



# Unlocking the water potential of agriculture



FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

## KEY FACTS

Freshwater use in 2000: agriculture 69%, industry 21%, domestic 10%.

In 2000, 42% of arable land in Asia was irrigated, 31% in the Near East and North Africa, 14% in Latin America and the Caribbean, and only 4% in sub-Saharan Africa.

Irrigation increases yields of most crops by 100 to 400%. Over the next 30 years, 70% of gains in cereal production are expected to come from irrigated land.

Over the past 30 years, the irrigated area expanded by about 1.6% a year, giving a total increase of some 100 million ha during 1962 to 1998. Over the next 30 years, the irrigated area will increase annually by 0.6%, and the total increase will be around 40 million ha.

Sub-Saharan Africa uses only 2% of its freshwater resources for irrigation (South Asia 36%, Near East and North Africa 53%, Latin America 1%, East Asia 8%).

To produce 1 kg of wheat, 1 m<sup>3</sup> of water is needed. It takes at least 1.2 m<sup>3</sup> of water to produce 1 kg of rice.

It costs around US\$0.90 to desalinate 1 m<sup>3</sup> of sea water. Desalination is far too expensive for staple food production.

In large areas of India and China, groundwater levels are falling by 1 to 3 m per year, causing intrusion of seawater into aquifers and higher pumping costs and jeopardizing agricultural production.

## More crop per drop

World population will grow from around 6 billion people today to more than eight billion by 2030. Thus an additional two billion people need to be fed within the next 30 years.

Almost the entire population increase will be in developing countries. FAO projects that world food production needs to increase by around 60 percent to feed a growing world population.

Agricultural water use will be a key element for increasing food production, especially in many developing countries, where water is often scarce. Currently around 800 million people in developing countries are chronically undernourished.

While there is no global water crisis, the serious water and food security problems in some developing countries and regions need to be urgently addressed. One in five developing countries will face water shortages by 2030.

## Investments needed

Over the past 40 years, the performance of irrigated and rainfed agriculture has increased dramatically. Around 3 billion more people have been fed. Production increase was achieved through the expansion of agricultural land, intensification and better water control.

There is, however, no reason for complacency. Agriculture, the biggest water consumer, has to improve the performance of both irrigated and rainfed production through integrated rural water development.

Investments for better water-saving agricultural practices and water management are urgently needed. The higher the productivity gains in existing agricultural systems, the lower the need for extra water for agriculture.



FAO/19732/G. BIZZARRI

Farmer carrying water for irrigation (Myanmar)

The following countries and territories withdraw more than 90% of their renewable water resources for agricultural, industrial and domestic use. These countries are often overusing their groundwater resources.

- Bahrain
- Barbados
- Egypt
- Israel
- Jordan
- Kuwait
- Libyan Arab Jamahiriya
- Malta
- Oman
- Qatar
- Saudi Arabia
- Turkmenistan
- United Arab Emirates
- Uzbekistan
- West Bank and Gaza Strip
- Yemen

Source: FAO, 2002

## Rainfed agriculture

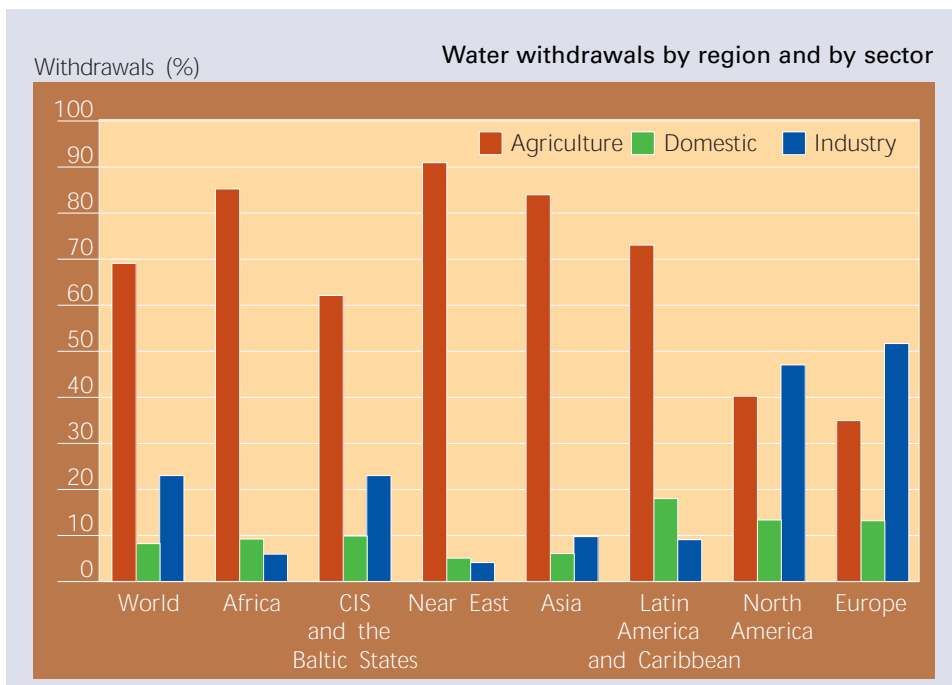
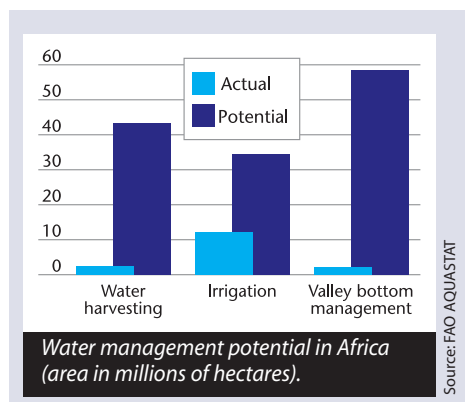
In the more humid regions where some 60 percent of the world's food crops are being grown, rain is the source of water for crop production. Rainfed agriculture takes place on some 80 percent of the arable land. In dry areas, rainwater harvesting (terraces and bunds, small dams, etc.) can both reduce risks and increase yields. There is significant scope for increasing rainfed production provided appropriate investments in technology, institution building and research are made.

## Irrigated agriculture

Irrigation is crucial to the world's food supplies and is expected to increase further. Irrigation makes up only 20 percent of the total arable land in developing countries but produces around 40 percent of all crops. Developing countries are expected to increase their irrigated area from currently 205 million ha to 242 million ha by 2030. Water withdrawal for irrigation in developing countries is projected to increase by 14 percent by 2030. There is still scope for expanding irrigation to meet future needs. However, by 2030, East Asia and the Near East and North Africa will be using three-quarters of their irrigable land, and South Asia almost 90 percent.

## Water and environment

Irrigation systems can cause waterlogging and salinization. It is estimated that some 20 to 30 million ha of the world's 270 million ha of irrigated land have been degraded by the accumulation of salts. Removing water from rivers and lakes can



jeopardize wetlands, which are important for agricultural production and biodiversity and also serve as filters and buffers. The intensive use of fertilizers, herbicides and pesticides can irrevocably damage surface water and groundwater reserves. The lack of adequate drainage plagues 250 to 350 million ha of global cropland – about a third of the total. Solutions exist to resolve these problems, but they require investment and political will.

## Virtual water

Virtual water is the water needed to grow food. Transporting food is thus equivalent to transporting water in a virtual form. Instead of using scarce water resources for food production, arid countries can save water through basic food imports from water-rich areas: for each kg of wheat imported, 1 m<sup>3</sup> of water is saved from internal resources. Virtual water trade can also contribute to saving water globally. However, countries facing food insecurity need to have fair and secure trade with water-abundant nations. Poor countries which cannot afford to import food still require international assistance for rural development.

## Modernizing irrigation

Often irrigation systems in developing countries need to be modernized: water-institutions and

infrastructure have to become more service-oriented and cost-effective. Countries need to decide what is the most efficient and cost-effective technology. This does not necessarily imply the use of high technologies only. The participation of individual farmers and farmers' groups is essential to boost the local economy and protect the public interest in land and water resources. The goal is to boost the profitability and sustainability of irrigated agriculture and water management.

## Low-cost technologies

Low-cost irrigation technologies are crucial to promote development among the poor. Inexpensive treadle pumps and small mechanical pumps have been introduced successfully in South Asia and Africa. They provide irrigation from shallow aquifers. Also in areas affected by the HIV/AIDS epidemic, where labour is often scarce, small mechanical pumps should be promoted. Localized methods such as drip irrigation, which put water only where it is needed, are more efficient than flooding fields and using sprinklers. The introduction of bucket drip irrigation kits has also been successful for irrigation of small plots of vegetables and fruit trees in peri-urban areas. In Kenya, the return on an investment of about US\$15 for one bucket drip irrigation kit was some US\$20 per month.

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