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When Water Lights the Fire

ALEPPO, SYRIA and JOHANNESBURG, SOUTH AFRICA. 26 August 2002 — Diamonds, gold, oil, land, even spices, have all led to conflict of one kind or another. Yet a simple molecular combination—H₂O— may challenge the current century as the most persistent source of cross-border disagreement. The rapid expansion of population, and increasing demand from industry, in many already water-scarce developing countries is generating yet more demand for fresh water. World Bank estimates suggest that by 2025 around 3 billion people in 52 countries will face either periodic shortages of water or a chronic water poverty.

For more than 5,000 years water has been managed to maximize its role in agriculture; many of those techniques were adopted and spread usefully in Europe, West Asia and North Africa, thanks to the influence of Imperial Rome.

The historians of two millennia ago recorded that much of what is today regarded as arid land flourished with field crops and productive orchards. It is likely that the Mesopotamians were the first engineers to harness the waters of the major rivers — in their case, the Tigris and Euphrates — for grand agricultural irrigation schemes.

No clear international law exists to govern cross-border disputes over water flow. The World Water Convention, coordinated by the World Water Council, is keen to develop a statement for each of the different regions of the world. This will be based on how countries in those regions see water issues developing over the next 25 years. From the information to be collected it will be possible to develop advance warning scenarios for crisis management and for sustainability.

The United Nations Environment Programme (UNEP) has already come up with a 'water exploitation index' to measure the amount of water used by a country as a percentage of its renewable water resources such as rainfall and river flows. By this measurement, an index of more than 50% indicates potential future difficulties. Tunisia, Egypt, and Libya, for example, all far exceed 50%, and Morocco and Algeria are expected to follow suit as they increase water use to supply increasing populations.

At present, only a few riparian neighbors have been able to settle differences on water extraction. India and Bangladesh argue over the Ganges while Iraq, Syria and Turkey discuss the Euphrates but have no formal treaty arrangement on either the volume or quality of water leaving Turkey for its more southerly downstream neighbors.

There are exceptions, however. Sudan and Egypt now have an agreement on the level of extraction each may make from the Nile.

Water management for sustainable development is at the heart of two of the Future Harvest Centers of the CGIAR: the International Center for Agricultural Research in the Dry Areas (ICARDA), based in Aleppo, Syria; and the International Water Management Institute (IWMI), based in Colombo, Sri Lanka. Of various options to deal with alarming water shortages, increasing water-use efficiency is particularly promising. By improved irrigation management, it has been possible to more than double wheat yields. Improved water-harvesting techniques and supplemental irrigation, and deficit irrigation, are other options to produce more with less water. Water harvesting concentrates rain water from very localized areas or up to several hundred square kilometers by building barriers and channels to guide runoff into ponds, reservoirs or lakes. ICARDA's research reveals that at least one-third of the full irrigation requirement could be saved without any loss in wheat productivity. The Center has developed recommendations for farmers to determine the correct level of supplemental irrigation for given rainfall zones, seasons and level of inputs such as nitrogen fertilizer.

Water quality is another serious issue. Most open systems suffer from evapotranspiration leaving a steadily increasing legacy of salt which enters the soil profile before being leached out.

ICARDA has achieved considerable success in growing forage crops with marginal quality water, including treated effluent. On both micro- and macro-scales, there are improvements in water use to be gained from blending water of varying qualities to produce a standard acceptable to individual crops. This can be done at farm level with mixtures of surface and borehole water or on a national scale as in Egypt. The Al Salam Canal will take 10-15 cubic meter a second of mostly drainage water from the Nile Valley under the Suez Canal to Sinai for blending with groundwater.

This is also giving plant breeders more work. They have had considerable success in transferring genes which confer drought stress resistance from wild species into cultivated varieties of wheat and barley. Tillage practices that conserve soil moisture are often overlooked by growers with a fixed management approach until the effects of extra yield are physically demonstrated.

The objective of ICARDA and IWMI research is to provide more water for agricultural production through the use of cutting-edge science. By reducing the level of water scarcity, these Future Harvest Centers seek to increase food production and, indirectly, reduce the potential for conflict over cross-border issues.

ICARDA's (www.icarda.org) mission is to improve the welfare of people and alleviate poverty through research and training in dry areas of the developing world by increasing production, productivity, and nutritional quality of food, while preserving and enhancing the natural resource base. ICARDA is a Future Harvest Center.

Future Harvest (www.futureharvest.org) is a global nonprofit organization that builds awareness and support for food and environmental research for a world with less poverty, a healthier human family, well-nourished children, and a better environment. Future Harvest is an initiative of 16 food and environmental research centers that receive funding from the Consultative Group on International Agricultural Research (CGIAR).