, which are mostly driven commercially, have emphasized detecting small quantities of organisms. If we had tests available that could detect a few molecules of botulinum toxin, how do you test 154,000 sites in the US where water is distributed? But the first step is a level of screening for water safety, which we have never done before. When we talk about a million dollars for 9 sites, it would be very costly to implement.

- (2) **Surveillance.** In order to prevent disease, we have to have a system in our major populated areas where there is a registry able to detect excess cases of any illness by checking admissions to intensive care units, hospitalizations, morbidity, and mortality. Such systems are being set up in New York and New Jersey.

- (3) **Rapid Response.** If there is an indication of an outbreak, we need to immediately identify the source and contain it. Obviously, there are tremendous energies going into imagining what we would do if smallpox were introduced into the U.S. Plans would center on the potential contamination of the water supply.

At the New Jersey Medical School, we have a Center for Emerging Pathogens and also a Center for Bio-defense. The Center for Bio-defense has an interesting history in that it was a congressional set-aside to the university, and actually the first funds arrived the same week as the first case of anthrax so that we were a little bit more engaged before rather than after this became a problem. The approach we have taken has to do with detection and particularly surveillance. One of the problems with an outbreak is that initially it is not specific. People come into the hospital with pneumonia, they come into the hospital with diarrhea, they are very sick, but patients with anthrax came into the hospital with meningitis, etc. We need to have a way to distinguish among agents.

We use a technology known as DNA micro arrays, which allow us to look at all of the genes in a person's white cells, which are activated by different organisms. The concept is that many if not each of the biological weapons and organisms may have a unique signature in the genes they turn on when people are infected. In this experiment, which we have done in our P3 bio container facility in Newark, we have looked at the difference in the genes that are turned on by exposure of white blood cells to anthrax. We looked at anthrax and drug resistant tuberculosis, which is a Type C listed agent, but still potentially a bio-terrorist weapon. There are 1180 genes that were turned on by *B. anthracis* but not TB, and 395 that are turned on by TB and not by *B. anthracis*. And ultimately one could come up with chips, DNA chips, which allow you to rapidly screen panels of genes, and within hours, to say, "Yes this is an emergency."

So far the water system has not been effectively contaminated or sabotaged. This is a good time to draw up plans because once an event occurs we are all in a reactive position.



**Statement of H. E.
Madina B. Jarbussynova
Permanent Representative of
Kazakhstan to the United Nations**

I believe each of us understands indeed how important and crucial are the issues of preservation of ecological balance and stability for us and for the generations to come. Environment in all its dimen-

sions represents invaluable treasures which humanity has to cherish like the apple of its eye. And both unwise and negligent treatment of fragile nature causes disastrous consequences affecting nations and people. We all remember tragedies occurred from such a behavior or more correctly—misbehavior.

On April 26, 1986, at the Chernobyl Power Plant in Ukraine (former Soviet Union) two explosions blew off the top of the nuclear reactor building releasing clouds of deadly radioactive material in the atmosphere. The people of Chernobyl were exposed to radioactivity 100 times greater than the Hiroshima bomb. Eighty percent of the radiation as estimated fell on Ukraine and Belarus. It is estimated that over 15 million people have been victimized by the disaster to different extent. More than 600,000 people from all parts of the Soviet Union were involved in the cleanup operations, and there were more than 32,000 Kazakhstanians among them.

Kazakhstan people understand and sympathize with Ukrainian and Belarus people—as nobody else can—and feel grief from the consequences of nuclear catastrophe.

You all may know about the Semipalatinsk polygon, where for over 40 years, the Soviet nuclear weapon was tested both above and beneath the soil. It used to be the largest testing ground in the world. More than 500 nuclear explosions or about 70% of all nuclear weapon tests of the Soviet Union were conducted there during the period 1948–1989, which allowed *The Observer* daily journalist David Harrison to state that, “This was like 116 Chernobyls.” Explosions caused enormous damage to the health of the population and natural environment of Kazakhstan. The tests were covered with strict privacy and prohibition of any information. The elementary norms of radiation safety and radiation control were not provided.

Though the tests have been banned, nuclear waste still contaminates and pollutes everything—air, water, soil, food, and, of course, afflicts the population of the region.

The effect of this disaster can be seen in everyday life. Primarily, this is a medical disaster which continues to cause hundreds of deformed infants and children through genetic and environmental exposure and abnormally high rates of various types of cancer. According to the statistics, about 1.6

million people were exposed to ionized radiation. The highest level of oncological diseases in Kazakhstan has been registered in Semipalatinsk region. Starting from 1950 child mortality rate increased five to ten times, the life expectancy decreased. Hundreds of thousands of people who suffered from the nuclear tests extremely need social and medical rehabilitation.

The problems related to the humanitarian and ecological rehabilitation and economic development of the Semipalatinsk region are of priority importance to the Government of Kazakhstan. We continue to take efforts to overcome the acute socio-economic, humanitarian and environmental aftermath of the nuclear weapons tests.

On the 52nd, 55th and during the current 57th UN General Assembly sessions, resolutions on international cooperation and coordination for the human and ecological rehabilitation and economic development of the Semipalatinsk region of Kazakhstan were adopted, which reflect the world's serious concern on the situation in the Semipalatinsk region. The resolutions were sponsored by 47, 72 and 61 Member States respectively, thus testifying to the

increasing support being rendered by the international community to Kazakhstan in overcoming the consequences of the nuclear tests left to us as a heritage of the past.

However, unwise and negligent human activity can cause catastrophic disaster without nuclear accidents and explosions, and radioactive contamination.

Today, unfortunately, we are witnessing that the Aral Sea, which used to be the second largest land-locked reservoir on the planet, is irrevocably shrinking. The environmental disaster zone of the Aral Sea Basin, which is currently inhabited by more than four million people, includes part of the territories of all the Central Asian States. Immense territory of the region is deserted. People settled in the Aral zone suffer from different oncological and immune diseases, dust and sand storms, and shortages of water for drinking and irrigation. The measures to curb the Aral crisis undertaken by the Central Asian States are inadequate and insufficient. For Central Asian States lacking financial resources and facing different challenges it is of crucial importance to draw

**Unwise and negligent human activity
can cause catastrophic disaster.**



Aral Sea

the attention of the international society to settle the crisis.

I am hopeful that the examples of Chernobyl, Semipalatinsk and the Aral Sea tragedies make us once again realize the price, paid and still being paid, for irresponsible human activity. Once again we understand how fragile and precious human life and nature is and how interdependent things are in our world.

We believe that the obvious severe consequences, as well as serious threats posed to the nations and to the whole world by the negative impact of large-scale disasters of this kind are convincing examples of how we need common international efforts to overcome them.

It is exactly the reason why we call upon all international organizations and the states concerned, as well as the individuals to tackle jointly humanitarian and environment problems and to take measures aimed at overcoming these problems.

**Role of an NGO in
Protecting Drinking
Water: Physicians for
Social Responsibility's
Strategic Involvement of
the Health Care
Community**

**Dr. Robert Musil
Executive Director and CEO,
Physicians for Social
Responsibility (PSR),
Washington, DC**



What I hope to do is give you some case studies of what we at Physicians for Social Responsibility try to do by taking scientific information and turning it into policy and change. The great problems that you have been listening to today cannot be solved by individuals alone. Truly global problems can only be solved collectively, through institutions like the United Nations and through governments. There are individual actions you can take, but it is not enough to simply put a water filter on your sink and hope for the best.

Even here in the affluent United States, problems of safe and affordable drinking water exist. What I hope to do is show how PSR has reacted to water related problems here, built constituencies, delivered scientific and citizen concerns to policymakers, and produced policy change.

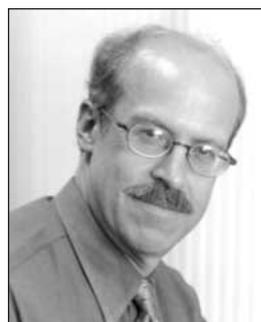
As Americans, we talk about the right to life, liberty and the pursuit of happiness. You can't do it without water. It is a fundamental right, and that's why it needs to be protected. You can't let a fundamental right be protected by somebody else alone. If you are going to have water as a fundamental right, you have to know what is it, what's in it, and you have to be able to have a say about it. We take a scientific public health slant. How you are affected medically, by exposures to pathogens and the like, depends on whether or not you have sufficient infrastructure to provide that clean, safe water. The bottom line at PSR is the Right to Know.

If you are from New Jersey, you know that along the Jersey shore is a place called Tom's River. It's a wonderful place, however, too many industries were built too close to the water and that has led to a cancer disease cluster in that area. Representative Jim Saxton, Republican of New Jersey, introduced amendments to the Safe Drinking Water Act in 1996, that require utilities in the United States to let their consumers know what's in the water. From that legislation we have Consumer Confidence Reports that should come in your water and utility bills. And if not, we have more work to do.

Those reports indicate which contaminates, such as arsenic, are in consumers' household drinking water. The information also suggests to consumers the possible sources of the pollutant. Since it is not always easy to get this information, our organization launched a series of educational efforts, including creating educational materials for physicians and healthcare providers.

The level of arsenic permitted in US drinking water had been 50 micrograms per liter for decades. By the early 1990s, medical science had advanced enough to reveal that this level was insufficiently protective. President Clinton signed an executive order lowering the threshold to 10 parts per billion. Early in the Bush administration, it appeared that this lower level, which was the WHO standard and accepted globally, would be repealed in the US. After considerable effort by our physician members, by informed consumers who had been reading their Consumer Confidence Reports, by other organizations, and by informed political leaders, arsenic levels were returned to the safer level of 10 parts per billion. The only problem is that right now you can't measure concentrations below about 3 parts per billion which is the level we would like to see.

PSR believes that the example of our efforts to safeguard drinking water in American households is the kind of solution we can replicate globally.



**Potential Water-Related
Impacts of the
Chernobyl Accident on
Human Health**

**Dr. David A. Savitz, Chair,
Department of Epidemiology,
University of North Carolina
School of Public Health,
Chapel Hill**

First, I want to make a few preliminary comments. As Ambassador Kuchinsky wisely reminded us, there are many interesting research issues, but there are also immediate needs. There are times when the need for further research can be held out to argue against taking action. That is not a good strategy when we want to improve the health of a population. There are many times we know what we need to do, and we don't need to wait for the epidemiology (the documentation of the health experience of a population) to go forward.

My second comment is to recognize that epidemiology is just one of many strategies for understanding the consequences of the Chernobyl disaster and also, more generally, for understanding the effects of water on health.

I will be talking about the comprehensive pathways through which water can affect human health, including chemical and radiological contamination, and also about research challenges.

Epidemiology, as I have so far described, addresses what I like to think is the bottom line of the health of populations. We focus not on the potential health experience, although of course that is important, but on the actual experience of populations. In addition, we try to consider, comprehensively, that in evaluating the consequences of a disaster, we not only examine the immediate and obvious issues, but also the many "downstream" consequences. Finally, I think epidemiologists are among the most cautious in drawing causal inferences from observational data. Our very challenging and important goal is to understand the complexity of the real world and discern subtle effects. We do well with dramatic effects, and I will come back to this issue in regard to low-lever radiological contamination in a large population.

Drinking-water exposure is a very important pathway for a variety of agents to reach humans. The standard estimates are that we consume over two liters of water a day directly, through absorption of food and in cooking. For a number of chemical agents, there are other routes of human exposure through inhalation of certain volatile compounds and thermal absorption.

Other pathways by which water can affect human health include: recreational exposures such as swimming, fishing, boating; occupational exposure through, for example, fishing and agriculture; and particularly pertinent in the Chernobyl incident, the use of water in agriculture, for livestock, and the exposure of fish living in contaminated waters. These are indirect pathways in which radionuclides, and in some cases other chemicals, can be absorbed and then ingested by humans.

There are a variety of pathways and sources of drinking water which have different kinds of potential health implications. Surface waters, through rivers, lakes and reservoirs, are directly exposed to the environment and are, therefore, directly accessible to environmental contamination. The risk of infectious disease through fecal contamination remains far and above the greatest concern. There is also agricultural run-off from pesticides, and industrial pollution carried to a population directly through water. Ground water supplies are traditionally less susceptible to direct short-term pollution, and immediate effects are not as dramatic. However, once there is contamination, the recovery process is extremely slow, requiring decades for the natural processes to restore themselves to their earlier condition.

There can also be sources of natural contamination distinctly hazardous to health but dependent on the local geol-

ogy. Radon is a water-born natural geologic source of health risk as is arsenic, disastrous in many parts of the world when consumed from wells for drinking water. Individual wells have varying quality depending on the depth and location and the direction of the water flow. This illustrates that ground water supplies follow less direct or less easily monitored routes than the surface water supplies we use.

There are certainly practical challenges in discovering the link between water and health. First, there are often many determinants of exposure. Living in a geographical area defines your exposure to some extent, but behavioral factors modify environmental exposures that people receive. People are often unaware of water quality except in relation to taste and odor. We aren't aware of radiological contaminants, and we aren't typically aware of microbial contaminants. Therefore, it is very difficult to gather information by interviewing people to gauge the magnitude of their exposure. And finally, the patterns of exposure change over time.

Chemical contamination takes a number of forms. I've mentioned some of the natural contaminants which can be very important. Arsenic, located in Bangladesh and certain areas of Mongolia, is a very serious health threat. Agricultural run-off in many areas of the world is also a concern in the way that it makes its way into the drinking water supply. There are some dramatic disasters involving toxic metal, such as mercury, cadmium and lead. Persistent organo-chlorides, such as polychlorinated biphenyls (PCBs) and DDT are well-known. The treatment of water in chlorination, which has tremendous benefits in preventing infectious disease, can produce toxic chemicals as byproducts of that treatment which may have their own human health implications.

With respect to Chernobyl, there are plausible reasons to be concerned with the potential for the interaction of chemical and radiation exposure—something that has not yet been thoroughly explored. Secondly, where there is a disruption of the primary drinking water supply, which often leads to the need for alternative supplies, in some cases, those alternative supplies are from shallow wells or ineffectively treated surface water thus creating other ill health hazards. One source of this disruption was the large proportion of the population moved out of the contaminated zone.

With respect to radiological hazards, there was a potential for direct contamination of drinking water. The distribution of radionuclides leads its way to crops and ultimately to human exposure, and this is one of the pathways other than direct ingestion. The consumption of fish living in contaminated waters increases the human exposure.

Dependent on which population you focus on there is a

People are often unaware of water quality except in relation to taste and odor.

Annual discharge of Chernobyl radionuclides to the Dnieper River

Cs-137: up to 2-4 TBq
Sr-90: up to 10-20 TBq

general sense that relative to some other pathways of radiation exposure, water as a direct source is relatively modest in magnitude, but it is over an extremely wide area. Cesium and strontium are now higher than they were before the accident. They are quite variable over time, but there is a general sense that the return to background levels will be a very slow process in this pathway of radiological exposure.

Let me close with several observations. Obviously, water supplies have a very profound and direct impact, but also I think we ought not lose sight of the indirect ways, in which public health can be affected. Environmental quality and environmental health are closely linked. Sometimes in scientific specialties, we separate the focus on natural resources and the quality of the environment from human health, and there are many ways that they are inextricable. Where infection is the primary concern, water quality related both to the natural condition and human activity, makes prediction very complicated and in some cases makes disease difficult to control.

Finally, there are multiple pathways of water exposure, so that if I am interested as an epidemiologist in studying the ill effects on populations with a given level of environmental contamination, I have a challenge, which is posed because of the various ways in which humans are affected by and exposed to water. The Chernobyl accident made small, but widespread contributions directly to radiological exposure and those will continue over some time.



**Water and Disease:
Special Vulnerabilities of
Infants and Young
Children to
Contaminated Waters**

**Katherine M. Shea, MD, MPH
Duke University Medical Center,
Durham, North Carolina**

Liquid water is required for life as we know it on earth. While water is a renewable resource, it is also finite. Accessible fresh water, upon which we depend, is actually relatively rare. While 70% of the world's surface is covered with water, only 3% is fresh and only 1% is in liquid form. This is divided between ground and surface waters, but less than half of this is available for human use. Assuring a safe and adequate fresh water supply is increasingly difficult as world population grows. The Administrator of US EPA, Governor Whitman says, "I believe water is the biggest environmental issue we face in the 21st Century in terms of both quantity and quality."

My talk today will not be concerned with quantity, but it is important to stress that this is a major concern. Water experts project that by 2025 about 40% of the world's population will live in areas with some water use restriction, and by 2050, one in four people in the world will live in areas of frank water scarcity. With that said, this afternoon I will be discussing water quality. First, I will review briefly fresh

Thus, by the three major routes of exposure, children have the highest exposure to water contaminants.

water uses, classifications of contaminants and routes of exposure. Then I will explain the parameters of children's special vulnerabilities, concentrating on early postnatal life. I believe other speakers will discuss prenatal exposures. Finally, I will give specific examples of how children are particularly and uniquely vulnerable to exposures. I will concentrate on chemical exposures only and leave microbial and radionuclide exposures to other speakers.

Briefly, we need fresh water for a variety of functions. The first and most important use is consumption. We also need fresh, clean water for hygiene, food production and recreation. Contaminants can be considered by categories such as microbial, inorganics, organics and disinfection by-products. This is how in general they are regulated and how health care providers tend to think of them. Contaminants can be naturally occurring, anthropogenic or both. Contaminants can also be categorized by source. These can be either point sources such as industrial discharge or sewage treatment plants, or non-point sources such as agricultural and urban run-off. These can contaminate surface water, ground water or both. Sources of contamination are numerous and vary with region, industrial/agricultural activity, population density, topography, etc. It is possible to anticipate the potential problems with water quality by looking at pollutant sources in a particular region.

No contaminant is directly dangerous to human health unless it can gain access to the body. Water has numerous ways to present toxicants to humans. The most obvious route of exposure is drinking water, and this will be the major focus of the rest of my talk, but people can also be exposed orally via food and recreational water use. Dermal exposures happen during bathing and recreational use. Finally, inhalation can be a major route of exposure as water droplets become suspended in air during cooking, showering and flushing. Infants and young children often are especially vulnerable to exposure to contaminated water. This increased vulnerability relates to five parameters: differences in their exposure patterns, differences in their metabolism, critical windows of development, their life expectancy and political standing.

First, children are likely to have greater exposure than other groups because of their small size and rapid growth. Infants and small children drink more water per unit body weight than any other age group. They also breathe more air which can contain aerosolized water in showers and recreational activities, and they have a greater surface area to volume ratio. Thus, by the three major routes of exposure, children have the highest exposure to water contaminants.

Second, young children and infants have immature metabolic pathways. They are anabolic rather than catabolic throughout growth and development. This means that their ability to detoxify and eliminate a toxicant is often decreased

at the same time that they absorb relatively more.

Third, infants and young children are uniquely vulnerable during critical windows of development when exposures may result in major derangement of differentiation, migration, specialization of systems or tissues. Vital organs continue to grow in size through adolescence, though at variable rates. More subtle, and perhaps more important, is that physiologic function also continues to mature throughout the first two decades of life. Exposures during these times can produce unique pathology in children which can result in lifelong disability. No parallel exists in adult exposures.

Fourth, the younger the child, the longer is his/her life time during which to express long latency diseases. Exposure at an early life to carcinogens or endocrine disruptors may dramatically increase the risk of developing cancer both in childhood and later in life. Water is the ultimate sink for many anthropogenic chemicals, many of which are known or suspected carcinogens. Finally, children have no political voice of their own. This is of particular concern where scientific uncertainty and information gaps exist. Until recently, environmental laws and regulations did not take into consideration the special vulnerabilities of the young.

Now, I'd like to take you through a few examples of how children are at

increased risk of harm from contaminated waters. Again, these are chemical examples, but there are also examples in the area of infectious diseases and radiation which I believe other speakers will touch upon. I will begin with examples that are well understood followed by less well understood risks.

Nitrate contamination of ground water is an old but increasing problem resulting from agricultural run-off, septic system failures and well head contamination.

Bottle fed infants have the highest exposure because they drink more liquid than any other age person. Nitrates must be activated to nitrites before they are danger, and this is more efficiently accomplished in a newborn because of high pH which promotes bacteria which make the conversion. Nitrites oxidize the iron in hemoglobin from ferrous to ferric and make it incapable of carrying oxygen. Fetal hemoglobin, normally present in young infants, is much more easily oxidized than the adult form, so newborn hemoglobin is more susceptible to nitrite poisoning. Finally, detoxification is not as efficient in babies because one of the two systems that reduces methemoglobin operates at only 50% efficiency in newborns. Damage from nitrates in newborns illustrates both the increased exposure and metabolic vulnerabilities of young infants.

Lead poisoning remains a serious public health problem. According to the World Health Organization, contaminated water is one of the six leading causes of lead poisoning worldwide. Lead illustrates the special susceptibility parameters of exposure, metabolism and critical windows. Infants and toddlers drink more water than adults. They also absorb lead very efficiently. A toddler will absorb between

50 and 70% of a given ingested dose of lead compared to an adult who will absorb from 5–15%. Once in the system, children exhibit symptoms at lower blood lead levels than adults. They also have unique pathology related to damage to developing central nervous system, such as decreased IQ, and other neurobehavioral deficits. These exposures result in irreversible life-long disability.

Methylmercury is often discussed in the context of water, even though the major exposure is from fish. I will mention it here because it is a problem that is increasing and legal and regulatory solutions are under active debate in the US. Mercury is a potent neurotoxicant and methylmercury is the most readily absorbed form. It crosses into the central nervous system and causes permanent damage to developing brain structures. High level exposures have been known to damage the developing brain since the tragedy of Minamata Bay, Japan in the 1950s. Lower exposures are also dangerous. Epidemiology studies are not completely consistent, but some show measurable and persistent adverse effects on memory, motor, cognitive and behavioral function

in children exposed at young ages to levels that are common in fish consuming populations. It is important to note that some mercury contamination has always existed. Ice

core data from United States Geological Survey, however, show major contributions from the 19th Century California gold rush, World War II manufacturing and the increase in industrial activities. Seventy percent of mercury contamination in water over the last 100 years had been anthropogenic. It is reassuring to note that after the Clean Air Act of 1970, mercury levels began to decline. Unfortunately, levels are on the rise again. These ice core data show that we do make a difference, and can control our effect on the environment and ultimately on ourselves.

Now we move into the areas where uncertainty outweighs data. All five parameters which define special vulnerabilities in infants and children are potentially at play. Organic industrial solvents are potential carcinogens, known to contaminate water and have been implicated in cancer clusters. The oldest example of this was described in Woburn, Massachusetts where contaminated wells have been implicated as the cause for an excess of childhood leukemia cases. This resulted in the famous litigation which was popularized in the book and movie, *A Civil Action*. The science remains controversial and some issues are unresolved, but the Woburn story remains emblematic of the environmental health issues facing health care providers, public health officials and law makers.

Very briefly, other chemicals that are found in drinking water include numerous pesticides. A recent survey by USGS of 5,000 surface and ground water sources found that 90% of streams and 50% of wells contained at least one pesticide. Levels were generally low, but health risks to children are unclear. Also, recently appreciated, is that the thousands

Infants and young children are uniquely vulnerable during critical windows of development.

of pharmaceuticals and personal care products used by all of us are finding their way into waste water and back into drinking water along with other synthetic organic chemicals in common use. A recent survey found that 80% of 130 streams contained at least one of the synthetic chemicals tested, but most were at levels below 1 ug/l. The majority of these chemicals have no defined maximum contaminant level. Sewage treatment does not remove these and the health risks are unknown.

In conclusion, we are left with risk and responsibility. The risk is defined by children's increased exposure to water contaminants by all major routes; their uncertain capacity to detoxify and eliminate contaminants; the unique vulnerability due to immaturity and rapid growth; and their longer life expectancy during which to express disease. The responsibility arises because children rely on us to protect them from harm including health harms from environmental degradation and exposures. I have talked a lot about problems because subsequent speakers are talking about solutions. As a pediatrician, I would be remiss if I did not mention the most obvious solution for early life which is to encourage breast feeding. We must also look to water source protection and pollution prevention and our laws and regulations should have defaults that are specifically child health protective and stress primary prevention.



Jan Pronk with international medical students



Mr. Roland DeSilva, WIT Executive Vice Chair; Dr. Claudia Strauss; and Ambassador Valeriy P. Kuchinsky



VOICES

■ Northwest Training Programs for Health Professionals and Community Advocates: *In Harm's Way: Toxic Threats To Child Development*. Thursday, November 6th (Oregon Health and Sciences University, Portland, OR); Saturday, November 8th (University of Washington, Seattle, WA). To learn more about *In Harm's Way* or to review the Training Program and materials, please visit: www.igc.org/psr/.

For more information:
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Koch, Oregon PSR, angela@oregonpsr.org, 503-274-2720 or visit www.oregonpsr.org; Washington—Martin Fleck, Washington PSR, www.wpsr.org, wpsr@wpsr.org, 206-547-2360 or Elise Miller, Institute for Children's Environmental Health, emiller@iceh.org, www.iceh.org, 360-351-7904.

■ 13th International Conference on Health and Environment: Global Partners for Global Solutions on the theme of "Conflict, Health and Environment," organized by World Information Transfer, co-sponsored by the Government of Croatia and the Government of Ukraine. April 29 and 30, 2004, United Nations Headquarters, New York City.

Further information and registration information will be sent via e-mail in 2004 and will be posted on our web site at www.worldinfo.org

■ The World Summit on the Information Society will provide a unique opportunity for all key stakeholders to assemble at a high-level gathering and to develop a better understanding of this information revolution and its impact on the international community. It aims to bring together Heads of State, Executive Heads of United Nations agencies, industry leaders, non-governmental organizations, media representatives and civil society in a single high-level event. The anticipated outcome of the Summit is to develop and foster a clear statement of political will and a concrete plan of action for achieving the goals of the Information Society, while fully reflecting all the different interests at stake.

The World Summit on the Information Society will be held in two phases. The first phase of WSIS will take place in Geneva hosted by the Government of Switzerland from 10 to 12 December 2003. It will address the broad range of themes concerning the Information Society and adopt a Declaration of Principles and plan of action, addressing the whole range of issues related to the Information Society.

The second phase will take place in Tunis hosted by the Government of Tunisia, from 16 to 18 November 2005.

■ **Correction:**

The Special Focus article in the Spring 2003 issue of the *World Ecology Report* inadvertently omitted the following source: "Beyond Lynn White, Jr," Richard Randolph and Jeremy Yunt (www.counterbalance.net/enviro/intro-body.html)

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World Information Transfer
WORLD ECOLOGY REPORT

World Information Transfer, Inc.
(ISSN #1080-3092)

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New York, NY 10016

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Electronic edition available on:

<http://www.worldinfo.org>

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Second row: Chungate Hwang, Eric Adisa (WIT Interns), Dr. Claudia Strauss, Dr. Christine Durbak, Marina Lystoe (WIT representative to UN in Vienna), Jin-ie Yoo (WIT Intern).



Jay Walker, Founder, Priceline; CEO, Walker Digital, speaking at Luncheon on April 24th



Dr. Mark T. Olesnicky, President, New Jersey Medical Society and Dr. William Rom, Professor and Chief, Pulmonary Division, NYU School of Medicine and Co-Chair of the 12th International Conference.



Left to right: Monica Saumoy, Rachel Samuel (Conference Interns), Dr. Claudia Strauss, Fariyah Perwez, Roma Sharma Samuel (Conference Interns).



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