UN WATER

World Water Day 2012

Water and Food Security
22nd March 2012

Coordinated by The Food and Agriculture Organization of the United Nations

Each of us needs to drink 2 to 4 litres of water every day.
But it takes 2 000 to 5 000 litres of water to produce one person's daily food.

The world is thirsty because of our needs for food. Today, there are over 7 billion people to feed on the planet and this number is expected to reach 9 billion by 2050.

To be able to feed everybody, we first need to secure water, in sufficient quantity and adequate quality.

We will also need to produce more food using less water, reduce food wastage and losses, and move towards more sustainable diets.

Water and food security: Understanding the linkages

Water is key to food security

Food security exists when all people at all times have both physical and economic access to sufficient, safe and nutritious food that meets their dietary requirements for an active and healthy life.

People who have better access to water tend to have better levels of nourishment. Lack of water can be a major cause of famine and malnutrition, particularly in areas where people depend on local agriculture for food and income.

Erratic rainfall and seasonal differences in water availability can cause temporary food shortages. Floods and droughts can cause some of the most intensive food emergencies.

Drought ranks as the single most common cause of severe food shortages in developing countries. Drought caused more deaths during the last century than any other natural disaster, and Asia and Africa rank first among continents in the number of people directly affected.

The human right to water in the context of the right to food

In 1948, the Universal Declaration of Human Rights affirmed the right of everyone to adequate food. However, access to adequate food in the rural areas of many developing countries depends heavily on access to natural resources, including water, that are necessary to produce food both for direct consumption and for income-generating activities that enable people to purchase food. The United Nations General Assembly declared access to clean drinking water and sanitation as a human right on 28 July 2010. Access to safe and sufficient water is a human right under international law, and under some national constitutions. The right to water in the context of the right to food is, however, a complex question. While drinking and cooking water would be protected, water for food production would probably not be covered under the minimum needs in arid areas, as agriculture production requires such high amounts of water.

Large quantities of water are needed to produce food

The production of all food - from crop, livestock, inland fisheries or aquaculture, and forests - requires water. This water originates from precipitations (green water), made available either directly or through moisture stored in soils, or from withdrawals in watercourses, wetlands, lakes and aquifers (blue water).

At the global level 70 percent of blue water withdrawals go to irrigation. Irrigated agriculture represents 20 percent of the total cultivated land but contributes 40 percent of the total food produced worldwide.

It takes for example about 1 500 litres of water to produce 1 kg of wheat and 10 times more to produce 1 kg of beef. Producing feed crops for livestock, slaughtering and the processing of meat, milk and other dairy products require large quantities of water. This makes the water footprint of animal products particularly high.

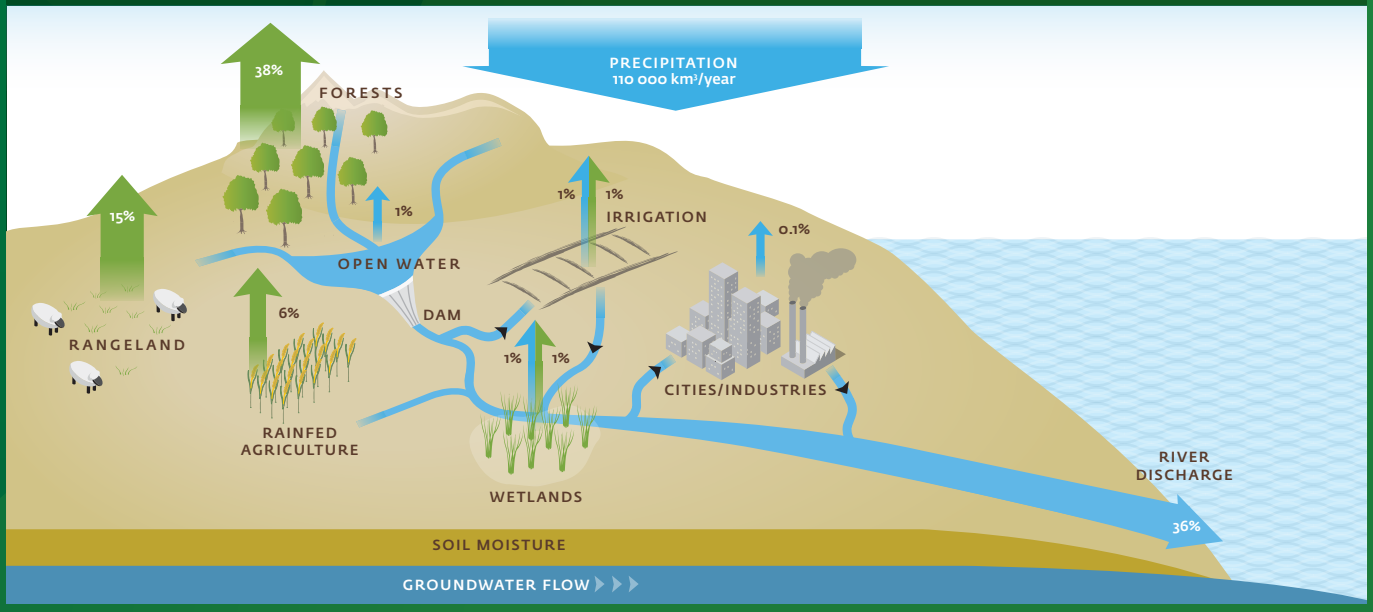
Fish products are an important source of protein. Fish production from rivers, wetlands, and lakes and, increasingly from aquaculture, contributes about 25 percent to the world's fish production. Aquaculture is the fastest growing food-producing sector: the average annual per capita supply of fish from aquaculture has increased at an average rate of 6.6 percent per year between 1970 and 2008. Inland fisheries and aquaculture do not consume water but do require a certain quantity and quality of water in rivers, wetlands, lakes and estuaries and are, therefore, important water users.

Water footprint

All human activities use water: drinking, cooking, washing, but mostly producing food, paper, clothes, etc.

The water footprint is a way of measuring our direct and indirect water use. The water footprint is the total volume of water that is used to produce the goods and services consumed by an individual, a community or a business.

Global water use



What is the future, what are the challenges?

The demand for food is rising and shifting

There are over 7 billion people to feed on the planet today and another 2 billion are expected by 2050. This, combined with anticipated shifts in diets, means that 70 percent more food will be needed, up to 100 percent in developing countries.

With rapid urbanization and increasing incomes, diets are shifting. Meat consumption in particular is expected to rise from 37 kg per person per year in 1999 /2001 to 52 kg in 2050 (from 27 to 44 kg in developing countries), implying that much of the additional crop production will be used to feed livestock. For example, 80 percent of the additional 480 million tonnes of maize required annually by 2050 would be for animal feed and soybean production would need to increase by a hefty 140 percent, to reach 515 million tonnes by 2050.

Climate change increases the risks

The main effects of climate change are on water resources. It will therefore impact both rainfed and irrigated agriculture, including feed and fodder for livestock, as well as forests products and aquaculture. Severe reductions in annual rainfall, river runoff and aquifer recharge are expected in the Mediterranean Basin and in the semi-arid areas of the Americas, Australia and Southern Africa, meaning that water availability and quality will be affected in already stressed regions. Some high latitude areas will, however, see an increase in their food production potential. Climate change also affects the risks of extremes of water availability. All regions will indeed experience more frequent and severe droughts, excessive rainfall, and floods that can destroy crops and put food production at risk. Populations who live in fragile environments, especially if they depend on agriculture for their livelihoods, face an immediate and increasing risk of crop failure or loss of livestock.

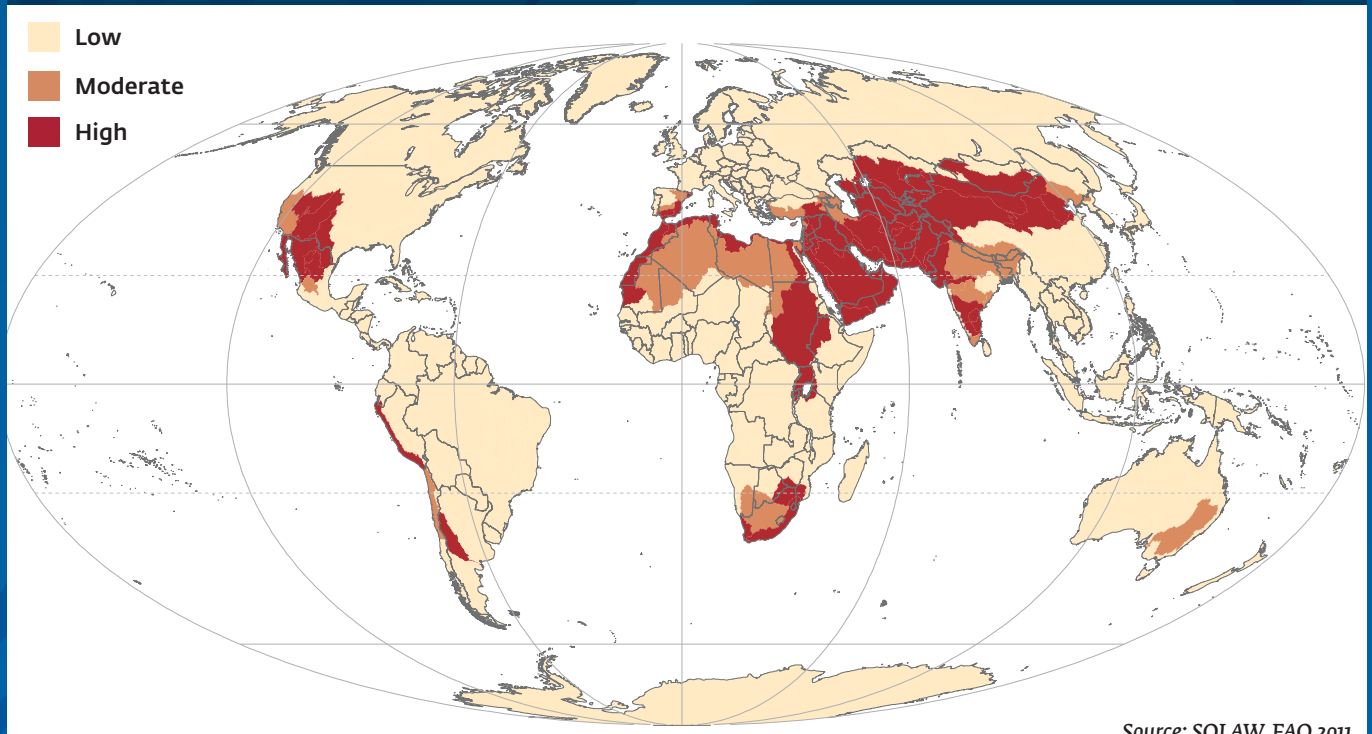
The gender gap in agriculture limits yields

In developing countries, 43 percent of the farmers are women, but their importance is even higher than this figure might suggest. However, women are usually not enabled to perform well because of unequal access to services and resource inputs - including water. If women had the same access to resources as men, they could increase yields on their farms by 20–30 percent. Closing this gender gap would lift 150 million people out of hunger.

Water resources are scarce

Water scarcity already affects almost all continents and more than 40 percent of the people on our planet. Currently, already 1.6 billion people live in countries or regions with absolute water scarcity and by 2025 two-thirds of the world's population could be living under water stressed conditions. The primary reason for this is over consumption of water for food production. The lack of water limits the ability of farmers to produce enough food to eat or earn a living. South Asia, East Asia and the Middle East for example are already close to or exceeding the limits of their water resources, and their population is still growing. Food production in some parts of North America is already unsustainable because of depleting groundwater.

Global distribution of physical water scarcity by major river basins



Source: SOLAW, FAO 2011

The competition for water is increasing

With population increase and economic growth, the demands of water for cities and industries are growing much faster than those of agriculture. In agriculture alone, staples, livestock, inland fisheries and aquaculture, and non-food crops - including fibres and bioenergy crops – already compete for water resources. Other competitive uses include drinking water, sanitation, hydropower and recreational amenities. All these uses can compete with each other and some can be regarded as higher priority than food. The juxtaposition of rapidly expanding urban populations and irrigation in the same river catchment is already a source of major conflict and forcing farming to limit its water use. All water uses need to be managed in a coordinated and integrated way, especially to protect the interests of the poor and other vulnerable groups, in particular women, who are the first to lose access to water when competition increases.

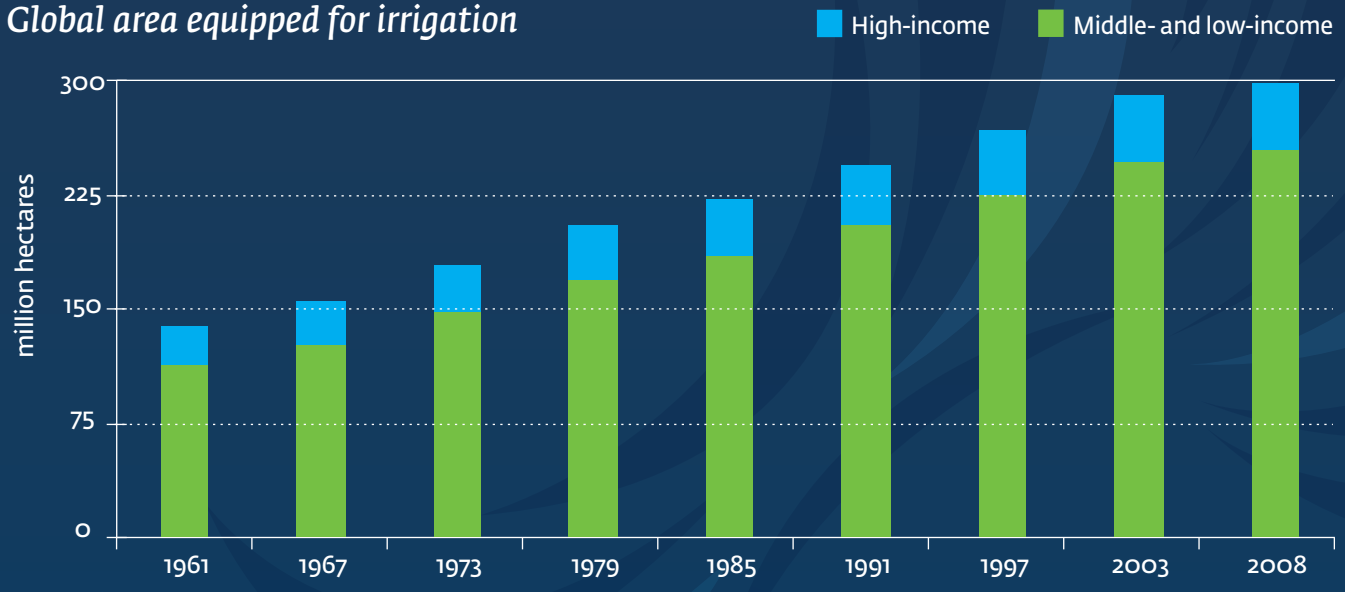
Land and water resources are degraded

The Green Revolution in the 1970s to 1980s - based on intensification using high yielding varieties, chemical inputs such as fertilizers and pesticides, and irrigation - had a very positive effect on global food production, including largely freeing the world from famines due to food production shortfalls.

But this was at the cost of significant impacts on the environment. A quarter of the world's lands are degraded. Many large rivers now run dry during part of the year, seriously impacting aquatic biodiversity. Large lakes and inland seas have shrunk, and half of the wetlands of Europe and North America no longer exist. Intensive livestock production and overuse of chemical fertilizers or pesticides have also lead to the contamination of water bodies. Water pollution is a significant cause of reduced water availability for various uses and can have serious impacts on the environment and on human wellbeing.

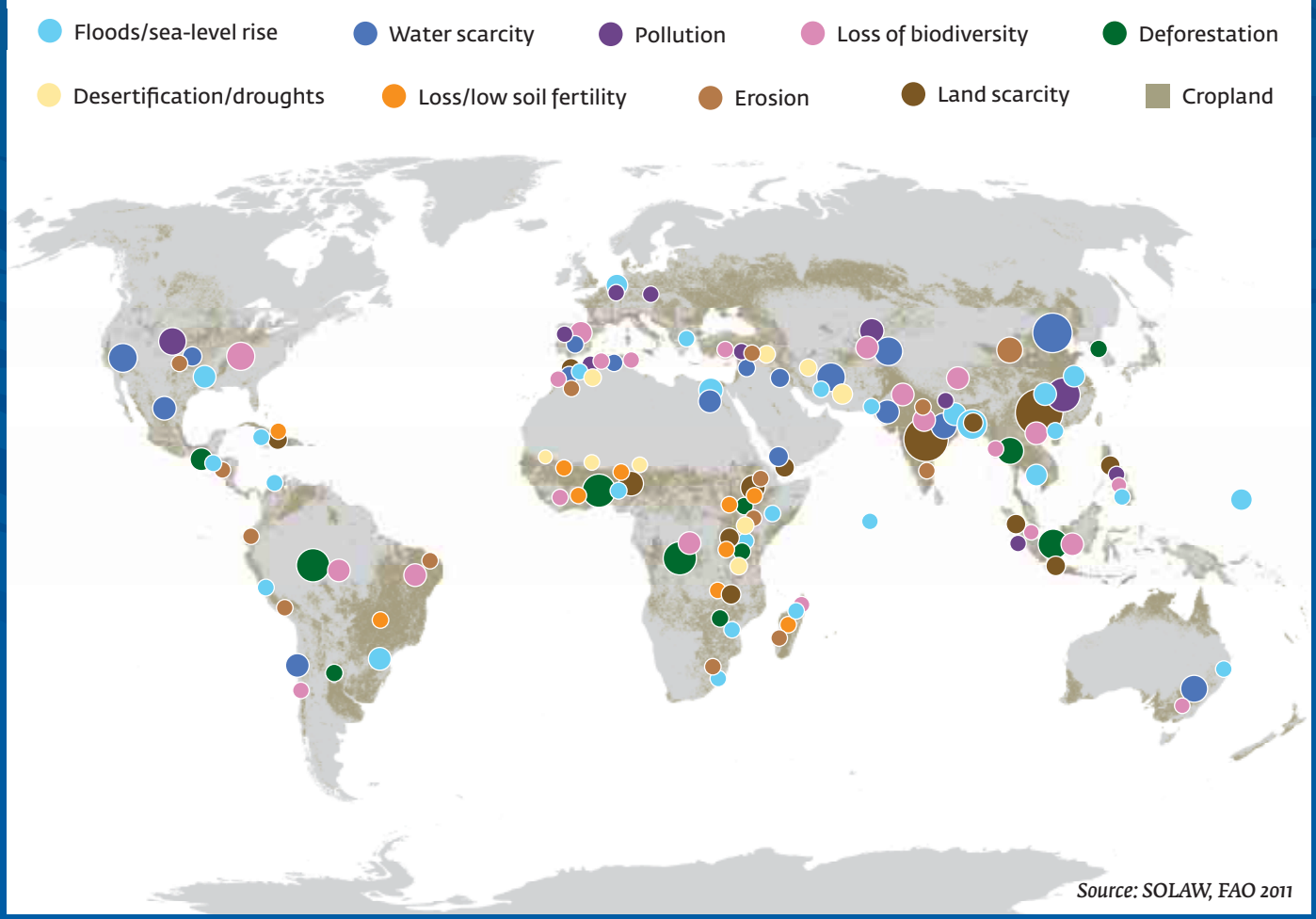
The number of regions that cannot satisfy the basic food needs of their growing populations is increasing. Many of these places are at risk because the impacts on the environment are beyond repair (see map).

Global area equipped for irrigation



Source: SOLAW, FAO 2011

Main risks associated with major food production areas



Source: SOLAW, FAO 2011

Water security for food security: some responses

Produce more with less water: sustainable intensification

A second green revolution using the same approach is not sustainable due to limitations on land, water and other inputs. Clearly resources need to be used more efficiently in food production systems.

Sustaining the increase in the production of food and other agricultural products will not be possible without improving water use efficiency in the fields, both in rainfed and irrigated agriculture. For many years, progress in agricultural production has been assessed in terms of 'yield', traditionally the production from a given area of land. It is now required to assess yield in terms of sustainable production per unit of all resource inputs, including land, chemicals, and in particular water. Small-scale irrigation technologies like treadle pumps or drip irrigation techniques can help improve efficiency in water use. The right incentives for sustainable farming as well as incentives for sustainable food consumption also need to be in place.

Prepare for climate change and natural disasters

Adapting water-management policies and practices to climate change contributes to reducing the risks of water related disasters. Both drought and flood risks management requires an improved approach to water storage. Physical infrastructure such as pools, dams, pits, retaining ridges, etc. and ecosystems - e.g. soils, wetlands and aquifers - are options to improve storage that need to be managed together to achieve optimal risk reduction outcomes.

Proactive and smart drought and flood-management strategies minimize the devastating impacts of these events, the frequency and severity of which are expected to increase with climate change.

Climate-Smart Agriculture

Irrigated rice presents a particular potential for saving water as this crop is currently flood irrigated, leading to very high water use and, at the same time, to high greenhouse gas emissions. Changing rice cultivation to aerobic conditions can reduce water use by 50 percent, while cutting emissions and increasing yields.

Protect the resource

Protecting water resources also entails conserving the ecosystems that sustain their availability and their quality. A good and well-maintained soil, for example, can capture much of the rainwater and avoid surface runoff that causes erosion and the loss of soil nutrients. Conservation agriculture is a multi-functional farming practice that enhances the contribution of soils and land cover to reduce water related risks for crops and, at the same time, contributes to improving both the quantity and quality of groundwater and rivers.

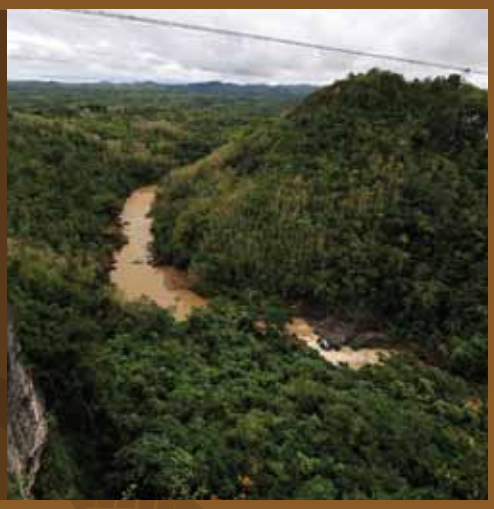
Conservation agriculture

Conservation Agriculture is an approach to managing agro-ecosystems for improved and sustained productivity, increased profits and food security while preserving and enhancing the resource base and the environment. Conservation agriculture is characterized three linked principles, namely:

- continuous minimum mechanical soil disturbance;
- permanent organic soil cover;
- diversification of crop species grown in sequences and/or associations.

The multiple benefits of forests for water and food security:

- Forests reduce the effects of floods and droughts, prevent soil erosion, landslides, desertification and salinization.
- Forests capture and regulate water and assure high-quality water supply for domestic, agricultural, industrial and ecological needs.
- The primary objective of 8 percent of the world's forests is soil and water conservation.
- Transpiration from forests contributes to sustaining regional rainfall, including to support agriculture.



Re-use and recycle

Drainage water, treated wastewater, brackish and, in some cases, desalinated water can be used in agriculture, especially in the arid and semi-arid zones and in rapidly growing peri-urban areas. Wastewater from cities is indeed becoming a more viable source of water and nutrients for agriculture.

There are also some opportunities to utilise farming or processing wastes to generate bioenergy, to further improve overall system efficiencies.

Cut food waste and losses

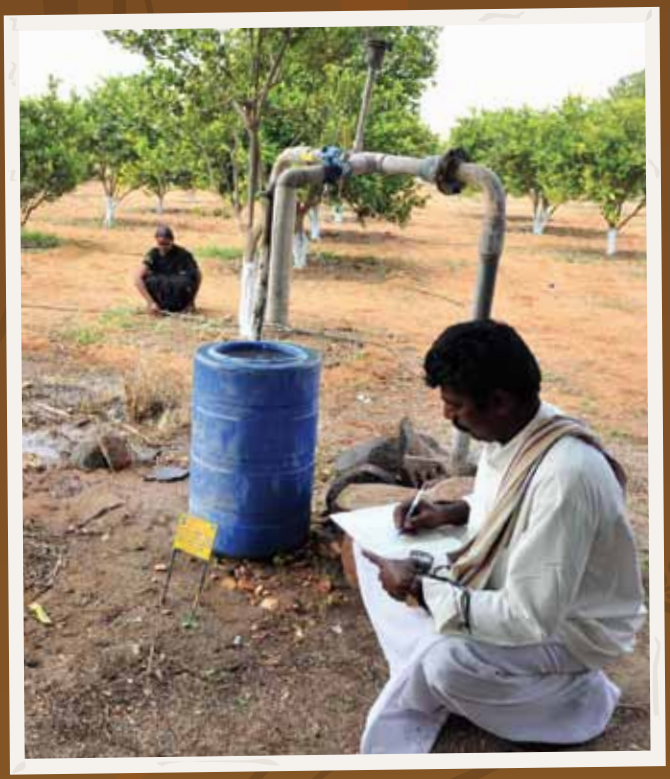
Roughly 30 percent of the food produced worldwide – about 1.3 billion tonnes - is lost or wasted every year. In many developing countries, large shares of the production are lost between the farmers' field and the market because of poor storage and transportation facilities. With growing urbanization, the efficiency of the food supply chain is crucial. In developed countries and particularly in cities, food is wasted by the consumer who may not be aware of, or sensitive to, the resources needed to produce food. Unhealthy diets are also a source of waste and a cause of growing health costs. A change in consumers' attitude towards this issue is necessary because limiting the waste results in reduced impacts on water.

Reduce food wastage to save water

A 50 percent reduction of food losses and waste at the global level would save 1 350 km^3 of water a year. For comparison: the mean annual rainfall over Spain is 350 km^3; water passing Bonn in the Rhine is around 60 km^3 per year; and the storage capacity of Lake Nasser is nearly 85 km^3.

Improve the integration of different production systems

Several integrated production systems have been developed that combine best practices for sustainable land and water management, adapted to local conditions and resources availability. They incorporate improved soil and water management techniques in a way that intensifies production and offer farmers opportunities to sustainably improve productivity.



In agro-ecosystems management, the needs, functions and services of ecosystems are efficiently addressed in order to enhance and secure food production. Typically it involves minimum- and low-till methods, rotational grazing intercropping, crop rotation, crop-livestock integration, intra-species variety and seed saving, habitat management and pest management.

Integrated crop-livestock systems optimize the use of biomass and nutrients cycles. For example, waste products such as manure from livestock can be used to improve soil fertility for crop production, while crop residues provide supplementary feed for animals.

Traditional rice-fish agricultural systems are Globally Important Agricultural Heritage Systems, as found for example in Longxian village, Zhejiang province, China.

In Asia, fish farming in paddy rice fields has a millennia-long history. Ecological symbiosis exists in this traditional system:

- fish provide fertilizer to rice, regulate micro-climatic conditions, soften the soil, disturb the water, and eat larvae and weeds in the flooded fields; and
- rice provides shade and food for fish.

Furthermore, multiple products and ecological services from the eco-ecosystems are beneficial to local farmers and the environment. The high quality food of fish and rice are helpful to maintain farmers' nutrient and living standard: the reduced cost and labour increases the productive efficiency, especially by reducing the use of chemical fertilizers, pesticides and herbicides to control insects and weeds, thus promoting agro-biological conservation and protecting the environment.

Opt for sustainable and healthy diets

Developing countries and emerging economies currently face a nutrition paradox with, on the one hand, high rates of undernourishment - over 800 million hungry people worldwide - and, on the other, about the same number who are overweight. Both undernourishment and obesity can lead to the risk of debilitating chronic diseases. In many cases, foods with smaller water footprints tend to be healthier choices and more environmentally sustainable. Water-food-health-environment considerations are therefore usually reinforcing enabling win-win solutions to be identified.

Sustainable diets are diets with low environmental impacts, which contribute to food and nutritional security and to a healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems; culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources.

UN-Water presents World Water Day

World Water Day is held annually on 22 March as a means of focusing attention on the importance of water and advocating for the sustainable management of freshwater resources.

An international day to celebrate freshwater was recommended at the 1992 United Nations Conference on Environment and Development (UNCED). The United Nations General Assembly responded by designating 22 March 1993 as the first World Water Day.

UN WATER
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World Water Day 2012 – Water and Food Security is coordinated by the Food and Agriculture Organization of the United Nations (FAO).
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Visual identity and communication campaign by UN-Water.
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