

World declaration Water Storage for Sustainable Development



In 2050 world population will likely exceed nine billion inhabitants

The global increase in population, both rural and urban, and the socio-economic development with increasing living standards for all, will continuously raise the requirement for water, food and energy consumption. Populations will continue to concentrate in cities where the need for water, food and energy will be most acute. The rapid population growth and socio-economic development means that by 2050:

The continuously increasing demands of water, food and energy will challenge the natural resources. We need to face this exceptional situation because at the same time:

- Due to climate change, water distribution may become more irregular, and disasters related to floods and droughts will worsen.
- Energy sources are limited:
 - Fossil energies are polluting and emitting greenhouse gases and their reserves are limited;
 - Nuclear energy is restricted to industrial countries which have the technology and the security of nuclear energy has aroused people's wide concern;
 - Variable renewables such as wind and solar sources are valuable and should be developed as much as possible; however, they need back up. Hydropower can play this role, but policies and markets are not encouraging this.

Water is precious and water storage infrastructure will become increasingly important!

Water storage infrastructure, providing multiple water services, is vital for human development. Out of the 40,000 km³ of freshwater available each year, only 9,000 km³/year is accessible. Through the construction of more than 50,000 large dams and millions of small reservoirs throughout the world over the past 5,000 years, many communities are able to enjoy reliable water services. These water storage facilities regulate about 4,000 km³/year.

The role of dams and reservoirs in sustainable development has already been acknowledged in various declarations: World Summit on Sustainable Development (2002), Beijing Declaration on Hydropower and Sustainable Development (2004), Dams and Hydropower for African Sustainable Development (2008), and the Ministerial Declarations of the Fifth and Sixth World Water Fora (2009/2012).

Humanity is facing a more severe water situation than it has ever faced in the past.

To face this century's greatest challenge – to manage water sustainably – we need to strengthen

existing water systems and further develop new water storage infrastructure. This will require adequate legislation and funding. It must also include the optimization of the use of water by combining multiple purposes:

- Flood management and drought mitigation
- Irrigation for food production
- Energy production
- Drinking water and sanitation
- Industrial water supply
- Navigation
- Environmental services
- etc.

There is need to improve the maintenance and operation of existing water storage infrastructure.

Taking into account the aging process, improved knowledge, and the effects of climate change, there is a need to increase efforts to maintain the existing water storage infrastructure. For example, modern monitoring and engineering can improve the safety of structures against extreme earthquakes and floods. Climate change is likely to make reservoir regulation more difficult as hydrological patterns change. Reservoir regulation must be optimized to store more floodwater, while considering the requirements of both upstream and downstream areas. With the latest forecasting systems and real-time acquisition of data, dynamic operations to control water levels in reservoirs can achieve the best balance between infrastructure safety and the wise use of water resources.

There is need to accelerate the development of new water storage infrastructure for multiple purposes.

- **Flood management and drought mitigation**
Floods and droughts are the greatest water management problem for many countries with insufficient water storage infrastructure. Every year, more than 200 million people are affected by flood damage. Due to climate change, floods and droughts will become more frequent and severe. Water storage infrastructure is a key component of water disaster mitigation, especially in developing countries.
- **Irrigation for food production**
Irrigated agriculture covers about 277 million hectares, about 18% of the world's arable land. This makes this land remarkably more productive, providing about 40% of the world's crop output. Irrigated lands also concentrate agricultural employment, with nearly 30% of the rural population working in these areas. Much of the world's food production must be in regions with long dry seasons. Since arable land area is limited, the

additional production will require efficient use of existing irrigation facilities and extending the area under irrigation through increased water storage facilities. It is estimated that 80% of additional food production by 2025 will need to come from irrigated land.

- **Energy production**
Hydropower supplies about 16% of the world's electricity today. Hydro supplies more than 50% of national electricity in about 65 countries, more than 80% in 32 countries and almost all of the electricity in 13 countries. The flexibility of this renewable resource is fundamental in matching electricity services with demand and contributes to the development of other intermittent sources of electricity production such as solar and wind, which are less flexible. Consequently, the energy stored in water, converted through pure hydropower and pumped storage, improves the reliability of power systems in a clean and efficient manner. Only 30% of the world's identified hydropower potential has been developed. Transforming the undeveloped hydropower potential into reality would save extraordinary amounts of fossil fuel, reduce greenhouse gas emissions substantially and improve the management of water resources.

- **Drinking water and sanitation**
One in eight people in the world do not have access to safe water for drinking, cooking and sanitation. With the expected population growth, and without investment in storage, the number of people who could not have access to water will reach 4.2 billion by 2025. One of the Millennium Development Goals calls for halving, "by 2015 the proportion of the population without sustainable access to safe drinking water and basic sanitation". Investment in sustainable water storage infrastructure in developing countries would help achieve this goal.

- **Industrial water supply**
Every manufactured product uses water during its production process. Industrial water use includes purposes such as processing, washing, diluting, cooling, or transporting a product as well as for sanitation needs within the manufacturing facility. Industries that use large amounts of water produce food, paper, clothing, chemicals, refined petroleum, or primary metals, all of which would aid developing countries to increase the value of their natural resources. However, sustainable and reliable water supply is a precondition to encourage establishment of such productive industries.

- **Navigation**
Inland navigation for goods transportation, compared with land and air freight, has many environmental and economic advantages. Inland navigation is also well suited for handling large quantities of cargo and items with large dimensions. For those reasons, nations have encouraged inland navigation on canals and natural river courses. The control of levels in water courses for navigation requires water storage, and this can be an important role for multipurpose reservoirs and infrastructure.

- **Environmental services**
Water storage infrastructure can keep the healthy life of rivers through ecological operation and serve wider environmental services. They can allow upkeep of minimum flows during dry seasons which enable the preservation of many aquatic animals and plants during droughts. Moreover, dams and reservoirs contribute to stabilizing ground water levels in adjacent land areas. Reservoirs can also be used to create new and biologically desirable habitats and to irrigate wetland biotopes or wetland forests.

We, therefore, call for joint efforts to develop water storage infrastructure in a sustainable way.

Today, water and energy schemes can be built in a safe, economic, and eco-friendly way. Water, food and energy services are intricately linked and need to be developed in an integrated approach. Based on the multi-faceted and cross-boundary nature of water issues in the present world, we call for:

- Continued cooperation among various stakeholders, government authorities, research institutions, businesses, civil societies, local communities and so on, to speed up the development and implementation of effective and sustainable water solutions.
- Development of sharing rivers with win-win cooperation to better serve regional requirements on water, food and energy.
- Improved policies, guidelines and protocols to evaluate and mitigate environmental and social impact of various storage options and to address the concerns of affected communities.
- Funding agencies to effect action in countries which need water storage, promoting national and regional development, with innovative financing mechanisms.

In conclusion

- **Water is life and water storage infrastructure is an indispensable tool for society.**
- **Investment in water storage infrastructure is investment in the green economy.**
- **The services they provide will be crucial in the mitigation of, and adaptation to, climate change.**
- **To meet growing demands for water, food and energy, it is time to develop solutions for better use of water resources, especially for developing countries, and to match political commitments with action.**
- **A balanced approach, combining large, medium and small reservoirs, is required; one that takes into account sustainable development, with full commitment to minimize negative impact.**
- **The organizations signing this declaration commit to collaborate with all partners and stakeholders that share this common vision.**



Approved on 5th June 2012 in Kyoto, by:

The International Commission On Large Dams (ICOLD),
The International Commission on Irrigation and Drainage (ICID),
The International Hydropower Association (IHA),
and the International Water Resources Association (IWRA).