



# AQUAPATH

Project

## AquaPath – Module 1

# WATER FOOTPRINT AWARENESS

[WWW.AQUAPATH-PROJECT.EU](http://WWW.AQUAPATH-PROJECT.EU)



Erasmus+





## 1. FRESH WATER: A LIMITED GLOBAL RESOURCE

### 1.1. WHAT IS FRESH WATER?

Fresh water is naturally occurring water on Earth's surface in ice sheets, ice caps, glaciers, icebergs, bogs, ponds, lakes, rivers and streams, and underground as groundwater in aquifers and underground streams. Fresh water is generally characterised by having low concentrations of salts. The term specifically excludes seawater and oceans as they are salty.

The definition of freshwater is water containing less than 1000 milligrams per liter of dissolved solids, most often salt.

Fresh water is needed for nearly all human activities, i.e. humans strongly depend on fresh water. Freshwater systems are the rivers, streams, lakes, ponds, groundwater, cave water, springs, floodplains, and wetlands (bogs, marshes, and swamps). Freshwater provides water for drinking, sanitation, agriculture, transport, electricity generation and recreation. It also creates habitats for a diverse range of animals and plants. We cannot live without freshwater.

Only 3% of the water on Earth is freshwater in nature, and about 2/3 of this is frozen in glaciers and polar ice caps. Most of the rest is underground and only 0,3% is surface water. Freshwater lakes contain 7/8 of this fresh surface water. Only a small amount in rivers. The atmosphere contains 0,04% water.

### 1.2. WATER CYCLE

Do you ever think about the journey of water while showering? The water cycle is a way that water moves all around the Earth. It never stops and doesn't really have a beginning or an end. It's like a big circle.

For example, water in the ocean or a lake. Some water on the surface of the ocean will evaporate due to heat from the sun. When it evaporates it turns into vapour water and goes up into the atmosphere. This vapour water gets together with a lot of other vapour water and turns into clouds. Clouds move about the earth with the weather and once they are so full of water they drop the water to Earth in some form of precipitation. It could be rain, snow, sleet, or hail. When the water hits the earth it may fall right back into the ocean or feed a flower or be snow on the top of a mountain. Eventually this water will evaporate and start the whole cycle again. This process keeps constantly moving!

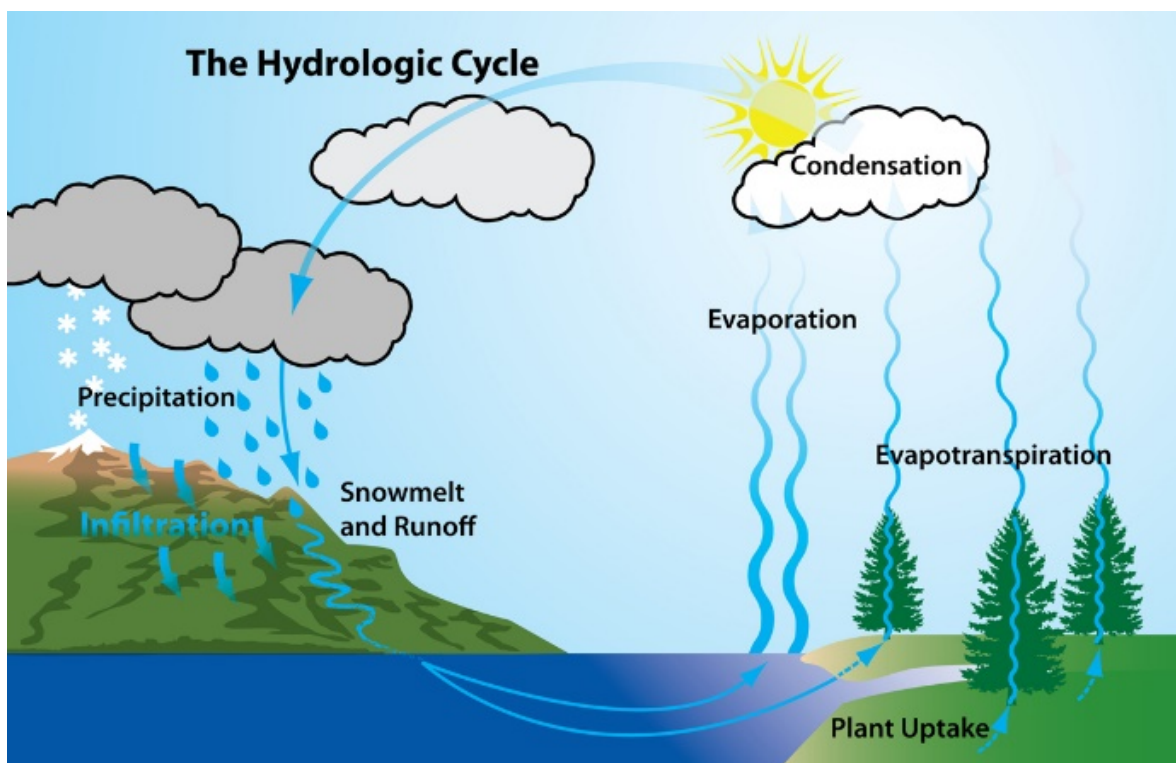


Figure 1. Water cycle<sup>1</sup>

### How does humanity impact the water cycle?

Freshwater is the single most essential good for our well-being. Like a giant engine working day and night, the water cycle and inherent ecosystems are the life support of the planet. Less than 1% of the world's water is readily available for direct human uses. These uses include agriculture and industry, drinking and domestic purposes, and energy generation and transport. Increasing competition for water among such uses is degrading the very natural resources on which we all depend.

Major human impacts on water cycle water consumption and water pollution. We take water out of the system to irrigate crops, to provide us with drinking water and to carry out many of our industrial processes. We add substances to the water – intentionally or not. As precipitation falls on the ground and moves into rivers and creeks, it picks up a whole range of pollutants. In rural areas these pollutants may include farm pesticides, herbicides and fertilizers as well as wastes from faulty septic systems and improperly handled manure. In urban areas, the pollutants may include gas, oil, pet waste, fertilizers, pesticides, salt and treated human waste from sewage treatment plants.

<sup>1</sup> <http://www.state.nj.us/drbc/hydrological/>



Another human impact on the water cycle is deforestation. Trees release normally vapour when they transpire, producing a localized humidity. The vapour then evaporates into the atmosphere, accumulating before precipitation brings the water back to the earth surface. Because of deforestation, there is less water evaporating into the atmosphere and subsequently less rain.

Greenhouse effect is a phenomenon of Earth's atmosphere trapping a range of gases, which in turn capture infrared radiation to keep earth at a moderate temperature range. Human induced climate change also impacts the water cycle. Higher temperatures mean there is more evaporation. Warmer air can hold more water vapour, which can lead to more intense rainstorms. But much of the water runs off into the rivers and streams, and the soil remains dry. More evaporation from the soil increases the risk of drought.

**Learn some more:**

- <https://www.youtube.com/watch?v=al-do-HGulk>

### 1.3. FRESH WATER AS A RESOURCE

Water is increasingly recognized as the “**blue gold**” especially in the countries where water scarcity and water pollution exists.

**Water scarcity occurs as water is often not available for the users in a specific location for a specific duration such as a month or a season.** Water scarcity is related to:

- amount of rainfall and the presence of water in rivers, lakes and groundwater (water availability);
- demand for water for different uses such as domestic water supply, agriculture, industry.

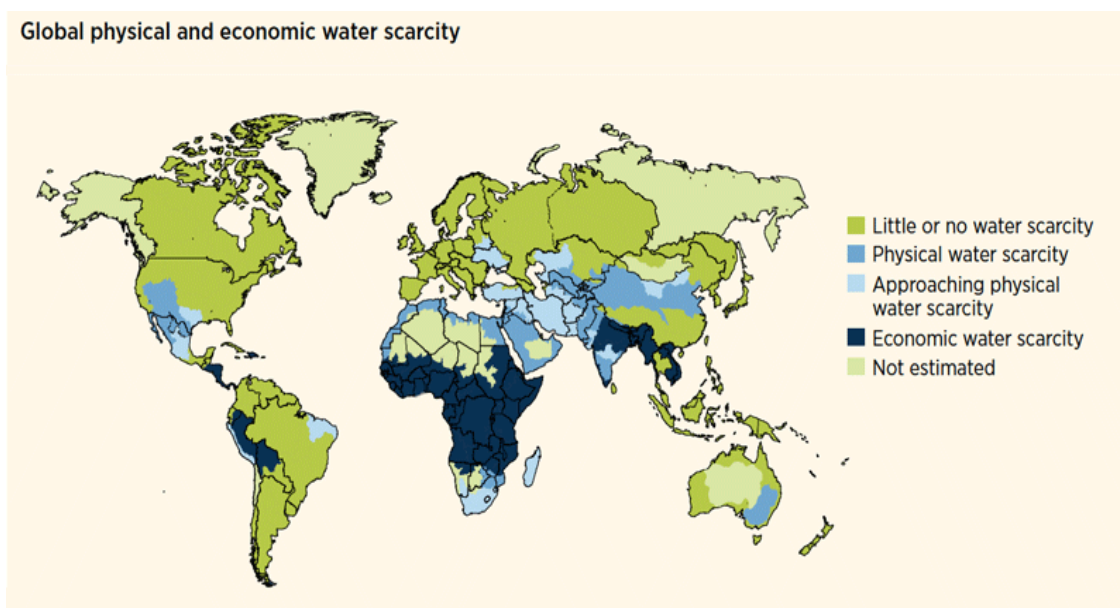


Figure 2. Global water scarcity<sup>2</sup>

Water issues are serious and worsening in many parts of the globe, thus making water management a complex task. While water is abundant all over Europe, large areas are affected by water scarcity and droughts — particularly in Southern Europe and Central Asia with their severe lack of, and high demand for, water. Europe is also suffering from floods, with an increasing number of deaths, displacement of people and economic losses. Climate change is projected to exacerbate this, with more frequent and severe droughts or floods projected for many parts of Europe<sup>3</sup>.



**Learn some more:**

- <https://www.youtube.com/watch?v=z-iVI3JJRM>
- <https://www.youtube.com/watch?v=iJJOOfOpUYs&index=7&list=PLHnzEAZ3Ishnekss0LWodXCLcskhWDHY>

## 1.4. WATER FOOTPRINT

The water footprint is an indicator of humanity's appropriation of fresh water in volumes of water consumed and/or polluted. It measures the amount of water used to produce goods and services. It can be measured for a single process, such as growing cotton, for a product,

<sup>2</sup> United Nations Educational, Scientific and Cultural Organization (UNESCO), 2012. United Nations World Water Development Report 4. Volume 1: Managing Water under Uncertainty and Risk, United Nations World Water Assessment Programme (WWAP), UN-Water.

<sup>3</sup> European Environmental Agency, 2011. Europe's Environment: An Assessment of Assessments (EE-AoA), Copenhagen, Denmark.



such as a pair of jeans, for an entire multi-national company (e.g. fashion brand), or for a geographic region such as a country or for an individual consumer. The water footprint of a product is defined as the volume of freshwater used to produce the product, measured over the full supply chain. For example, the water footprint of a cotton t-shirt refers to the amount of water consumed and polluted in the entire production processes of a t-shirt: cotton farming, ginning, spinning, knitting, wet processing (washing, dyeing, finishing), cutting, sewing, printing, etc.

The water footprint has three components: blue, grey and green.



The **green water footprint** refers to consumption of rainwater (rainwater stored in the soil as soil moisture) by plants, crops and forestry. It is relevant for agricultural production such as cotton.



The **blue water footprint** refers to the water consumption from the surface water (e.g. river, lakes) and groundwater.

The term 'consumptive water use' refers to one of the following four cases:

- water evaporates;
- water is incorporated into the product;
- water does not return to the same catchment area, e.g. taken from ground water and given back to surface water or the sea;
- water does not return in the same period, e.g. it is withdrawn in a scarce period and returned in a wet period.



The **grey water footprint** refers to pollution and is defined as the volume of freshwater that is required to assimilate the load of pollutants given natural background concentrations and existing ambient water quality standards.



## Water footprint of a consumer

*Direct water footprint: water we drink and use at home, work and in our daily life*

The water footprint of a consumer is the sum of its direct and indirect water footprints. The direct water footprint of a consumer is the water consumption associated with washing, showering, cleaning, cooking, drinking etc. The indirect water footprint of a consumer is related to the goods/products that consumer consumes such as food, clothing, electronics. For each consumption item, there is a water footprint. When we focus on meat consumption, the direct water footprint of the consumer refers to the volume of water consumed or polluted when preparing and cooking the meat. The indirect water footprint of the meat consumer depends on the direct water footprints of the retailer that sells the meat, the food processor that prepares the meat for sale, the livestock farm that raises the animal and the crop farm that produces the feed for the animal.

*Indirect water footprint is related to items we consume, such as food. There is water need to produce the food we eat and indirect water footprint refers to this water.*



Do you think that your water footprint is only related to the water you use to shower, drink, cook, clean etc.? These activities in average represent less than 4% of your personal water footprint. The majority of your water footprint is related to the food you eat and goods you buy.

You can reduce your direct water footprint (home water use) by installing water saving toilets, applying a water-saving showerhead, closing the tap during teeth brushing, using less water in the garden and by not disposing medicines, paints or other pollutants through the sink.





Related links:

<http://www.unep.org/geo/geo3/english/pdf.htm>

<http://waterfootprint.org/en/water-footprint/what-is-water-footprint/>

<http://www.physicalgeography.net/fundamentals/9s.html>

<http://www.iweather.net/educational/water-cycle-disruptions-cause-droughts>

<http://water.usgs.gov/edu/watercyclesummary.html>

<http://water.org/water-crisis/water-facts/water/>

<http://www.learner.org/courses/envsci/unit/text.php?unit=8&secNum=5>

Videos:

<https://www.youtube.com/watch?v=al-do-HGulk>

<https://www.youtube.com/watch?v=jlJOOOpUYs&index=7&list=PLHnzEAZ3IShInekss0LWodXCLcshWDHY>

<https://www.youtube.com/watch?v=z-iVl3JJRM>