

PROTECTION OF WATER RESOURCES FOR FUTURE GENERATIONS

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Water resources are becoming increasingly scarce due to overexploitation, wastage and pollution, while population and industrialization are pushing up water demands. Mismanagement of water has resulted in often irreversible environmental damage at an unprecedented scale. The inadequacy of water services as well as the intensifying competition for clean water has inspired a remarkable consensus among many developing countries and external support agencies on the need for integrated planning and management of the resource and its use. Many people see that the world food crisis is related to water shortage and use, but many crops are still grown in the wrong place at the wrong time, consuming much more than needed.

Many governments claim that food security or food self-sufficiency is their policy towards stability, but we are not clearly aware of the possibilities of efficient trade mechanisms, which could help alleviate food problems and water scarcity. Most of us would have little difficulty agreeing that the first decades of the next century are going to bring extraordinary difficult challenges to those concerned with managing global water resources. Much of these challenges need to be targeted on sustainable development.

The environmental aspects of the needed efforts are attracting a great deal of attention in the media and with the public at large.

ABSTRACT

Fresh water on the Planet Earth, has no nationality, does not recognize boundaries, is not tied in time or space, is neither create nor destroyed, and above all is unsubstitutable.

Fresh water is the heritage for all life on earth. Every living creature has the right to its fair share of fresh water. Water is an element that unifies the World and makes this planet unique among the ones we know.

As human beings we have responsibility to protect this precious resource, for us and for the future generations.

If we set aside our temporary desires for power and domination, if we strengthen our resolve to cooperate, share and respect other's needs, if we would like to see life continue and flourish on Earth in peace and harmony.

The future is no longer what it was thought to be, or what it might have been if humans had known how to use their brains and their opportunities more effectively. But the future can still become what we responsibly and realistically want.

RÉSUMÉ

L'eau douce sur la Planète Terre n'a pas de nationalité, ne reconnaît aucune frontière, n'a pas de contraintes temporelles ou spatiales, elle ne peut pas être créée ni détruite et, ce qui est le plus important, elle est irremplaçable.

L'eau douce est l'héritage pour toute forme de vie sur la Terre. Toute créature vivante a droit à sa juste quote-part d'eau douce. L'eau est un élément qui unifie le Monde et rend unique cette Planète.

En tant qu'êtres humains, nous avons la responsabilité de protéger cette précieuse ressource, pour nous et pour les générations futures.

Si l'on met de côté nos souhaits temporaires de pouvoir et de domination, si nous fortifions notre volonté de coopérer, partager et respecter les besoins d'autrui, si l'on souhaite que la vie continue et fleurisse sur la Terre dans la paix et l'harmonie.

L'avenir n'est plus ce qu'on imaginait, ou ce qu'il aurait pu être si les êtres humains avaient su comment utiliser leurs esprits et leurs opportunités d'une manière plus efficace. Mais l'avenir peut encore devenir ce que nous souhaitons en termes raisonnables et réalistes.

We realize that the welfare of the human race hinges not only on moderation in the quantity of water readily available but in its quality.

Salinization destroys our soils and crops; silting of reservoirs and harbors reduces their capacity and efficiency, polluted drinking water wracks with diseases our bodies and those of our children.

WATER AND DEVELOPMENT

Access to water must not be considered an end in itself, but rather a means to other ends; providing decent health, industrial and agricultural production, and maintaining our natural ecosystems.

In many countries, easily accessible water resources have been developed and the costs of using remaining sources will be increasingly expensive.

Rapid population growth in regions where the climate is dry is leading to increasing water scarcity,

and within a few decades, unrestrained water demand could outstrip the amount that can be sustainably provided in many areas. Rivers, lakes and groundwater aquifers are increasingly contaminated with biological and chemical wastes. Vast number of people lack clean drinking water and rudimentary sanitation services. Millions of people die every year from water-related diseases. Massive water developments have destroyed many of the world's most productive wetlands and other aquatic habitats.

The economic and hydrologic resources for major new irrigation projects cannot be found, and expected changes in global climatic conditions will alter future water supply, demand and quality.

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Scientists, planners, developers, and the public are slowly beginning to perceive the intimate connections between the availability and quality of fresh water resources and environmental problems.

WATER AND ECOSYSTEMS

Only 10% of the earth's surface is covered by inland waters; 70% is covered by the oceans. Yet the oceans contain only 7% of the animal species alive today, while inland waters contain 12%. Some estimates say that the total faunal diversity of rivers is 65 times greater than that of the sea. It is expected that water quality, species distribution and ecosystem processes will be altered in the future at rates faster than ever before. These accelerated effects will be caused by increases in human populations, decreases in water quality, invasions of nonnative species, & climatic changes.

In addition to species introduction, modification of free flowing rivers for energy or water supply has many effects on aquatic ecosystems including losses in species diversity and floodplain fertility. New dams replace freeflowing rivers with standing pools of water, with concomitant ecological effects.

The lack of better data and information on even the most common water quality problems such as fecal contamination, microbial diseases, and the types and extent of chemical contamination, must not stop us from acting to prevent future contamination of our fresh waters on an international level.

SUSTAINABILITY OF IRRIGATED AGRICULTURE

The sustainability of many irrigated agricultural systems around the globe is jeopardized by the activities of many other systems such as the industrial effluents and the municipal sewage wastewaters. The problem has thus been shifted from water management and the necessity for existence of a reliable drainage system as internal problems to the reuse of a mixture of fresh and nontraditional water resources as external problems.

The sustainability of those irrigated agricultural systems is hence dependent on actions and policies outside the control of those systems.

Actions and policies in many developmental projects were blind in looking to their impacts on the natural systems and we are harvesting now the byproducts of such projects.

Industries and municipalities, which dump wastes, effluent and sewage waters in streams, which are used for agricultural production, are considered free riders of the other systems. This concept of bad behavior has to be looked at seriously and that picture has to be clear to the users of such streams. The tools and rules of the organizations, which consume fresh water resources, have to be clear in terms of what could be done to alleviate the managerial and operational problems of wastewater management resulting from the systems.

WATER USE EFFICIENCY

Unfortunately, the world for the most part has yet to apply to water the valuable lesson energy taught us: the importance of doing more with less. Water scarcity is going to be the dominant issue in the 21st century which is right around the corner. Worldwide extraction is growing by 4 to 8 percent a year to meet the growing need. It is becoming more and more evident now that we need to launch a water efficiency revolution. River waters are shrinking as they are diverted to more cities and agricultural fields. Groundwater levels are falling in many areas as overdraft is taking place more than what can be replaced by nature. Irrigation efficiency worldwide is estimated at less than 40%, so most of the water diverted for agriculture never even benefits crops. We need to rethink our whole approach to water. Efficiency must be the option of first choice.

As we enter an era of water scarcity, we need a new ethic, one that promotes efficiency and protection of the ecosystem in all we do.

Part of that ethic is an acceptance of the obligations that accompany the rights we assume we have to water obligations to protect water's many ecological functions, to get as much possible out of the little we take from the natural course, and to help others receive its benefits.

The awareness of the grave discrepancy between mankind's fast growing numbers and the limited supply of fresh water is among the most important insights to be shared today.

ACTIONS FOR ENVIRONMENTAL SUSTAINABILITY

Regulatory plans and actions seem hard because they carry within their confines, the necessity to change habits, behaviors and assumptions. And since quality is an intangible parameter, educational programs are needed in order to increase the awareness of the individuals and the institutions.

Environmental issues are unique and have different boundaries which could be either local or global. Many scientists, organizations (national, regional, local or international), individuals and communities have interests in restoring their environments within the specific boundaries of their habitats.

Linkages and overlaps between boundaries should be the first step to understand what is happening in the system under consideration, and how it is being effected or affecting other systems. Whoever is interested in restoring the environment should look at the boundaries of the system and the interaction between its internal components and the external factors. How to increase the awareness of others should be at the top list of priorities, when research is being done, when data is handled and when findings are presented to both decision-makers and the public.

Integrated development of shared water resources has become a necessity. However, political boundaries are of a conflicting nature with the River Basin boundaries where countries share surface waters, groundwater and wastes. On the local or national levels, sectorial management and demand management became another conflicting issue between different sectors.

Water could be an issue for conflict or an issue for cooperation. The process of transfer from conflict to cooperation does require a lot of work. On individual basis, farmers who use branch canals to satisfy their crop water requirement have objectives similar to those of states which supervise, operate, and maintain their systems to satisfy the demand of their different systems. Both share objectives with international organizations interested in water resources, management and planning to satisfy peace and tranquility between nations. The question then is whether the objectives of earth system could be met within its specific boundary and without affecting others?

The term sustainability could be maintained or abused depending on the harmony of those systems to act and react in a positive manner.

Donor agencies have another role in getting agreements and approvals of the different parties which implement a project or are affected by the project.

The future hope for humans to preserve their environment for the sake of themselves and the coming generations is quite promising. The following is a list of areas for future environmental activities between states including many inputs from individuals: males, females, and even children. Different sectors which deal with water resources still have many issues to be worked out, and a lot of opportunities exist to develop new business areas.

1. Users' participation in the management of water which is conceived in many parts of the world as a public good is one of the new areas. Countries with experiences involving users in the decision-making process succeeded to restore their small environmental system due to the accumulative human thinking involving different habits, norms and actions for preserving the environment which are even more valuable and effective than many governments are.

2. The hydrological cycle starts with rainfall, but due to the fact that there are changes in the local or global climate in many areas of the world, a lot of work still needs to be done in terms of both micro and macro climatological changes, and their causes and effects on the sustainability of many systems.

3. Political boundaries between states do not necessarily match with the hydrological boundaries of a river basin or a groundwater aquifer. This match can only take place with full cooperation and coordination between the different states which share the same hydrological boundary. The issue of hydropolitics is in need

for technically sound, imaginative, creative, and environmentally sustainable ideas and projects to be considered as a basis for starting cooperation and coordination.

4. The non-conventional waters are becoming a harmful ingredient to many ecosystems nowadays. The issue of wastewater management has thus come up to the fore in recent years, and non-conventional water could become a reasonable resource, where recycling could be utilized in many ways, otherwise, it could be harmful. This subject still needs a lot of research in terms of its long-term impacts.

5. The interdisciplinary system approach has proved to be very effective in studying and implementing water resources projects. Part of the process is the learning experience when applying this approach to any defined environmental system. Even though this approach has been used successfully, yet it should be generalized on a large scale. And though its process is simple, yet ways to convince others to use it need time as well as hands-on and minds-on training.

6. Economics of environmental impacts need more of analytical tools where long- and short-term benefits and impacts have to be taken into considerations. The gained experience from previous projects that were implemented during the past decades has enriched the human knowledge of the unfavorable long-term impacts. The advancements in the communication methods have contributed as well to the transfer of knowledge and information. Economics of long-term impacts which might exceed the life span of the project is an area which needs further work.

7. Both small-and large-scale thinking are needed when dealing with environmental issues, where any system performance is dependent on the accumulative thinking of its individuals and institutions, as well as on the managerial capacity and the feed-back mechanism within the system. Educational programs and continuous training are key factors in increasing the awareness of the system users. It is truly believed that investment in people would contribute much more in preserving the environment than investment in the hardware of the system.

INSTITUTIONAL FRAMEWORK FOR WORLD FRESH WATER

The growth in global population and the level of industrial development and water demand has led to an increase in the risks of political conflict over the Earth's finite fresh water resources. A substantial portion of fresh water resources is contained in international drainage basins which are shared by two or more nations. These basins make up nearly 50% of the Earth's land area. While there are numerous treaties regulating the use of shared water resources, international agreements are often either inadequate or lacking entirely in many parts of the world where water is in greatest de-



mand. The recent finalization of the negotiations on a fresh water convention under the auspices of the UN is a great step towards a world convention for fresh water of rivers.

The key to peaceful solutions of disputes over shared water resources is continued communication between the states concerned, starting preferably on the technical level, over all aspects; from the hydrologic data to basin-wide development plans.

Existing international arrangement for cooperation in water resources proved to be inadequate. The need for improved institutional arrangements for international cooperation in assessment and management of the world water resources has been recognized for many years. Numerous organizations have addressed this issue, individually and collectively.

During the 8th World Congress of the International Water Resources Association (IWRA) convened in November 1994 in Cairo, Egypt, it was recommended to establish the World Water Council, an umbrella under which the work of all international water associations and organizations can be coordinated.

Early in 1996, the water international community created the "World Water Council". It became an international water policy think tank. Its major task is to promote awareness, to explore the limits of our knowledge and to expand them, to propose and to advocate the complex long-term solutions that are this generation's debt to the future.

The Council in response to the need for a better understanding of all the complex issues related to water: quantitative and qualitative, political, economic and environmental, that must go into shaping a global, long

term, water policy for the next millennium towards this need, the Council has initiated a complex and overarching study, consultation and analysis that will lead to a global "Vision for Water, Life, and the Environment" in the next century.

In preparing the long-term Vision, the Council wants to highlight the needs to integrate into an overall framework the various water-related activities that contribute to the improvement of the quality of life and the preservation of ecosystems. The vision will address several options to improve the quality of life including the following:

- Food security through aquaculture and efficient use of irrigation water;
- Adequate water supply and sanitation services;
- Development of water resources for the production of hydro-power; and
- Protection of coastal areas and securing navigational needs.

To ensure the sustainability of life, the Vision will also address the issues of the conservation of fresh water biodiversity and more generally the preservation of the ecosystems against the negative impact of water-related projects such as pollution and the spreading of human diseases.

Several committees will work on all the above issues at a national, regional or global level under the guidance of existing centers and international organization, and the Vision will be presented to the "Second World Water Forum" to be organized during the year of 2000.

EAST-WEST SOLIDARITY

North America, Western and Eastern Europe are, by and

large, considered as water-rich nations. Their fresh water resources are among the highest in the world and their population density and future growth are among the lowest.

Water demands are, however, high due to high industrialization, urbanization and standards of living, all requiring high levels of demands.

A very quick assessment reveals some general differences and common problems. The common problems are:

- Quick deterioration of water quality;
- Rising demand for water; and
- Rising environmental awareness.

The differences are:

— The East is facing acute water quality problems and waste-disposal bottlenecks. This is due to long neglect, lack of awareness of centrally controlled systems of long-term problems, underdeveloped technologies for wastewater treatment and present financial and institutional downturn.

— The West has access to advanced wastewater treatment technologies, environmental conservation systems and relatively rich financial resources. It is conceivable that a system of cooperation between the West and the East can be mutually beneficial to both sides.

The West can supply the badly needed technologies and financial resources to reduce wastewater discharges into fresh water systems of lakes, rivers and aquifers of the East. This will alleviate the fresh water problems of the East in the short term and help in rebuilding a more solid base for sustainable development of indigenous technologies.

Fresh water can be the medium for peaceful cooperation with local, national and global effects. One example worth mentioning here is the Aral Sea. This was heralded as a major development effort in the former Soviet Union. The present day effect is that the Aral is about disappeared.

The irrigated lands are facing the twin menaces of salinity and waterlogging, the present five states are in a financial crunch. A program led by the West under the auspices of the World Bank is undertaking a program of action to tackle these problems.

NORTH-SOUTH SOLIDARITY

Much has been said about the North, the rich in technology, water and financial resources; and the South is poor in all of the above. Development assistance has been steadily in the decline and economic downturn affects many countries especially those in Africa. Fresh water problems are enormous in most of Africa, parts of Asia and Latin America. Forecasts for the next fifty years show that 80 percent of the population in developing countries will be facing water shortages, acute water quality deterioration, and environmental degradation. This will have a severe negative effect on social, eco-

nomical and political stability leading to endangering world peace and security.

Renewal of the commitment of the developed North to reach the target of 0.7% of GNP to be directed to development assistance is the first step. Retargetting financial assistance to support rapid action for fresh water resources development in the following key areas:

- Supply of clean drinking water and sanitation programs to satisfy rural and urban population needs.
- Remedial actions to reduce wastewater discharges, beat waste and recycle industrial and municipal waters.
- Improve water use efficiency for municipal, industrial and agricultural purpose to meet economic, social and environmental needs.
- Capacity building and institutional strengthening.
- Stimulation of private sector financing and supporting management transfer in the fresh water fields.

The North has largely neglected the problems of fresh water in the South. This situation cannot last for very long before we reach a catastrophic situation. Without infusion of serious and steady assistance from the North, it is not possible that the South can meet the present or future demands for water or be able to solve current or future problems in any significant way.

As a representative of the South, I appeal to those nations of the North: East and West, to be, seriously and significantly, engaged in the fresh water problems of the South. The time for rhetoric is over; the time for action is long overdue.

SOUTH-SOUTH SOLIDARITY

As much as I stressed the needs of the North-South cooperation, I believe that a great deal can be done through South to South cooperation. A number of areas that do not depend on imported technologies or external financial assistance can lead the list of cooperative efforts among developing countries.

Let me highlight a few of them:

- Establishing acceptable, just and fair water allocation systems for shared international waters, both surface and groundwater, with sustainable institutional and legal system that can address and settle disputes peacefully and mutually.
- Transfer of knowledge, appropriate technology and information on use of fresh water for food production and other uses, can enhance economic and social development of concerned nations.
- Engage in cooperative efforts to support R & D on common problems so that indigenous solutions can be formed and sustained.
- Harmonize training and education systems to generate the professional cadre needed to manage and operate fresh water systems.
- Avoid using water as an element of dispute but use it as a medium of cooperation and a tool to develop a lasting peace. ●