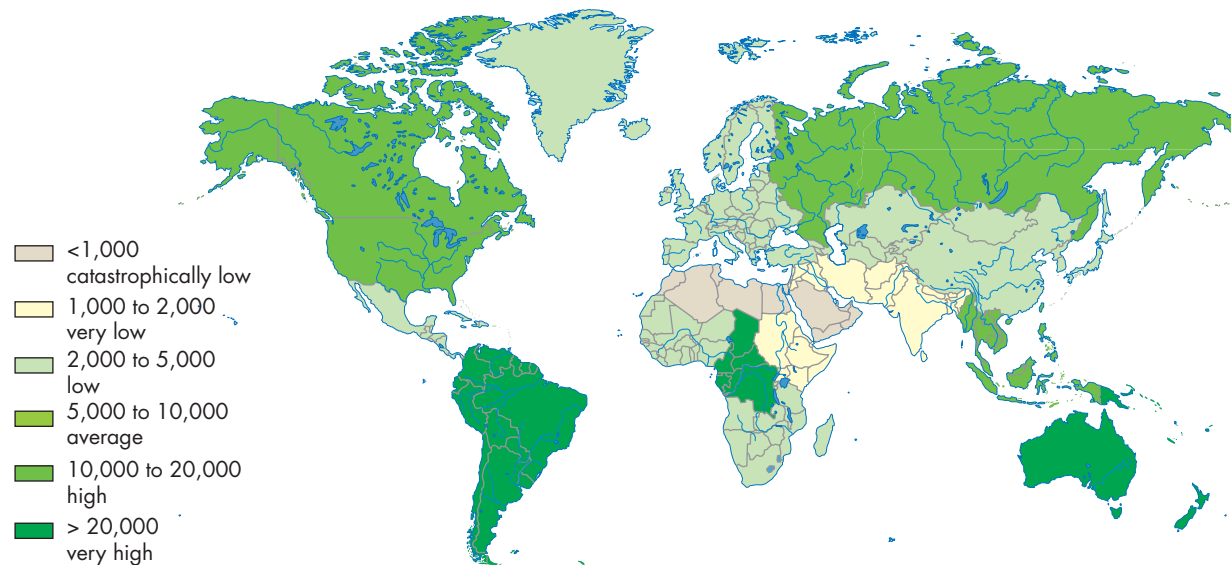


# WATER

## use with care

From thousands of kilometres above, the Earth is blue. With three-quarters of its surface covered by water, it seems no one could ever go thirsty. And yet water is a rare and unevenly distributed resource. Saltwater in seas and oceans accounts for 97.5% of the planet's total reserves. As for freshwater, most of it is frozen in glaciers and perpetual snow, which makes it difficult to exploit. This leaves lakes, rivers, groundwater and clouds, the equivalent of less than 0.01% of available water. Without water there can be no human activity; it is used by agriculture (70%), industry (22%, including water used to produce hydroelectricity and nuclear power) and households (8%). Ten countries, led by Canada and Brazil, share two-thirds of freshwater reserves while some thirty others, mostly in Africa, face frequent shortages. And when water isn't lacking, it is often polluted by intensive agriculture, industrial waste, household detergents ... all factors that affect its quality. As a result, polluted water causes millions of deaths each year. In developing countries, 80% of diseases and deaths are water-related. Over a billion people are still deprived of access to drinking water, and 2.4 billion live without adequate sanitation. Almost invariably, these are the poorest populations. At the Millennium Assembly in 2000, governments allowed themselves fifteen years to reduce by half the proportion of the world's people who are unable to reach or afford safe drinking water. "Water for all" now ranks among the priorities of the international community.

WATER AVAILABLE PER SUB-REGION IN 2001 (in m<sup>3</sup>/person/year)



Source : GEO-3, UNEP



↓ A leak can waste dozens of litres a day.

→ **6L**

per minute, or the average rate at which a tap flows

20% OF THE WORLD'S 10,000 FRESHWATER FISH SPECIES ARE THREATENED BY EXTINCTION.

→ **1,500L**

of water are needed to grow 1 kg of wheat, 30,000 litres to make a TV screen

IN ARID ZONES, GROWING FRUIT AND VEGETABLES FOR EXPORT PUTS A STRAIN ON MEAGRE LOCAL GROUNDWATER RESERVES.

### CLIMATE CHANGE

Constantly increasing worldwide, road traffic and the production of goods and services release more than 30 billion tonnes of greenhouse gases into the atmosphere each year. The subsequent rise in global temperatures disrupts the climate and increases the frequency with which natural disasters occur. In the northern hemisphere, precipitation is increasingly violent and irregular while equatorial regions are exposed to typhoons, tornadoes and other extreme phenomena. Over the past fifty years, the number of hydrometeorological catastrophes (caused by water and weather conditions) has significantly increased. Sudden water swell and flooding have altered the structure of water-courses, transformed landscapes and killed thousands of people.

Other changes are taking place more slowly, but with lasting effects. Accelerated glacier meltdown is causing sea level to rise. In some regions, deforestation and climatic water deficits cause the desert to encroach on already drastically arid regions. Exposed to only rare and unpredictable precipitation, there can be no form of life in these areas. Climate change is therefore responsible for some 20% of the worsening world water shortage.

[www.uicn.org/places/medoffice/CDCambio\\_climatico/index\\_en.html](http://www.uicn.org/places/medoffice/CDCambio_climatico/index_en.html)  
[www.ec.gc.ca/water/en/info/pubs/fs/e\\_fsa9.htm](http://www.ec.gc.ca/water/en/info/pubs/fs/e_fsa9.htm)



↓ Runoff causes nitrogen fertilizers from farmland to find their way into lakes and rivers. Phosphates and nitrates stimulate the growth of algae which, by using up the available oxygen, rapidly asphyxiate fish and other aquatic species. This is known as eutrophication.



↓ One could imagine that rainfall adds to water stocks. In reality the quantity of water on Earth remains stable as it moves in a continuous cycle: only the stages change.

### WETLANDS UNDER THREAT

Farming methods and urbanization have taken their toll on wetlands - marshes and swamps - over recent years. Over the course of the 20th century, 50% of them have quite simply disappeared. And yet these undervalued areas play a fundamental role in regulating ecosystems. By naturally modulating water levels, filtering stagnant water and "trapping" carbon, they help limit flooding and pollution caused by runoff. Since 1971, the Ramsar Convention on Wetlands provides for the conservation and wise use of wetlands and their resources. [www.ramsar.org](http://www.ramsar.org)

2  
MILLION TONNES  
OF WASTE ARE  
POURED INTO LAKES,  
RIVERS AND STREAMS  
EACH DAY.

→ x7

Over the 20<sup>th</sup> century, demand for water was multiplied by 7



↓ Women bear most of the burden of fetching water. In Africa, they walk an average six kilometres to the nearest well. And while little girls are waiting to fill their bucket, they aren't in school. Access to water and sanitation is therefore a fundamental right to give girls and boys equal access to education.

DAILY WATER  
CONSUMPTION :  
AMERICAN = 425 L  
EUROPEAN = 200 L  
PALESTINIAN = 70 L  
HAITIAN = 40 L

→ 300

water-related conflicts have been identified by the United Nations

→ 82,000

km<sup>2</sup>: the size of the largest freshwater lake in the world, Lake Superior in North America

BY  
2020, WATER  
CONSUMPTION IS  
EXPECTED TO INCREASE BY  
40% TO SATISFY THE WORLD  
POPULATION'S NEEDS, AND  
17% MORE WATER WILL  
HAVE TO BE USED TO  
GROW CROPS.

## IMPACTS

### Agriculture: a major water consumer

Three-quarters of freshwater from lakes, rivers and underground sources are used in farming. The development of irrigation techniques has substantially increased the amount of farmed land in the world. Today, more than 270 million hectares are irrigated, compared with less than 200 million 30 years ago. Over the same period, water consumption has grown by 1,000 km<sup>3</sup>. Now 40% of the world's crops are grown using irrigation. And yet this is not always the most efficient technique. Often no more than a third or half of the water actually reaches the plant. Irrigation can therefore be vastly wasteful and weakens local groundwater resources.

### Deterioration in water quality

In those regions where it is widely available, water is often polluted. The "guilty parties" include untreated wastewater, chemical effluents from factories, and phytosanitary products. A further and significant proportion of water pollution is the result of runoff, as rain carries chemical fertilizers and pesticides from farmland, and urban drainage. The World Commission on Water has sounded the alarm: *"More than one-half of the world's major rivers are being seriously depleted and polluted, degrading and poisoning the surrounding ecosystems, thus threatening the health and livelihood of people who depend upon them."*

[www.worldwatercommission.org](http://www.worldwatercommission.org)  
[www.fao.org/docrep/W2598E/w2598e07.htm](http://www.fao.org/docrep/W2598E/w2598e07.htm)  
[www.ec.gc.ca/water/en/manage/poll/e\\_poll.htm](http://www.ec.gc.ca/water/en/manage/poll/e_poll.htm)  
[www.geog.ouc.bc.ca/conted/onlinecourses/geog\\_210/210\\_8\\_5.html](http://www.geog.ouc.bc.ca/conted/onlinecourses/geog_210/210_8_5.html)

### Diverted watercourses

The construction of dams and water-conducting canals has become common practice as a means of optimizing water resources, rationalizing land development, and to supply sufficient water for irrigation, hydroelectric production and households. Of the 227 largest rivers in the world, some 60% have been diverted this way. While multiplying these structures has resulted in increased crop yields and electricity production, reservoirs have also displaced 40 to 80 million people, altered freshwater ecosystems, and disturbed freshwater species. River banks, once non-developable to act as buffer zones in the event of rising water levels, are now

being built on. Such disruption has provoked an increase in the number of so-called "natural" disasters.

[www.maf.govt.nz/mafnet/rural-nz/sustainable-resource-use/land-management/erosion-risks/erowater.htm](http://www.maf.govt.nz/mafnet/rural-nz/sustainable-resource-use/land-management/erosion-risks/erowater.htm)

### Water-related diseases

While a person can survive several weeks without food, no one can go more than 4 days without drinking. Each year, over 5 million people succumb to water-related diseases. An estimated 6,000 children die each day because of unsafe water supply, sanitation and hygiene. Among the most common of these water-related diseases, malaria continues to take its toll. There are some 100 million cases of malaria with between 1 and 2 million deaths each year. To this can be added almost 4 billion cases of diarrhoea worldwide, killing 2.2 million people.

[www.who.int/water\\_sanitation\\_health/diseases/en](http://www.who.int/water_sanitation_health/diseases/en)

### Tonnes of plastic for bottled water

Sales of bottled water are thriving. Reputedly pure, rich in mineral salts and excellent for the health, mineral water is gaining over tap water. Yet according to the Food and Agriculture Organization of the United Nations (FAO), most municipal tap water is equally as good as water from a bottle. Tap water is also less polluting: each year, 1.5 million tonnes of plastic are produced solely to manufacture water bottles. These bottles also create waste, while exported bottled water must be transported which adds to greenhouse gas emissions.

[www.who.int/docstore/water\\_sanitation\\_health/GDWQ/Updating/draftguidel/draftchap87b.htm](http://www.who.int/docstore/water_sanitation_health/GDWQ/Updating/draftguidel/draftchap87b.htm)

### Industrial effluents

Industry continues to consume substantially less water than agriculture. The main problem it poses concerns effluents. The majority of water used by industry is for cleaning or cooling. Because of this, 80% is polluted by the products or waste that are part of the manufacturing process and discharged, often untreated, into nature. In this way, chemicals such as acids and solvents are left to contaminate ground and surface water.

[www.who.int/water\\_sanitation\\_health/industry/pollution/en/index1.html](http://www.who.int/water_sanitation_health/industry/pollution/en/index1.html)

# ON THE RIGHT TRACK

Adopting alternative irrigation methods, stopping leaks, wasting less and adapting behaviour to a region's geography ... all over the world, endless possibilities exist to save water while still satisfying different populations' demands.

## → Bringing water to the suburbs of Tegucigalpa

In Honduras, an unprecedented population explosion has brought the number of people living in the capital to some 850,000, more than half of whom live on the edges of the city. Thanks to a partnership between the United Nations Children's Fund (UNICEF), the national water and sewage authority, and local government, a programme was put in place to supply these communities with water. Over a ten-year period, this project has provided 150,000 people in these peri-urban districts with safe drinking water while drawing on contributions from all the stakeholders. The local community provides labour and construction materials, pays for the water and recovers the full investment cost in taxes. It is also responsible for basic maintenance of installations. The water authority and UNICEF supply technical assistance and financial backing.

[www.unicef.org/wes](http://www.unicef.org/wes)



## → WASH

A decade ago, almost 12 million South Africans had no access to drinking water. Populations in rural areas in particular had to walk kilometres each day to carry water back from a river, stream or well. In 1994, South Africa's new government embarked on an important water-supply programme.

Alongside measures taken to bring water to villages, a vast information campaign was launched to prevent epidemics. Water, Sanitation and Hygiene for All, or WASH as it is known, aims to raise public awareness, influence behaviour, and put sanitation, hygiene and safe water at the top of the political agenda. The results of this campaign, implemented nationwide, have been so encouraging that in 2002 the Johannesburg Summit decided to extend WASH to the entire international community.

[www.wsscc.org](http://www.wsscc.org)



## → International network of cleaner production centres

UNEP and the United Nations Industrial Development Organization (UNIDO) have set up an international network of 24 cleaner production centres in developing countries with the aim of cleaning up industrial processes and reducing water consumption and pollution. Each centre provides resources, transfers know-how, and trains and advises on how to find the best solutions for specific problems. These centers have helped develop numerous initiatives that preserve water. In Korea, innovative cotton-dyeing techniques save 8 to 10 tonnes of water per tonne of cotton produced. In Costa Rica, 47 potential solutions have been found to cut water consumption by the agri-food industry. In Uganda, fish conservation methods have been reviewed, with a subsequent 30% reduction in the amount of water used.

[www.uneptie.org/pc/cp](http://www.uneptie.org/pc/cp)

KIRIBATI, NAURU AND SAINT LUCIA, ALL ISLANDS IN THE BAHAMAS AND THE CARIBBEAN, HAVE DEVELOPED DUAL WATER-SUPPLY SYSTEMS. ONE PIPE CONVEYS WATER FOR CONSUMPTION WHILE ANOTHER SUPPLIES SALTWATER FOR FLUSHING TOILETS.



↓ Waste water can be filtered using a variety of natural processes with plants such as bamboo and water hyacinths.

## HYDROPONICS

The basic principle of hydroponics is to grow plants in just water without the need for soil. This is not a recent technique: it was already known to communities in Peru and India would grow plants on the surface of mountain lakes. It is, like aquaponics which combines hydroponics with aquaculture, a valid alternative to traditional cultivation techniques. [www.ag.uiuc.edu/vista/html\\_pubs.html](http://www.ag.uiuc.edu/vista/html_pubs.html) [www.carbon.org](http://www.carbon.org)



## PUTTING IDEAS INTO PRACTICE

### Individuals

→ REDUCE CONSUMPTION AT THE SOURCE → TAKE SHOWERS RATHER THAN BATHS  
 → DETECT LEAKS AND REPAIR THEM STRAIGHT AWAY → DON'T CLEAN TEETH, WASH UP, ETC. UNDER RUNNING WATER → FIT TAPS AND TOILETS WITH LOW-FLOW DEVICES  
 → USE NATURAL HOUSEHOLD PRODUCTS RATHER THAN CHEMICAL OR DANGEROUS ONES → DON'T POUR TOXIC PRODUCTS DOWN THE DRAIN OR DUMP THEM; TAKE PAINT, VARNISH, SOLVENTS, ETC. TO A WASTE COLLECTION POINT → USE LESS DETERGENT AND WASHING POWDER → RESPECT STANDARDS WHEN INSTALLING SEWAGE PIPES OR SEPTIC TANKS → COLLECT RAIN TO WATER THE GARDEN AND WHERE POSSIBLE FOR CLEANING → PREFER LOCAL PLANT VARIETIES OR ONES THAT NEED LESS WATER → REPLACE CHEMICAL PLANT-CARE PRODUCTS WITH BIODEGRADABLE ONES OR OTHER NATURAL METHODS (SEE "LEISURE") → USE WATER CAREFULLY WHEN VISITING HOT COUNTRIES (SEE "TOURISM")

### Companies

→ IMPLEMENT AN ENVIRONMENTAL PLAN TO REDUCE WATER CONSUMPTION AND SET TARGETS FOR THE STAFF → TREAT WATER BEFORE DISCHARGING IT, EQUIP SITES WITH NATURAL SEWAGE SYSTEMS, PREFER LOCAL PLANT VARIETIES OR ONES THAT NEED LITTLE WATER FOR LANDSCAPED AREAS, AND AVOID LAWNS WHERE THERE IS LOW RAINFALL → INDUSTRY: USE WATER IN A CLOSED CIRCUIT OR REPLACE IT WITH PULSATED AIR, CHOOSE THE LEAST POLLUTING PRODUCTS POSSIBLE AND MONITOR THEIR USE → AGRICULTURE: USE DRIP IRRIGATION AND TERRACE FARMING TECHNIQUES; GROW LOCAL VARIETIES, VARIETIES THAT NEED LESS WATER AND FRUIT AND VEGETABLES IN SEASON; AVOID CHEMICAL FERTILIZERS

### Local authorities

→ INFORM LOCAL RESIDENTS, BOTH ADULTS AND CHILDREN, ON WAYS TO SAVE WATER  
 → BUILD A WASTEWATER TREATMENT PLANT OR CONNECT TO THE EXISTING SEWAGE SYSTEM → MAINTAIN CONTROL OF HYDRAULIC INFRASTRUCTURE → EQUIP COMMUNAL SITES TO USE LESS WATER → ENCOURAGE FARMERS AND BUSINESSES TO MONITOR THEIR WATER CONSUMPTION AND EFFLUENTS; REMIND CARETAKERS TO CHECK THEIR BUILDINGS FOR LEAKS → DESIGNATE "WATER SAVING" DAYS → CLEAN UP WATERCOURSES AND SET UP NATURAL FILTER SYSTEMS → MAINTAIN RIVER BANKS USING NATURAL METHODS AND PROTECT ECOSYSTEMS (MARSHES, LAKES, RIVERS) → PREFER LOCAL PLANT VARIETIES FOR PARKS AND GARDENS → COLLECT RAIN FOR WATERING



↓ Rain can be collected and used in various ways, such as to water plants, wash a car or flush the toilets.

#### FIND OUT MORE

World Water Assessment Programme:

[www.unesco.org/water/wwap/facts\\_figures/index.shtml](http://www.unesco.org/water/wwap/facts_figures/index.shtml)

Unesco Water Portal: [www.un.org/issues/m-water.asp](http://www.un.org/issues/m-water.asp)

UNEP Global Environment Monitoring System: [www.gemswater.org](http://www.gemswater.org)

International Office for Water:

[www.oieau.fr/anglais/index.htm](http://www.oieau.fr/anglais/index.htm)

Network for the water business: [www.waternunc.com](http://www.waternunc.com)

UNEP Division of Technology, Industry and Economics, Production and

Consumption Branch: [www.uneptie.org/pc/home.htm](http://www.uneptie.org/pc/home.htm)

Information on the world's freshwater resources:

[www.worldwater.org](http://www.worldwater.org)

Water web consortium: [www.waterweb.org](http://www.waterweb.org)

World Water Assessment Programme:

[www.unesco.org/water/wwap](http://www.unesco.org/water/wwap)

Hyperlinks in hydrology for Europe and the world:

[www.nwl.ac.uk/ih/devel/wmo](http://www.nwl.ac.uk/ih/devel/wmo)

Water and Sanitation program: [www.wsp.org](http://www.wsp.org)

World Water Council: [www.worldwatercouncil.org](http://www.worldwatercouncil.org)

Global Water Partnership: [www.gwpforum.org](http://www.gwpforum.org)

International Water and Sanitation Centre: [www.irc.nl](http://www.irc.nl)

Centre for Ecology & Hydrology: [www.nwl.ac.uk/ih](http://www.nwl.ac.uk/ih)

European Desalination Society: [www.edsoc.com](http://www.edsoc.com)

Global Water: [www.globalwater.org](http://www.globalwater.org)

International Water Academy:

[www.thewateracademy.org](http://www.thewateracademy.org)

International Network on Water, Environment and Health:

[www.inweh.unu.edu/inweh](http://www.inweh.unu.edu/inweh)

Improving water availability:

<http://globalcrisis.info/wateravailability.html>

#### VISION 21

At the second World Water Forum in The Hague in 2000, the Water Supply & Sanitation Collaborative Council (WSSCC) presented targets for the Vision 21 programme to provide better access to water around the world.

- By 2015, reduce by half the number of people without access to sanitation facilities or without access to adequate quantities of affordable and safe water.

- By 2025, achieve universal access to hygiene, sanitation and water services.

[www.wsscc.org/load.cfm?edit\\_id=45](http://www.wsscc.org/load.cfm?edit_id=45)

#### → Saving water in the home

A person in a developed country uses up to 425 litres of water per day, when simple equipment will reduce a household's water consumption as well as its water bill. An aerator, which

regulates the flow of water from a tap or shower, is the guarantee of substantial savings. In the toilet, a dual-flush cistern will also help limit consumption (a conventional cistern flushes an average 13 litres each time). Households can add to the impact of this type of equipment by changing their everyday habits: prefer showers to baths, wash up in a bowl, fill the sink to shave, find and mend leaks ... all simple ways to save water at home.

[http://eartheasy.com/live\\_water\\_saving.htm](http://eartheasy.com/live_water_saving.htm)

[www.ca.uky.edu/enri/consrv.htm](http://www.ca.uky.edu/enri/consrv.htm)



#### → Drip irrigation

Despite consuming 70% of the planet's freshwater reserves, agriculture still sometimes implements inefficient watering systems. Drip irrigation technology, which distributes water through underground pipes, is both efficient and cost-effective. Water slowly soaks into the soil to provide continuous moisture around the plant's roots. Considerably less water is lost, in particular through evaporation. In India, Israel, Jordan, Spain and California, drip irrigation has cut back the amount of water used by 30 to 70% while increasing yields by 20 to 90%.

[www.cropinfo.net/drip.htm](http://www.cropinfo.net/drip.htm)

[www.fao.org/docrep/S8684E/s8684e00.htm#Contents](http://www.fao.org/docrep/S8684E/s8684e00.htm#Contents)

#### → Catching clouds

Since the nineteen-nineties, vast fog nets have sprung up in villages in Yemen, Guatemala, Chile, Nepal and Haiti. Erected two metres above the ground and supported by a wooden post at either end, these polypropylene nets capture droplets. Under the influence of gravity, these suspended droplets run along the netting to fall into a trough. Water collected this way is then conveyed by pipes into a storage tank, ready for use. In the world's most arid desert – the Atacama Desert in Chile – fog collectors provide local populations with 40 litres of water per day and per person.

[www.fogquest.org](http://www.fogquest.org)



## AT UNEP

#### → ATLAS OF INTERNATIONAL FRESHWATER AGREEMENTS

To coincide with the International Year of Freshwater in 2003, UNEP initiated a vast information programme comprising a communication campaign, a website, and a complete listing of United Nations documents on freshwater. UNEP also published the Atlas of International Freshwater Agreements. It details all the transboundary water resources that are covered by an agreement between different countries for improved river management, and gives advice on how to manage others. In Japan, UNEP has also set up the International Environmental Technology Centre. The centre is in the process of compiling a database of water-saving recommendations, technologies and policies. Information is collected from the four corners of the globe, from industrialized nations to developing countries, not forgetting small insular states.

[www.earthprint.com/cgi-bin/ncommerce3/ProductDisplay?prfrnbr=232250&prmenbr=27973](http://www.earthprint.com/cgi-bin/ncommerce3/ProductDisplay?prfrnbr=232250&prmenbr=27973)

→ THE FRESHWATER RESOURCES REPORT: [www.unep.org/vitalwater](http://www.unep.org/vitalwater)