World Water Council
3rd World Water Forum

• P R E S S R E L E A S E •

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*(Hideaki Oda, Secretary General of the **3rd World Water Forum**, will be available for interviews in Tokyo on Thursday, Nov. 8th. Please call Frederick Kiel to schedule time. William Cosgrove of the World Water Council will be available for interviews in Canada, Thursday, Nov. 8 and Friday, Nov. 9. Call Marshall Hoffman for interviews. TV B-roll is available upon request.)*

World's Lakes Endangered

Over-use, Water Withdrawals and. Pollution Puts One Billion People at Risk

More than half of the world's lakes and reservoirs, which hold nearly 90 percent of all surface liquid fresh water, are facing massive ecological threats that are endangering the entire global environment, say a panel of experts for the **3rd World Water Forum**. Some lakes are dying fast.

Many of the hazards to the world's five million lakes derive from a growing global demand for water, which will be increased as the world population rises by nearly 2 billion people by the year 2025. There are two major population-related phenomena causing degradation: 1) overuse of lake water, especially from diversion of lake water for irrigation, and 2) contamination by toxic substances and nutrients from industry, farms and sewage. These problems have led to declining water levels, acidification and invasions of non-native plants and animals.

"Lakes are among the most vulnerable and difficult to restore of all natural ecological systems, but they have been widely ignored even as they have deteriorated," says Masahisa Nakamura, Director of Japan's Lake Biwa Research Institute in Shiga, Japan, host of the **9th International Conference on the Conservation and Management of Lakes** (Nov. 11-16, 2001), where this press release is being issued. "Lakes in both industrial and developing countries are endangered, though rich countries have the resources to begin adopting policies to save their lakes."

"Natural lakes, especially large ones, are of great economic, ecological and cultural importance, with at least one billion people depending directly on them for their livelihood and for drinking water," says Dr. Mahmoud Abu Zeid, Minister of Irrigation and Water Resources of Egypt and President of the World Water Council, sponsor of the **3rd World Water Forum**, to be held in Kyoto, Japan in March of 2003."Specifically, lakes are a source of commerce, transportation, recreation, tourism, and food and energy production. They also provide important habitat for a diverse array of plant and animal species."

The Lakes Conference is one of a series of international meetings leading up to the **3rd World Water Forum**, which is sponsored by the World Water Council every three years with a different host country. The **3rd World Water Forum** will highlight actions being taken to implement solutions to global water problems. Some 6,000 government officials, representatives of international organizations such as the World Bank and World Health Organization, along with water experts, non-governmental organizations (NGOs) and the media are expected to attend the 2003 meeting in Kyoto, Japan.

The amount of water that is currently stored in the world's freshwater lakes is approximately 35 times that found in rivers, and many of these lakes are important sources of water for human use.
That can change rapidly. For example, between 1950 and 1980, 543 large and medium-sized lakes in China disappeared when their water was diverted for irrigation.

Lakes in industrialized countries that are most endangered are shallow ones, especially those situated in areas of intensive agriculture, which sends tons of agricultural chemical run-off into the lakes, or which have been depleted for drinking water and industrial uses, water experts say.

Such shallow lakes include:

• Lake Okeechobee in Florida, the second largest U.S. lake (excluding the Great Lakes shared with Canada) at 730 square miles, is half the size of Rhode Island, but has an average depth of just 10 feet (3 meters). This lake is a water source for growing nearby populations, which has caused significant water loss, making it a man-dominated controlled water body. The loss of natural flow of water has been adversely affecting the Everglades;

• Arre Lake in Denmark has also suffered severe water loss because of its rising use of water for growing populations. The government has been attempting a recovering project through biomanipulation;

• Hungary's Lake Balaton, which has an area of 232 square miles (600 square kilometers), has a deepest point of only 41 feet (12.4 meters). It also suffered water loss through its use for nearby cities. Authorities have developed what they call Kis-Balanton, a constructed wetland nutrient trap. This project, together with construction of sewerage plants, has made some important improvement in the lake condition.

Other lakes in trouble include:

• Great Lakes of North America -- The region's glacial history and vastness of the lakes create unique conditions that support a wealth of biological diversity, including more than 130 rare species and ecosystems with vast forests and wilderness areas, rich agricultural land, hundreds of tributaries and thousands of smaller lakes, and extensive mineral deposits.

Over the past 300 years, many different types of pollution have entered the Great Lakes system. Even though much of this pollution has been reduced, significant challenges remain. These range from threats to divert water out of the Great Lakes basin to the introduction of non-indigenous invasive species and airborne toxins into the basin. Protection of water quality and sustainable development remain long-term goals.

• Lakes District of the United Kingdom -- The Lake District is an area of around 880 square miles in the county of Cumbria, in the north-west of England.As the name would suggest the area is characterised by its lakes, over a hundred in all, that were carved out of the landscape during the last ice age. Most problems arise from the heavy influx of tourists. The area around Lake Windermere is especially popular, and is called a "honeypot." Environmental problems arise in summer especially over holiday weekends, too many cars lead to congestion, parking problems and an increase in noise and pollution. Footpath erosion along popular paths and along the banks of the lakes is a serious problem. Too many people use these paths, vegetation cover is lost and the soil exposed to erosion.View sites are ruined by the increased number of buildings, caravan parks and camp sites in prime positions. The ecosystem is disrupted as the natural habitats of wildlife and vegetation on the lake shores is disturbed.

• In Scotland, the lakes and streams found in upland areas are highly valued ecosystems with great conservation and amenity value. However, they are also subject to a range of environmental pressures such as acid deposition, metal pollution, catchment and habitat disturbance, nutrient enrichment and climate change. Surface water acidification constitutes the most pervasive environmental problem for lake waters in Scotland Agricultural Pollution Group (SAPG), which encourages more sustainable farming in Scotland, says that agricultural run-off into lakes is a growing problem. The wet weather of 2000, where, in major agricultural areas such as the Scottish borders, rainfall was as much as 150% above average, was blamed for the increase in incidents. The apparent inability of collection and storage systems to cope with the rain, shown by increased discharges of dirty water, livestock slurry and silage effluent, is described as "worrying and a possible sign that investment in storage capacity has been neglected on some farms.

• Lake Biwa in Japan, spread over 259 square miles, has a mean depth of 141 feet, though that measures just 13 feet in the southern portion. In the past, it has suffered from heavy water use from surrounding populations and contamination. Government action has halted further increases in contamination.

• Aral Sea between Kazakstan and Uzbekistan has dropped in area from the world's fourth largest lake to just the eighth largest, because of heavy irrigation and other uses.

• Lake Baikal, the world's deepest lake with an average depth of 2,395 feet (730 meters), is located in Russia's Eastern Siberia. The lake, which contains about one-fifth of the world's reserves of fresh surface water, covers 12,161 square miles (31,500 sq. km.) and is 394 miles long (636 km). Although logging was abolished close to the lake shore in 1987, pollution from industrial plants, especially a pulp and paper factory, continues 24 hours a day. Dozens of international expeditions that researched Baikal in recent years have all concluded that such factories and other intensive exploitation of natural resources are hurting the lake and its inhabitants.

In the developing word, some of the most threatened lakes include:

- Lake Victoria, Africa's largest lake, is undergoing incredibly fast deterioration in water quality, the disappearance of some fish species and significant nutrification (caused by agricultural run-off), siltation and sewage discharge along all of its coastline;
- Lake Chad, in Africa, which has experienced a steep decline in its water levels;

- Many lakes and reservoirs in the Amazon Basin of Brazil have been drained for agriculture and other economic activities, adding to the stress on the rain forests;
- Songla Lake in Thailand, which has been turned a deep green from nutrification, threatening wildlife;
- Lake Bhophal in India has suffered from the untreated waste from millions of people. The Indian government has been conducting extensive research to determine how to save this lake;
- Taihu Lake in China, where experts say you can practically walk on its surface, because of severe pollution.

"If a lake dies, it affects people for hundreds of miles around it," says Prof. Sven Erik Jørgensen, chairman of the United Nations-supported International Lake Environment Committee (ILEC), a non-governmental organization (NGO). "People in the developing world are much more dependent on lakes than residents of industrialized countries. Without water from their lakes, they cannot develop economically."

Threats to Lakes

Water experts say that the threats to lakes are difficult to manage because they are often interwoven, and that attacking one threat often leads to the increase of another threat. The threats include:

Accelerated eutrophication -- Most of the world's lakes suffer from eutrophication, a natural process in which an over-abundance of nutrients lead to a rapid growth of aquatic plants that chokes off other life and which leads to a build up of silt. The ILEC found evidence of eutrophication in 54 percent of the lakes in the Asia-Pacific region, 53 percent of those in Europe, 28 percent of those in North America, and 41 percent of those in South America.

Chemical pollution -- Contamination of lakes by toxic substances from industrial discharges, agricultural chemicals and urban run-off is a critical problem for lakes worldwide and is the second most commonly cited threat to lakes.

Exotic plant and animal species are introduced into lake environments inadvertently in the ballast water of ships, as part of the aquarium trade, from small boats traveling between lakes, in bait and by escaping from aquaculture. In some cases, they have been intentionally introduced to boost fishery

production or to control another exotic species. This is happening more frequently as long-distance transportation becomes faster and easier and international trade increases.

Acidification -- Acid precipitation is a serious problem in many parts of the world, including most of central and northern Europe, the northeastern United States and southeastern Canada, Australia, New Zealand, Japan, and China. Many lakes in Scandinavia and the affected regions of North America have become so acidic in the past few decades that they can no longer sustain the diverse forms of life originally found there. The source of the problem is the large quantities of sulfur and nitrogen oxides emitted by industry, which combine with water molecules in the air to form acids that can travel long distances before falling as rain or snow. Coal burning power plants are especially responsible for producing these contaminants.

Water withdrawals from lakes, their tributaries or the groundwater feeding them have increased dramatically over the last century. Since 1900 estimated water withdrawals worldwide have increased to 3 800 km^3 per year, from 578 km^3 per year. Another study estimates a six-fold increase in water withdrawals from lakes and rivers between 1990 and 1995, a rate that is twice as fast as population growth.

Saving Lakes

Many conflicting interests use lake resources, which makes it essential to involve all of those concerned with the management of lakes in the decision making process. In addition, large capital resources for improvements such as sewage treatment plants are often necessary, water experts say.

The important elements of successful lake management that experts have identified include:

- citizens and stakeholders should be involved in planning and implementation activities.
- the geographic focus must include the entire lake watershed.
- development of a strategic plan allows for careful integration of environmental, economic and cultural considerations.
- effective communication between scientists, occupants of the lake basins and decision-makers is essential.
- an institutional mechanism is needed to facilitate cooperation and coordination among government jurisdictions, businesses and organizations in the watershed.

“We do have examples of lakes that have made major improvements when this multi-faceted approach was used,” says William Cosgrove, Vice-President of the World Water Council. “Most of them have been in the industrialized countries, however, because developing ones lack the necessary resources to devote to lakes.”

Mono Lake in California, which has a surface area of 45,500 acres (180 million square meters) but has an average depth of only 58 feet (10 meters), is an example of a once endangered lake that has recovered its prehistoric levels through a two-decade long effort by residents, scientists, students and conservationists. A nesting spot for millions of migratory and nesting birds, Mono is a saline lake with very unique ecosystem and scenic formations.

"Wastewater treatment with advanced nutrient removal is effective in restoring lakes," Dr. Nakamura says. "Unfortunately, it is also a remedy that is usually beyond the means of developing countries."

Dr. Nakamura points out that some developing countries have succeeded in improving the condition of lakes, particularly of urban lakes with sewerage plants or with some restoration measures. Lakes important to tourism have also been improved in the developing world, including an artificial lake in the Brazilian capital of Brasilia and Lake Lacar in Argentina. Small and shallow urban lakes in major metropolitan districts become the first targets for lake restoration in developing countries for improving aesthetics. The Xiamen city government in China has constructed several sewage treatment plants to clean up once severely polluted lakes within the city.

“We cannot continue with the present attitudes towards the environment, including lakes, unless we are prepared to accept substandard living conditions for future generations,” says Jose Tundisi, Ph.D., former President of the National Council for Scientific and Technological Development, Brazil. "Danger stems from the fact that new problems are emerging with an ever increasing frequency. There are two kinds of deep difficulties in this regard: the disproportion between the speed of ‘problem creation’ and solution, and the situation of pollution costs, which are rising more rapidly than the availability of manpower, financial and material means available for use in solutions. This knowledge suggests a need to change attitudes and create new approaches towards the management of natural resources, including aquatic habitats.”

“These cases do give brighter picture and some confidence in lake restoration in developing countries," says Dr. Nakamura. "In general, however, the problems facing most of the developing countries are quite serious, and their government recognize the need to improve the condition of their lakes not for aesthetics or touristic reasons, but for survival."

Once a lake becomes degraded, it takes a long time and a great deal of effort to restore it to health. As a consequence, successful restorations are rare, particularly in the case of large lakes.

One success story is Lake Washington near Seattle, Washington, which was highly eutrophic (too many nutrients) in the 1960s and early 1970s as a result of the untreated municipal and industrial wastewater being discharged into it. Restoration entailed installing a wastewater treatment system and diverting the treated effluent out of the lake's watershed.

Many of the larger lakes in Europe, including Lake Constance and Lake Geneva, have also shown significant improvement in water quality since the early 1980s even though they are subject to significant pressure from urban and agricultural activities. In these cases, restoration involved the introduction of stringent control measures, including advanced wastewater treatment systems to reduce the excessive amount of nutrients flowing into the lake.

Localized restoration measures have also led to dramatic improvements in water quality but for the most part only in very small lakes. Lake Trummen in Switzerland, for instance (which is only 1 square kilometer in size, or about .4 square mile), was successfully dredged in the early 1970s to correct eutrophication. Lake Orta, a small but deep lake in Italy that was suffering from acidification due to the discharge of industrial wastewater, was restored by adding lime, in addition to upgrading the wastewater treatment plant.

“It is possible to clean up lakes, but such efforts often have to compete with continued use of the lake both as a source of water and wastewater disposal for economic reasons,” says Mr. Cosgrove. “When this exploitation can be curtailed, for example through wastewater treatment before discharge into the lakes, they are often able to recover on their own.

Mr. Cosgrove adds that “managing a lake is very difficult for two reasons: It entails resolving important technological, financial, and institutional issues, and it requires support from industry and the public as well as government. A participatory, watershed-based approach is much more difficult to achieve for

lakes in developing countries, where political instability and the lack of financial resources are more common."

"We hope that the 9th Lakes Conference will lead to an exchange of information on real-world practical solutions to lake problems," says Dr. Nakamura. "Experts will discuss various united efforts on a regional and international level that have led to good results, and which can be replicated elsewhere."

The theme of the 9th Lakes Conference will be "Partnerships for Sustainable Life in Lake Environments: Making Global Freshwater Mandates Work." It will be held in Shiga, Japan Nov. 11-16, 2001.

"**The 3rd World Water Forum** will discuss all water issues during its crucial meeting in 2003, including the problems with lakes discussed at this 9th Lakes Conference," says Yoshitsugu Kunimatsu, Governor of Shiga Prefecture, where both the Lakes Conference and the 3rd World Water Forum will be held.

"Lakes have a lot to offer in the discussion of the all freshwater debates, including river basins and groundwater," Dr. Nakamura adds. "To be able to manage lakes, you have to take care of all aspects of freshwater simultaneously -- water supplies, flood control, agriculture, fisheries, pollution control and ecosystem services. In addition, competing interests are usually extremely complicated and severe. You have to live with conflicts of interest. The concept of integrated water resources management has been introduced as a key for improving the freshwater outlook, but for many lakes it has been part of life for many decades, if not many centuries."

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