WWDR4
Managing Water under Uncertainty and Risk

Stakeholder Briefing Notes

Educational, Technological and Scientific Community

Water makes a critical contribution to all aspects of personal welfare and economic life. However, global water resources are coming under increasing pressure from growing human demands and climate change. Protecting water resources, optimizing the use of water across personal and water-intensive economic activities and establishing sustainable levels of future supplies of water resources and services provides a major technological challenge and opportunity. The ability of the scientific and educational community to respond to these issues will help to secure the future sustainability of water resources and to raise economic and social welfare to attainable levels.

Responding to the challenges and stresses of the future will require a different mindset from water managers and users, compared to what has sufficed so far. New generations of water stakeholders - schoolchildren and students – can carry the new messages into their working and social lives. Those involved in scientific and technological research, both academically and commercially, should find water a fruitful and profitable application of their talents.

The narrowing gap between the supply of and demand for water will necessitate new behaviour, new science and new technology, to complement and give effect to the policy changes that are called for. Four sectors make up the bulk of water use: production of energy; agriculture, industry and human consumption. Across all these activities, demand is growing.

- All sources of energy and electricity require water as part of the process of production. Energy is itself a component part of making water available to human and economic uses, whether through pumping, transportation, treatment, desalination and irrigation. Population growth and increasing economic activity are expected to cause a surge of energy consumption, particularly in non-OECD countries.
- Production of crops and livestock is water-intensive: agriculture accounts for 70 percent of all water withdrawn, and 90% of what is consumed. Best estimates of future global agricultural water consumption are that this will increase by about one fifth by 2050.
- Water is an integral part of many industrial processes and demand will increase in line with increasing economic activity.
- The main source of demand for drinking water, sanitation and drainage comes from urban communities. The urban population of the world is forecast to practically double over the first half of the current century.

Climate change is expected to have a major impact on the availability of water mainly through an increasing variability of water supplies and growing extremes of climate. The frequency and impact of water-related disasters is likely to increase, including a greater incidence of floods and droughts. Availability of robust data is a huge problem: water managers are now having to deal with extremes of events that have not yet been observed and are outside the range of variability described by past experience.

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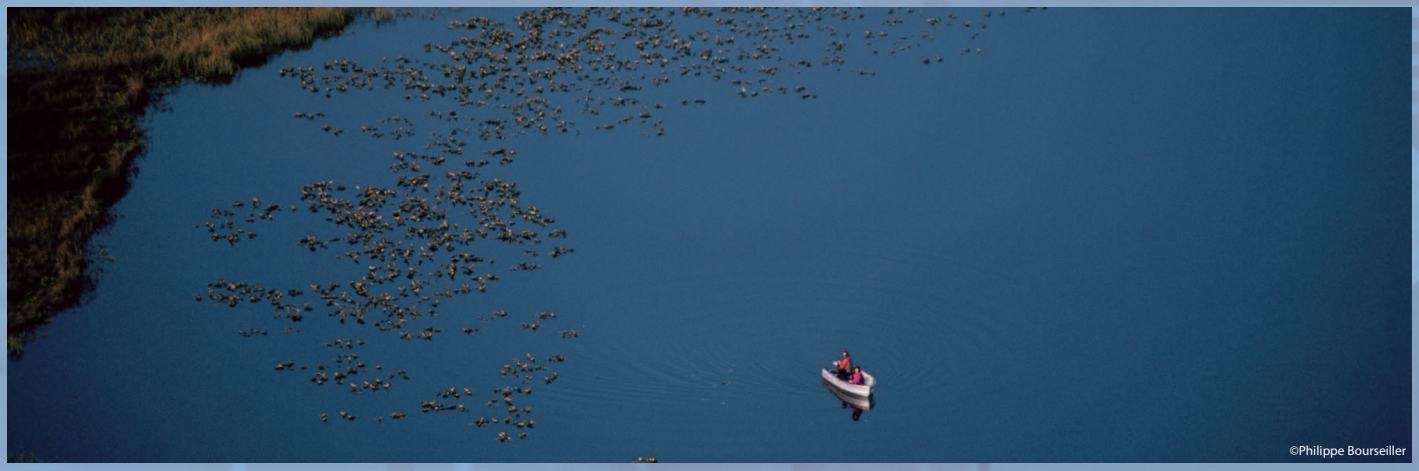
Technology is playing an increasingly important role in the protection and conservation of water resources. For example:

- The development of techniques that enable evapo-transpiration from crops to be measured accurately.
- Making accurate estimates of precipitation using data about signal attenuation between mobile phone towers, which means that telecommunications service providers can help to fill data gaps.
- The GRACE family of satellites have enabled the application of remote gravimetric measurement to determine changes in the total water 'stock' in specific geographical areas, demonstrating the potential to monitor changing groundwater reserves in large alluvial basins.



- A pilot initiative of the WWAP, basing the estimate of available water on a combination of observed hydro-meteorological and surface elevation data, which produces long-term moving averages of total annual renewable water resources (TARWR).
- Direct use of water by field crops can now be reliably assessed using remotely accessed data.

Certain specific issues have the potential to transform the availability of data to underpin policy development and to reduce future risk and uncertainty. Examples of these are:

- Better monitoring of groundwater resources and abstraction rates, not least for abstraction licensing purposes.
- Better monitoring of the amount of surface water actually abstracted from rivers and dams to irrigate fields.
- Technological measures to reduce surface water pollution and irreversible contamination of acquifers.
- Increasing water productivity in agriculture: for example, better use of affordable technology by agriculturalists to check crops and soil moisture so as to increase the efficiency of irrigation schedules.
- Developing infrastructures for better rainwater harvesting.

Such issues make water an exciting frontier for teaching, research and technological development.

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