



Circular Economy Lab & Observatory

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WATER STATUS

Water scarcity
Italy-2.1



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INTRODUCTION

Water scarcity is the lack of drinking water for people and animals in an area. Lack of water affects population health, energy production and everything that concerns agriculture. It can be of two types: economics and physics. Economic water scarcity is a lack of investment and infrastructure which form part of the collection and distribution of drinking water. It may also be due to the lack of water itself. The lack of water has a negative effect on the economy and resources of a country because it can lead to many problems related to water. Lack of water worsens further in some areas due to the climate, the population increase and corruption.



Physical water scarcity occurs where there is not enough water to meet all the requirements, including those necessary for the effective functioning of ecosystems. A fifth of the world's population lives with the scarcity of physical water, that is the lack of water sufficient to irrigate the soil naturally.

This occurs in dry environments such as Africa and so the economy of this continent is hard hit because of this lack.

The United Nations (UN) estimates that out of 1.4 billion cubic kilometres of water on Earth, only 200,000 cubic kilometres represent fresh water available for human consumption. Only 0.014% of all water on Earth is both fresh and easily accessible. Of the remaining water, 97% is saline and about 3% is difficult to access. The freshwater available on the planet is about 1% of the total water on Earth. ⁷⁻⁸

A major role in the shortage of freshwater is played by climate change. The lack of precipitation during winter and spring seasons, followed by heat waves in early summer, resulted in critical condition regions that never faced such problems decades ago, that is, Europe and the United Kingdom. According to the European Commission's EDO (European Drought Observatory), September technical report ¹ 22% of the EU territory is in Warning conditions due to soil moisture deficit, and 27% is in Alert conditions, that is vegetation stress following soil moisture and vegetation deficit.

In the last summer European countries had to deal with reduced crop yields because of water and heat stress for cereal and other crops. Hydroelectric energy production was affected too. For instance, this implied a reduction of 5039 GWh compared to the average of previous years in Europe. As we have briefly exposed, water is a very precious resource which is strictly connected with our survival. It is not as abundant as one would initially think.

In the next paragraph we will discuss to what extent men can be responsible for water scarcity, and the possible actions we should take in a very short time in order to solve or mitigate water scarcity problems.



Riverbed of the Esaro river in Crotone, Italy: plants grow where water used to flow -photo by Giovanna Papa

PROBLEM'S DESCRIPTION

Water scarcity is a deficiency of adequate available water resources to meet the claim for each region. Water is unevenly scattered and a big part of it is polluted or wasted. Many factors affect water availability and quality:

population growth: today the competition for water resources is much more intense.





The consumption of meat that needs water for production is increasing and there is a growing competition for water from industry, urbanisation, biofuel crops and food products dependent on water;

expansion of agricultural and industrial users: the scarcity of consumption is mainly caused by the intensive use of water in agriculture, in breeding and industry. People in developed countries generally use about 10 times more water per day compared to developing countries.

Much of this is indirect use in agricultural and industrial high water intensity of consumer goods;

water pollution: it is the contamination of water bodies, usually as a result of human activities, so as to adversely affect its uses. Water bodies are: lakes, water basins, aquifers, rivers, oceans, seas. Water pollution occurs when pollutants come into contact with these water bodies. This may be due to sewage or industrial activities for example;



climate change: it can have significant impacts on water resources around the world due to the close connections between the climate and the hydrological cycle. If temperatures increase, evaporation and the number of very intense precipitations will also increase. With highly intense precipitation, soil and plants are not able to retain water, that simply runs off eroding soil. The rate of underground water recharge is also compromised.

Droughts and floods can become more frequent in different regions at different times. Higher temperatures will also affect water quality. Climate change could also mean an increase in demand for agricultural or common irrigation.

But what are the possible medium- and long-term effects of climate change on the hydrological cycle and the amount of water available?

The situation is really not reassuring, in Italy in particular, you could have a reduction of 10% in a short-term projection, to 40% in the long term.⁶

A water saving study estimated water consumption in Europe with a 16% increase by 2030. The worst effect of global warming is how it accounts for the water cycle.



It is not possible to know where it will rain and South Africa and South Asia are seriously in a problematic situation. Even more worrying is the issue of leaks in the network of the drinking water distribution service.¹⁻⁶



POSSIBLE SOLUTIONS

The wrong agricultural and industrial systems have increased the withdrawal of groundwater. Strategies to reuse water include the recycling of it and the use of zero-liquid waste systems, so that water within a facility is constantly treated, used and reused again and again without being discharged into the sewer or other external water systems. But not all water can be reused.

Non-drinking water can be used for washing cars, irrigating the landscape, industrial processing and draining toilets. Such a system allows waste water that would have been discarded to become a useful resource. Reuse of water or grey water can therefore save a lot of fresh water for human consumption in times of water scarcity and water stress. Agriculture is playing a key role in water shortages nowadays.

Currently, excessive levels of chemical fertilisers and pesticides are used to maximise yields but lead to severe soil pollution, which in turn results in water pollution underground and contributes to the problem of water scarcity.

It is imperative that farmers reduce the use of chemicals, including improving farming practices, to ensure clean water and reduce the problem of water shortages.



A method to reuse water could be desalination, that is salt water treatment. This treatment process aims to obtain fresh drinking water from salty ocean waters or groundwater with high salt concentrations. Nations should invest in desalination technologies as a means of obtaining a more reliable water resource system to meet the everincreasing demand for water. Desalination can therefore offer an incredible solution to the scarcity of freshwater.



However, it relies heavily on energy-hungry technologies and structures that should be thoroughly evaluated. All over the world there are about 19'700 desalination plants. In Europe, Spain is the leading country in the use of this technology, producing 5 million cubic metres per day of water obtained via desalination. In Italy, only 0,1% of civil water is desalinated water. But the costs are gradually becoming more competitive, and there will be an increase in the desalination plants in Italy in the next future. ¹³

One of the key ways to solve the water scarcity problem can be by repairing infrastructure and maintaining water channels. Damaged and leaking pipes and sewer systems lead to large waste of water over time.

Millions of litres of water are lost every year in various regions of the world due to sewer leaks and contamination, creating water shortages ³. A common case is leaks from pipes, which most likely are not visible.

There are tools that can easily locate leaks. The gas-tracer is one of the most accurate and cutting-edge systems for identifying and locating the points where the pipes are leaking without the possibility of error.

An alternative to tracer gases are geophones, electronic correlators and other tools for acoustic localization. All this type of equipment is used especially for the search for large underground or deeply buried leaks.



The third option, when you need to locate a leak and don't want to break the walls, is to use special infrared cameras. This equipment allows the plumber to identify the leak on the screen of a special device that reproduces thermographic images ¹¹.

When installing a new pipe line, a good option is to install water sensing cables that can detect a future leak with one metre accuracy. These cables are supposed to be installed alongside the water pipes. They have a sensing wire and some electric wire to carry the signal. When the sensing wire gets wet, a signal is sent to locate the leak. ¹² Another strategy involves a change in the behaviour of the entire population, that is, saving water when possible, taking quick showers, limiting the use of washing machines, keeping the tap closed while brushing our teeth, etc.. etc.. They are small things that seem trivial but make a great difference ⁴.

We become aware of the lack of water when we see how things are changing quickly around us for the worse.

Rivers have long run dry; water fountains are now a thing of the past. There are also more advanced technological devices to be installed in buildings.



Although these system are quite compact and can reduce water consumption by 45%⁵, they are most likely to be installed in new buildings, or in in houses that undergo a significant renovation.



<https://www.pexels.com/it-it/foto/persona-che-pulisce-le-mani-sotto-l-acqua-66346/> - photo by Samad Deldar

CONCLUSIONS

According to the IPCC, by the end of the century the great mountain ranges of the world such as the Alps, Andes and Altai etc. will lose up to 80% of their glaciers. But this is just an average. Specifically, in fact, due to global warming, it is expected that in Italy all glaciers below 3500/3600 metres of altitude will disappear by the end of the century. According to other estimates, however, it will happen within 20/30 years.

In short, the situation we are experiencing had been “foreseen”, or at least we had been warned: continuing to call them “fatality” and having an attitude of reaction rather than preparation is NO longer acceptable. We can deduce that water is a limited resource and it will end sooner or later, and if we continue with business as usual it will happen very soon.

As Ovid said: “What is harder than a stone and softer than water? Yet the soft water digs the hard stone.” This phrase best recognizes the importance and strength of water, that must be protected and rationed and above all, not wasted. Through our solutions, we have identified methods to ensure that water can be used over and over again in order to avoid waste.

Water scarcity cannot be solved if we don't change our behaviour and we don't understand the actual importance of this problem. Only a few people in the world are truly aware of it and do something to solve it.



One of the biggest water wastes is inside our own homes, as we tend to use more water than necessary for things for which very little water is needed, for example, running the water while taking a shower, washing dishes, brushing your teeth etc.

If we fail to change our habits, we will end up without any water. New technologies are now available in order to monitor water consumption and water waste, for instance when a pipe is damaged and water spills out.

In Italy only, since most of the pipelines are quite old, water networks have an average water loss of around 40%. From an engineering point of view, the facilities have always been designed considering water as an abundant, if not infinite, resource.

Now we are starting to design facilities in a circular way, meaning that precious water is used again and again for different purposes. Even if this application is initially expensive, the cost is justified by the benefits in terms of water savings. "What we do is just a drop in the ocean, but if we didn't, the ocean would have one drop less." – Mother Teresa



<https://www.pexels.com/it-it/foto/persona-in-possesso-di-fragole-rosse-in-confezione-di-plastica-6004132/> - photo by RODNAE Productions

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