



# The race for blue gold: water: source of life and cause of conflicts and migration

PUPIL BROCHURE  
1<sup>ST</sup> AND 2<sup>ND</sup> GRADE SECONDARY SCHOOLS

## The role of water in the development of life on Earth

Life on Earth is believed to have originated around 4 billion years ago: a natural, gradual process from non-living matter (such as simple organic compounds). This happened when the planet began to cool down and the temperature reached a level where water could be present widely in a liquid state.

**Everything originates from water, all chemical reactions within living cells take place in the presence of water,** which is why it is the indispensable compound for life.

### WATER, AN ESSENTIAL GOOD FOR ALL LIVING BEINGS

Water is indispensable and irreplaceable, there is no other compound that has the same properties for the multiple functions it performs.

Most of our body is made up of water, it is the main component of our blood and cells and accounts for about 65% of our body weight; water keeps our organs healthy and restores the fluids we lose through breathing, sweating and digestion.

Water is essential:



for **personal hygiene and general sanitation needs**, including sewage systems



for **cooking**



to **connect and move people and goods**, thus enabling trade and commerce



to **grow fruit and vegetables and breed animals**



as a **fish source**



for the **motive force produced by water** which drives gears (think, for example, of mills in the past)



to **produce hydroelectric power**

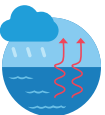


to **make consumer goods**

Oceans, seas and other water bodies also regulate the climate:



they **retain heat and release it slowly; ocean currents cool or warm** many territories so that they are habitable.



**evaporation from warm seas causes precipitation** all over the world, in the form of rain (or snow), bringing life!

**Water also captures and absorbs large amounts of carbon dioxide** from the atmosphere (about 1/4 of that emitted by humans each year).

# A bit of history...

Human history has always been conditioned by the presence or absence of water.



## PREHISTORY

While in the **Palaeolithic** mankind did not know how to cultivate and procured food and water by **consuming the resources he found at his disposal**, in the **Neolithic** period men gradually switched from nomad to **sedentary**, thus making their relationship with water more 'active' and **profitable**: they learnt to manage it in their favour through the exploitation of river waters.

## GREAT CIVILITIES

On the banks of the Tigris, Euphrates, Nile, Indus and Yellow River, the most important **civilisations of the past** were born: Egyptian, Babylonian, Sumerian and Chinese. The **great rivers ensured drinking water, food, more fertile soil for crops, agility of transport and water for livestock breeding**.

In Europe, the superiority of some ancient civilisations over others seems to have depended on hydraulic engineering works and the ability to 'tame' water by exploiting it to meet the needs of the population.



## IN ITALY

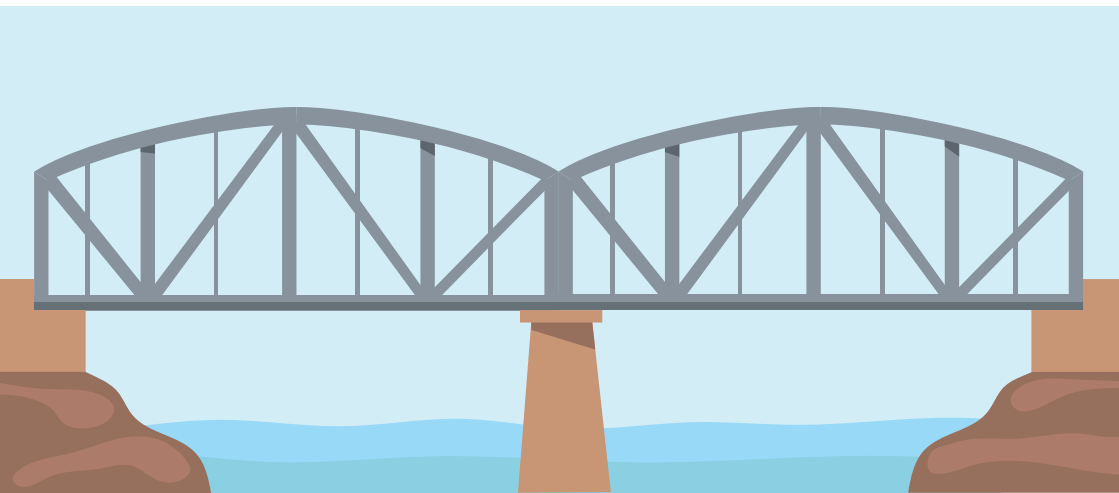
The Etruscans were the first Italic peoples (around 500 B.C.) to develop water technologies (aqueducts, sewers, cisterns, mills, dams) to bring water to the cities and irrigate the fields, these works were later continued and developed by the Romans.

## MIDDLE AGES

In the Middle Ages, the construction of aqueducts in Europe came to a standstill; water was supplied via wells and cisterns and this led to health problems due to contaminated aquifers, drinking water shortages in urban centres and stagnant water, resulting in the development of diseases (cholera and malaria).

## EARLY MODERN INSTALLATIONS

The first drinking water distribution system was built in Scotland in 1804. In 1806, a large plant was built in Paris for treating water through sand filtration and the use of charcoal. In 1893, the first ozone treatment plant for Rhine water was set up in Holland.



# Drinking water in the past

The **non-potability** of water, i.e. the alteration of water quality for human use, depends on:

- **contamination by man** through his activities
- but also by **naturally occurring microbiological factors**

In the past, analysis laboratories did not exist: especially in developed societies, man had established criteria relating to water characteristics and origin in order to assess its suitability for drinking.

## CHARACTERISTICS OF DRINKING WATER

The **water had to be odourless, colourless and clear**: dirty or foul-smelling water was rightly considered contaminated. To make them clear, the ancients performed filtration (e.g. with sands), boiling or other operations.

Moreover, the water had to **be running**; stagnant water was not considered healthy.

It **had to come from 'safe'** springs: the health status of the people living near the springs was assessed.

Checks were also made for possible contact with sewage and human or animal faeces.



Unfortunately, even today, after millennia of human history, even visibly dirty water is used in many degraded situations, bringing infections and diseases.

In the mid-20<sup>th</sup> century, the problems of metal contamination, acid rain, surfactants and radioactivity came to light and were then investigated.



## LOUIS PASTEUR

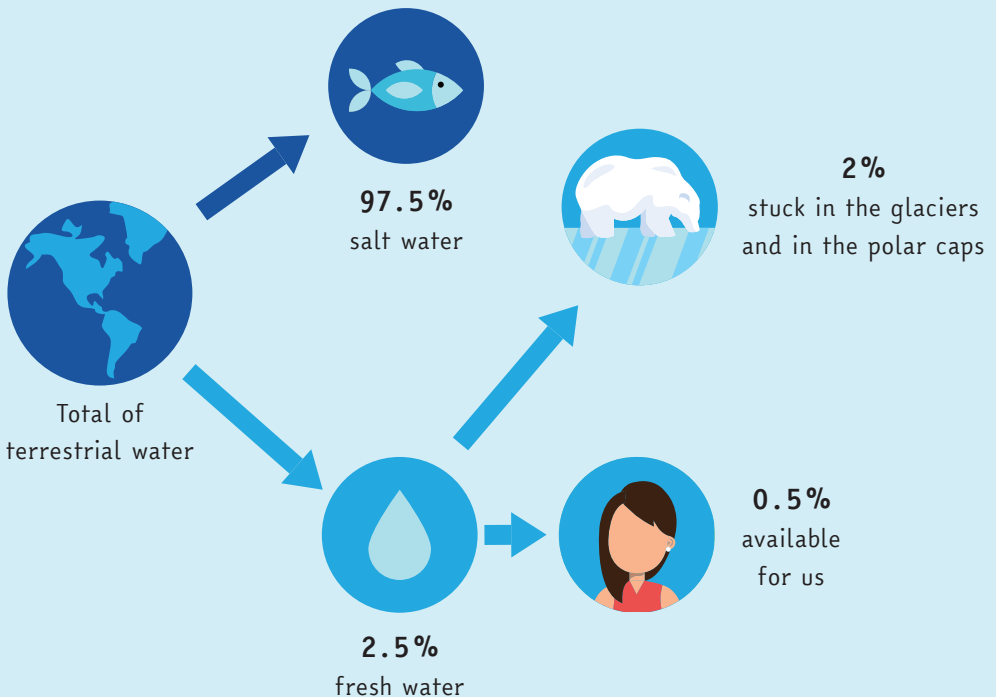
Nobel Prize winner Louis Pasteur (1822-1895), a French chemist and microbiologist, said this phrase 'We drink 90% of our diseases'.

His studies in microbiology proved, in fact, the close relationship between the hygienic level of water and the spread of certain diseases.



# Why is water called 'blue gold'?

Our planet is full of water, it is in fact called the Blue Planet. 71% of the earth's surface is covered with water, but how much of it can be used by humans?





**Water is a renewable element** (it renews itself through the water cycle) but it is also a **limited resource and its ability to renew itself is endangered** by humankind who, through his activities, inevitably alters its quality. This happens:

- with the **input of pollutants**: chemicals, plastics, dispersed oils, pollutants from industry, fertilisers or agricultural pesticides, sewage from livestock farms, emissions from industry and transport means (which settle on rivers and seas). Some pollutants may remain even after treatment of polluted water
- through **interventions that modify the original structure**: river diversions, artificial barriers, etc.

## WATER IS 'BLUE GOLD' BECAUSE:



it is a very **valuable**, primary and irreplaceable resource and in many areas of the planet it has a **very high value**



drinking water for human use is becoming increasingly **scarce** for many states



it is **disputed**: in many parts of the world, **the absence of water can trigger wars and cause population migrations** (more on this later)

*The definition of blue gold highlights how a basic and primary resource, a common good of mankind, is representing an economic interest such as to be compared to a consumer and market good*

(Barlow, Clarke 2002)

This description makes us understand how water management has become functional to policies of economic growth as well as of sustainability of the resource as a common good and social property of collective interest.

# Water and climate change

Through the greenhouse effect, certain gases in the atmosphere (greenhouse gases) trap the sun's rays striking the Earth, retaining heat and thus increasing the temperature on the planet. This has allowed life to develop; otherwise, instead of an average temperature of  $+15^{\circ}\text{C}$ , we would have  $-19^{\circ}\text{C}$ . Thanks to this phenomenon, temperatures remain fairly constant in summer and winter, at night and during the day.

However, through his activities such as industry, animal husbandry, transport, agriculture, but also the heating in our homes, **man has significantly increased the amount of greenhouse gases in the atmosphere** (mainly carbon dioxide and methane). Increasing **gas emissions trap more and more solar energy in the atmosphere, heating it up**. This augmented heat is stored in the oceans, increasing their temperature and also changing the circulation of their waters.



In addition, another phenomenon is happening: rising temperatures are melting and shrinking the surface of the polar ice caps.

As a result, less solar energy is reflected back into space, further warming the planet.

## WHAT HAPPENS THEN?

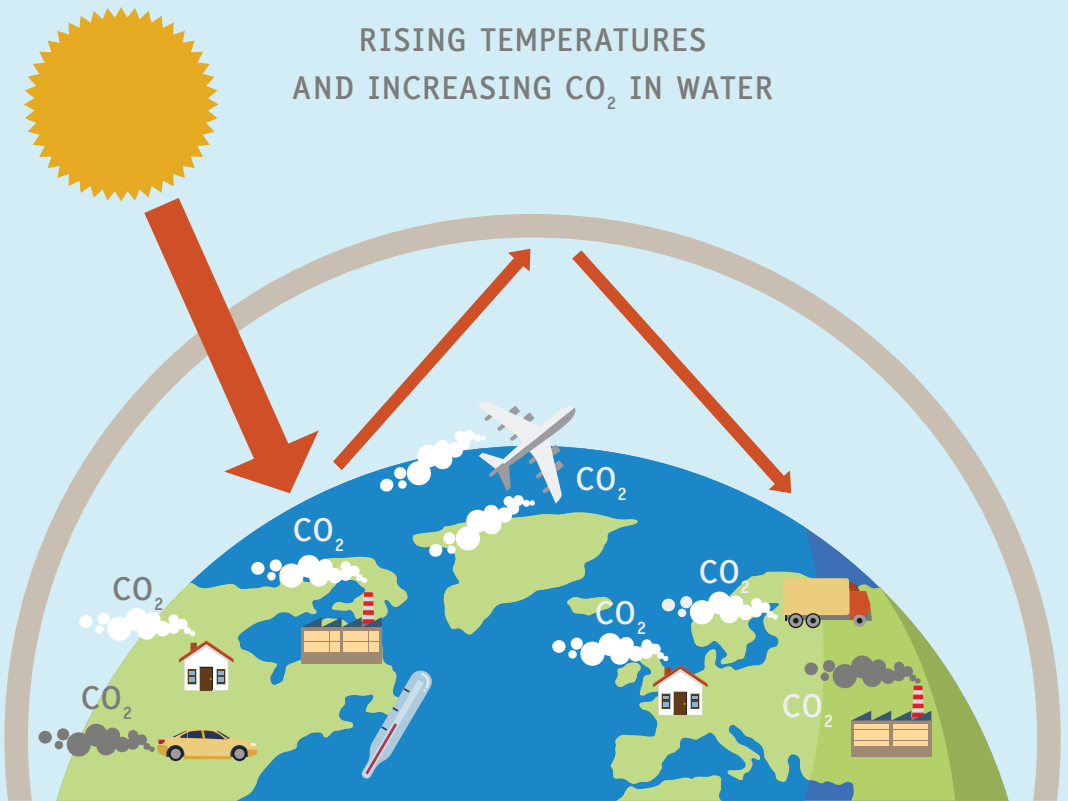
Rising temperatures strongly affect the earth's water cycle: **the increase in water vapour in the atmosphere creates imbalances, altering the climate and resulting in increasingly extreme events, strong heat waves, intense downpours and floods, and exacerbating drought situations in many areas or making wetlands even wetter.**

**The increase of CO<sub>2</sub> in the atmosphere also causes an increase of dissolved CO<sub>2</sub> in seawater, so oceans and seas become more acidic, threatening their inhabitants and the entire marine ecosystem.**

INCREASED GREENHOUSE GAS

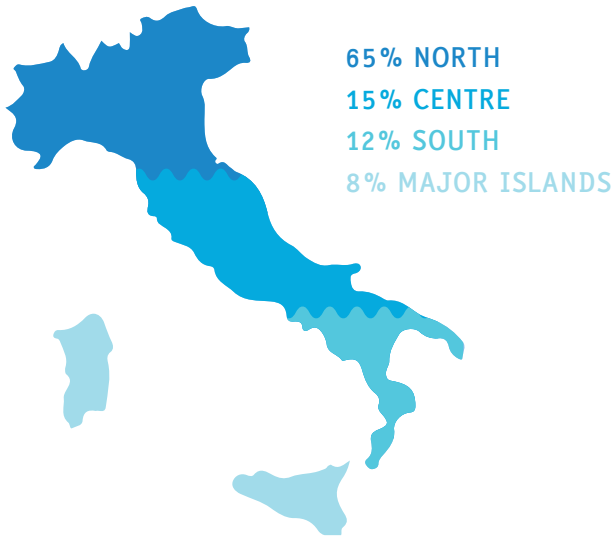


RISING TEMPERATURES  
AND INCREASING CO<sub>2</sub> IN WATER



# Situation in Italy and Europe

Italy is a country rich in water: springs, streams, natural lakes, groundwater but, as in other countries, availability differs in various areas:



Compared to local availability, water is used in the following percentages:

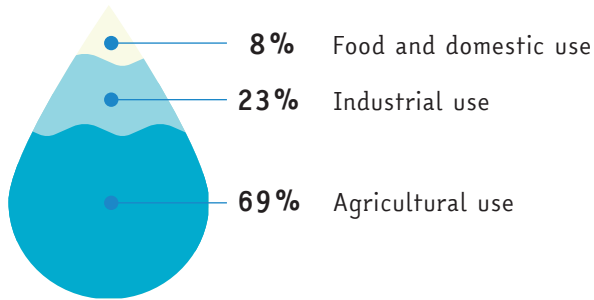
NORTH 78%

CENTRE 52%

SOUTH AND ISLANDS 96%

The figure for the South and the Islands is hardly 'sustainable', not because of the amount of water consumed per se, but because **almost all the water available is consumed, leaving very little available.**

Italy is among the largest water consumers among European states, both in terms of drinking water withdrawal per inhabitant and total volumes. But how much water is consumed for the different uses?



As can be seen from the drawing, use in **agriculture accounts for a marked prevalence** of total water use (as is also the case in other Mediterranean countries).

Climate change will also affect Europe: water resources will decrease especially in the southernmost states, while other areas will be increasingly affected by flooding.

---

## DESERTIFICATION

A major problem that is also affecting Italy is **desertification**, i.e. the gradual transformation of the land into arid and semi-arid areas due to climate problems or human actions (such as over-exploitation for agriculture and livestock). In Italy, the most affected regions are the southern regions and the larger islands.

According to the European Union, 27% of the Italian territory is threatened by withering processes.



# Many marine species and fish sources are at risk

All the changes that are taking place in seas, oceans, lakes and rivers, such as the increase in temperature and acidity, but also the modification of habitats (think of the reduction of the polar ice caps), are affecting the delicate balance of nature, endangering marine species.

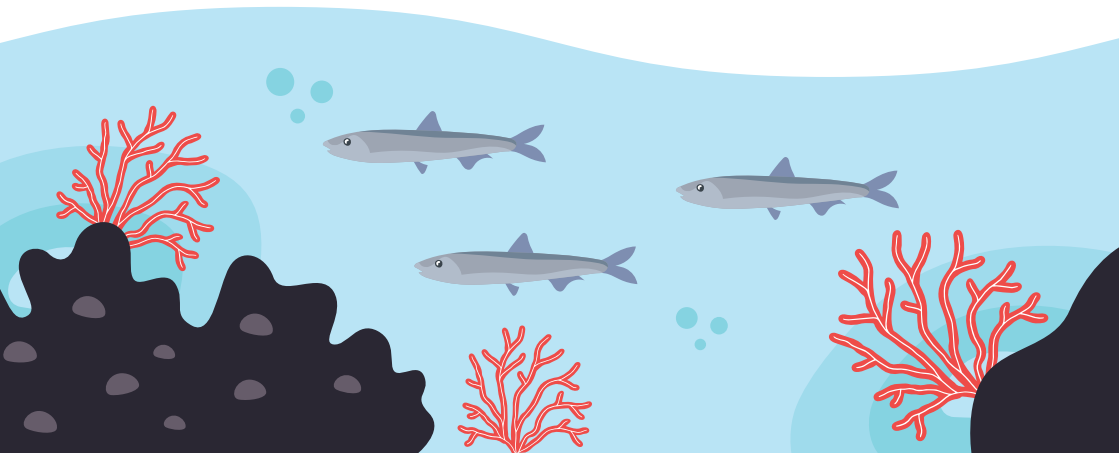
Any examples?

Fish cannot reproduce in waters that are too warm or they move to other seas in search of their food sources.

In warm weather, tropical fish species move into seas and oceans that were colder before, threatening other local fish.

... also to the detriment of man: less fish means less food and creates problems to those who make a living from fishing!

In some areas of the planet, there is one third of the fish that was available less than a century ago.



In addition to this, **human activities** such as intensive fishing, ship traffic and oil activities, waste, microplastics, illegal dumping and pollution in general are also endangering the health of water bodies and their inhabitants.

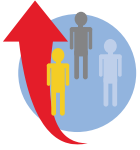


Earlier, we also talked about **acidification**, i.e. the **change in pH of the water due to the absorption of CO<sub>2</sub> from the atmosphere**. This phenomenon negatively affects the photosynthesis of aquatic flora and leads to the reduction of important minerals needed by marine organisms (e.g. calcium carbonate for the formation of mussel shells or corals).

# Reasons for the reduction of available water resources



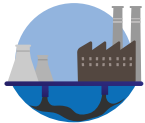
**Climate change**, as we have already seen



**The sharp increase in population** over the last 100 years, mainly due to better medical care and quality of life that have reduced mortality



**The destruction of habitats** such as forests



**Discharge into the environment of contaminated water and pollutions** in general.

## INSIGHTS

**Population increase in recent centuries:**

in 1600	➔	600 million
in 1800	➔	1 billion
in 1950	➔	2.5 billion
in 2020	➔	7.8 billion

## INSIGHTS

**Forests are green but also blue!**

Forests, woods and wetlands are water tanks: they are useful for the water cycle, both as quantity than as quality (they purify it!). Forests reduce landslides, droughts and floods, regulate rivers and streams, recharge flaps and also have an important role on rainfall.



# Wars and Migration due to water

Let's examine the serious consequences of water problems below, with some figures that make us realise their true dimensions.

- Approximately **74%** of all **disasters between 2001-2018** were caused by **water**
- More than **52%** of the world's population by **2050** will live in **water scarce regions**.

---

## WARS AND CONFLICTS

Water scarcity leads to:

- **wars between peoples fighting over the resources** of transboundary water basins or transboundary underground aquifers

## WHAT ARE TRANSBOUNDARY WATER BASINS?

They are those bodies of water shared by several states: watercourses (especially those of significant length and flow) and lakes.

Just to give a couple of examples: the Nile is shared by 11 states, the Amazon River washes 9 of them.

The 280 existing transboundary basins cover almost half of the earth's surface (i.e. 60% of renewable freshwater resources, providing water for 40% of the population).

Source [www.waterandfoodsecurity.org](http://www.waterandfoodsecurity.org)

- **internal conflicts related to discrimination in the use of water:** one example is industrial use at the expense of local poor people
- **tensions and rebellions related to interventions aimed precisely at improving water security** (such as dams), which, however, sometimes lead to negative impacts on certain sections of the population



*"If the wars of the 20<sup>th</sup> century were fought over oil, the wars of the 21<sup>st</sup> century will be fought over water"*

Vice President of the World Bank, Ismail Serageldin, in 1995

And this unfortunately is a current sad reality: there are **well over 300 ongoing conflicts related to the blue gold** (data from *The United Nations world water development report 2019: leaving no one behind by Unesco*).



## MIGRATIONS

Since 2008, i.e. since environmental migrant data has been monitored, an average of **more than 25 million people are forced to flee each year due to environmental disasters** (data from the Internal Displacement Monitoring Centre - IDMC).



Compared to forty years ago, the risk of human beings being displaced by **natural disasters is now 60% higher**, a much higher percentage than for fleeing wars and violence.

## We need commitment and collaboration

### WATER IS AN INDISPENSABLE COMMODITY FOR ALL OF US

**Water problems**, therefore, cannot be linked to individual states but are 'global' issues, to be addressed through effective cooperation between governments and greater personal and collective awareness in terms of the proper protection and management of this precious resource. Although much progress has been made compared to the past (one positive figure above all: **2.6 billion more people have had access to improved drinking water resources since 1990** - Source: United Nations Development Programme - UNDP-), the current situation is not positive and tells us that action is needed on two fronts:



**collaboration between states** to find solutions and projects to reduce climate change. Furthermore, all countries must create internal institutions dedicated to this issue

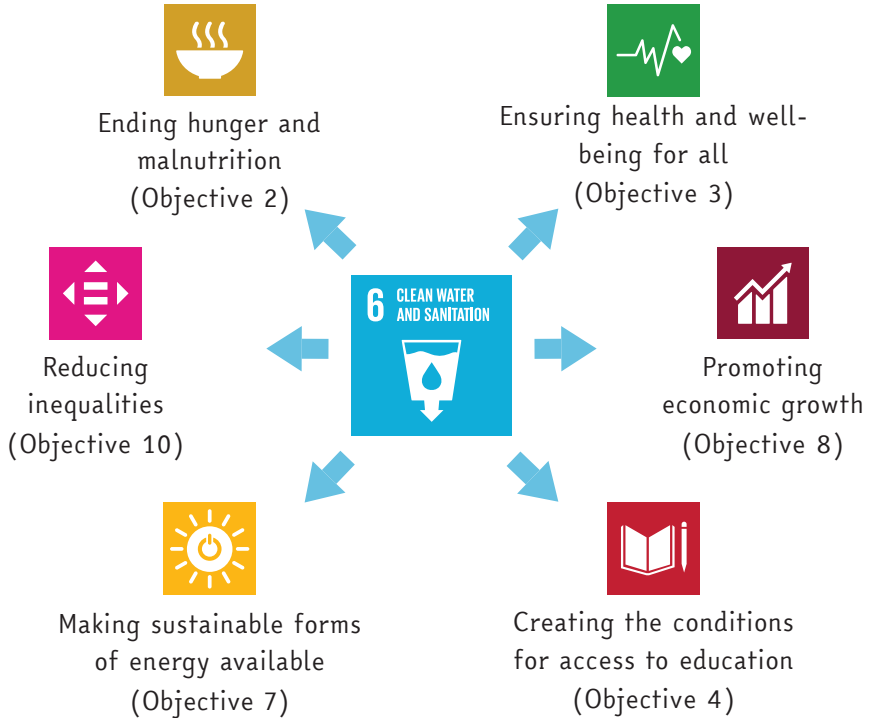


**proper investment and use of new technologies** both to reduce water wastage and pollution and to make water available to all populations of the world

The resolution of the problems lies, therefore, in the **effective dialogue between science/technology, business and governments.**

## 2030 AGENDA - GOAL NUMBER 6

The themes of the previous chapter are central within **Goal No. 6 of the 2030 Agenda**, namely 'Ensure the availability of water and sanitation for all'. As well as being a vital right for individuals, it becomes central to other objectives:



## WHAT IS THE 2030 AGENDA?

### (THE GLOBAL AGENDA FOR SUSTAINABLE DEVELOPMENT)

It is an action plan to achieve - within 15 years - significant improvements for the life of Planet Earth and its inhabitants. It was approved on 25 September 2015 by the countries of the Earth meeting in the United Nations (UN) and consists of 17 global goals to be achieved by 2030 that affect people, the Planet and prosperity.

## PERSONAL RESPONSIBILITY AND CORPORATE RESPONSIBILITY

Each of us can make a difference in terms of reducing water waste.

For example:

- use water only when necessary and reduce the amount
- buy water-efficient taps or showers or install flow reducers on taps
- collect rainwater for the vegetable garden and when watering, prefer mornings, you will avoid evaporation of water from hot times of the day
- as a family, do regular maintenance of water systems and watch out for leaks in the systems!
- **in short, consider water as gold... blue gold!**



Businesses also play an important role in guaranteeing the right to water for people and local communities, a right understood in its key features (availability, quality and accessibility), by:

- adopting measures to **reduce water consumption**, especially in case of scarcity
- using the **best technologies for waste water treatment**
- carrying out **environmental impact assessments** with experts
- implementing a relationship of **dialogue and collaboration with local communities**
- preparing a **water protection plan** with actions and responsibilities



## INNOVATIVE TECHNOLOGY TO PROVIDE CLEAN WATER IN AFRICA

A Euro-African collaboration between academic and industrial partners, including Italians, has developed an innovative water purification system that purifies chemical pollutants and disinfects water by eliminating pathogens. Purification includes a pre-treatment phase in which the organic material suspended in water is separated using a coagulating salt that is easily removed through a filter. Then we proceed with water disinfection, a new European technology involving electrochemical oxidation to produce powerful oxidants, such as ozone, without the need for additional chemicals. The systems are self-sufficient as they operate through photovoltaic modules.




Two demonstration plants were installed, one in Mozambique (Incomati River) and one in South Africa (Klip River). The aim of this system is to disinfect water in remote rural areas of Africa in a sustainable and accessible way, producing drinking water.

Source: [cordis.europa.eu](http://cordis.europa.eu)



 **EasyReading® Font**   
High Readability Font



© Reproduction reserved

This tool is designed for educational projects by Achab Srl SB; the use of the contents and their disclosure are protected in accordance with the laws in force. It is neither usable nor transferable to third parties without special authorisation.

