Circular Economy Lab & Observatory

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SUSTAINABILITY

6.a Water footprint examples for everyday products and the ways to reduce our impact

Romania-6.1

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What exactly is a water footprint?
A water footprint is the total amount of water utilised by a certain entity during a specified time period. This can be computed for a product, a service, an industry, a company, a nation, or even an individual. It also accounts for both direct and indirect water usage. Nowadays, the water footprint (WF) has emerged as a key metric for monitoring human impact on the freshwater supply. The WF, one of the footprints in the footprint family that complement the ecological and carbon footprints, was created by Dr. Hoekstra in 2002. The WF idea primarily tries to illustrate the connections between water usage and human consumption, as well as between international water commerce and water resources management.

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In order to demonstrate the significance of human consumption at global level and the importance of good practices in water use and water governance, this idea has been introduced into the field of water management research.

Making sure there is enough water for all living beings on our planet can be one of our most pressing issues, and understanding how much water we use can help us find a solution.

Every consumer in our world economy "consumes" as much as 5,000 litres of water daily on average (ranging from 1 500 to 10 000 litres per day, depending where you live and what you eat). Everything we use or consume leaves a water footprint, sometimes in our area but more frequently in river basins away from where we live, sometimes even in other countries. A product may contain ingredients from many sources.

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Water is a limited but easily accessible resource. The quantity on Earth is the same as it was at the time of the dinosaurs. There is increasing demand for finite supplies as our population expands. Pollution and the notion that the amount of water available varies seasonally and geographically make this problem worse. We are currently using more freshwater than the earth's natural supplies can sustain in many places.

The water footprint for a kg of beef, for instance, would be as follows:

- The water necessary to cultivate the grass, cereals, and forages they consume.
- The water required to maintain the environment, wash the barn, and care for the animals.
- The water they consume throughout their life.
- The water required to remove production-related pollutants.

All things considered, a kg of beef has a staggering footprint of 15,500 litres. Such a large amount of water! On the other hand, an apple only requires 800 litres. It may be really frightening to see just how much water we waste every single day without even noticing it. We can imagine how people, the environment, rural regions, and cities utilize water using the assessment of WF. To encourage effective water management, it permits a comparison between genuine water supply and true water demand.

A chemical production plant (https://unsplash.com/photos/c7RWVGL8IPA; Free to use under the Unsplash License)

From a life cycle perspective, the WF examines both direct and indirect water usage. Direct usage is defined as the direct consumption of water by a consumer or producer. According to Hoekstra et al. (2009), "indirect use" is defined as "the total volume of water embedded in the supply chain for the production of goods and services consumed by people in a country." Embodied water or virtual water are terms used to describe indirect consumption.

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For any clearly defined set of consumers (such as a person, a city, province, state, or nation) or producers (such as a public organization, a private firm, or an economic sector), WF may be determined for a specific commodity. WF will be calculated as the entire amount of freshwater utilized to generate commodities and services used by people, communities, or enterprises. It displays the geographical distribution of a nation's water requirements for domestic and industrial use.

The average household direct water usage is reasonably simple to quantify, but our indirect water use is so extensive that it can be challenging to grasp. Depending on personal choices, we consume varying amounts of water, a wide range of services, and products. You must consider:

- The water which we personally use each day for tasks such as showering, cleaning, cooking, and gardening.
- The water used in the production of the food we consume.
- The water used to make the goods we buy and the clothing we wear.
- The water used to generate the services we use, like power, etc.

The Water Footprint analysis keeps track of three important water components. First, the blue water footprint assesses how much water is consumed by people and communities, both above and below ground. This is the farming water found in rivers, lakes, swamps, and subsoil.

The proportion of a river's overall blue water footprint to its blue availability. A "blue water shortage" is the lack of blue water in a basin for a specific amount of time. Blue water is regarded as uncommon if the ratio is equal to 1.

Second, the term "green water footprint" describes the utilization of rainwater that has been retained in the soil as soil moisture that is available to plants and has been held in the precipitation-formed unsaturated zone.

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The quantity of freshwater required to remove the pollutants in compliance with the existing standards for ambient water quality is known as the "grey water footprint," which also refers to pollution.

It is a sign of the degree of water pollution when freshwater turns into wastewater and needs to be treated to eliminate contaminants before being reintroduced for use in agriculture, industry, or human consumption. A study was conducted in 2011 by Mekonnen and Hoekstra to evaluate worldwide WF. According to this study, China, India, and the US accounted for around 38% of the world's WF production between 1996 and 2005.

China has the biggest grey WF at around 36%, whereas India has the largest blue WF of about 24%. In order to analyse water sustainability from a global perspective, provide frameworks and tools, offer techniques for evaluating WF, and encourage sustainable water management for countries, regions, cities, as well as people, the Global Water Footprint Network (WFN) was established in 2008.

Some Facts and Figures About Water Use:

- 70.9 % of the planet's surface is covered with water.
- That water is mostly salt water (97%).
- 2.1 billion people do not have access to clean water worldwide.
- The amount of water used is increasing twice as fast as the population. By 2025, two-thirds of the world's population will experience water "stress" unless this trend is reversible and we discover a way to share water fairly and sustainably around the planet.

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- The average annual water footprint per person in the USA is equal to the volume of water required to fill an Olympic-sized swimming pool, or 7,786 litres of water per person every day.
- The average water footprint in China is 2,934 litres of water per person each day.

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Two crucial factors should be considered while researching the water footprint of a certain product or process:

1. Analyse if a product or process's water footprint needlessly adds to the water footprint of mankind as a whole by contrasting it with the global average (or benchmark). The scope of any research should be expanded if such a standard is not accessible, therefore this study also covers establishing what a fair benchmark may be.

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2. If the WF contributes to any particular hot spots by determining whether or not each component WF is located in a hot spot.
   A global hotspot database at both the geographical and temporal levels is necessary for this. The scope of any research must be expanded to incorporate catchment studies from a geographical perspective if such a database is not already accessible. How Much Virtual Water Do Some Products Contain?

Consider smartphones as an example. Their grey water footprint, or virtual water connected with their production, is where their water footprint emerges. Phones are made up of several parts that were assembled in several processes, each of which required water. In the production of smartphones, a variety of resources, components, and materials are used, such as rare earth metals (like lithium), tin, glass, and plastics.

The supply networks for these minerals are extensive, reaching nations like China, Indonesia, and the Philippines. Processes like mining for precious metals, making synthetic chemicals for glue and plastic, as well as assembling and packaging, may all be considered production phases. The blue water footprint is made up of all the water used during each step. When all of the water used in the creation of a smartphone is summed together, the water footprint of a single phone is estimated to be 12 thousand litres.

Similarly, water is used in the production of the majority of other items. One kg of plastic, for example, requires 80 litres of water to produce. In truth, it takes at least twice as much water to make a plastic water bottle as it does to fill it. One kg of cotton has a water footprint of 10 000 litres. That's more than 2 500 litres of water for a single new cotton t-shirt. Even refining gasoline requires water — one to 10 litres of water are required to refine one gallon of gasoline.

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Save water by following the Three Rs: Reduce, Reuse, and Recycle. Given all of the water and other resources that go into creating all of the items used in the EU, the phrase "reduce, reuse, recycle" becomes even more pertinent. Buying fewer things in the first place decreases the overall quantity of products manufactured, and consequently the amount of water needed by the businesses that produce these products. Furthermore, recycling consumer products might have a positive impact.

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Small changes, like recycling at home, reusing products when available, and using less plastic bags and paper towels, may add up to a significant reduction in water usage. The most water is saved by reducing the demand for new items in the first place – stopping overconsumption. It makes a great difference to avoid purchasing throwaway, low-quality things that are designed to be tossed aside. When new purchases are needed, buying used things and thrifting – especially for apparel – or purchasing products that are of higher quality, reusable, and, if necessary, recyclable are the best solutions.


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Food is frequently wasted, whether in farms, the distribution chain and grocery shops before it is sold, or in our homes. According to the World Resources Institute, 1 billion tons of food are lost or squandered each year, as does 25% of all agricultural water required to grow it. There are several things that may be done to reduce food waste. The most essential thing for customers is to plan their meals and purchase appropriately. Retailers may also help by simplifying expiration date labelling and providing food preservation advice.

We can lower our water footprint as consumers by consuming fewer water-intensive items. Plant-derived goods, such as vegetables and grains, require less water to produce than animal products, such as meat and dairy. Additionally important to one's health is a plant-based diet. In this aspect, research appears that the terminology used by firms and restaurants to promote plant-rich foods influences customer preferences, since people prefer goods sold for their appearance and flavour rather than their health advantages.

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Nonetheless, certain crops demand significant volumes of irrigation water, causing issues in water-stressed areas. Nature-based solutions are an excellent method to safeguard vital natural resources such as land and soil. Agroforestry, for example, improves soil health, decreases soil temperatures, and helps in the effective use of water. This natural remedy raised corn yields by 50% in Malawi.

Water management and drought have an impact on crop output. In rice fields, for example, modern irrigation systems can manage the water level to boost yields while decreasing water consumption. However, certain crops are more suited to arid environments than others. Farmers in drought-prone areas could pick crops that use the least amount of water, and governments may fund research and create incentives for good water management.

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Conclusion

Although most of the water depletion and pollution has been going on for years, we have yet to develop an adequate solution.

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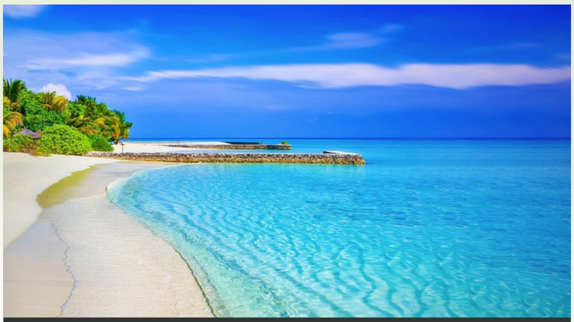
Three approaches are proposed to promote more sustainable water use. First, governments must set water footprint limitations for all catchments across the world. Such limitations are required to regulate water usage in each river basin.

A cap will be determined by local water availability and will change throughout the year, as the maximum quantity of water available for use is smaller during the dry season. Furthermore, not all of the water in a river may be utilised. A certain amount of water must be preserved in order to sustain ecosystems and biodiversity. It also affects the livelihoods of people living downstream.

Water footprint caps may also be used to determine a maximum amount of pollution in a watershed based on its capacity for absorption.



https://pixabay.com/photos/beach-sea-panorama-panoramic-1824855/

Once a quota has been established, we must guarantee that the number of "water footprint permits" provided to individual users does not exceed the restrictions. Only in this manner can we ensure that the sum of water consumption and pollution loads remain below sustainable limits. We should recognise that water usage is not always an issue if utilised water is purified and returned to the river or aquifer from where it was collected.

As a result, the water footprint only measures consumptive water usage, or water that is not returned to the source from which it was obtained, and the volume of dirty water, or water that has not been treated before disposal.

The second step is to develop water footprint benchmarks for all water-intensive requirements, such as food, drinks, clothing, flowers, and bioenergy. We must encourage the finest possible technology and practises that result in the least amount of water use and pollution.

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Water waste is massive in agriculture and industry. We will have a gauge of what are appropriate levels of water consumption using water footprint benchmarks for products, including for each step of a product's supply chain. Several studies have previously demonstrated that replacing obsolete procedures with improved ones that are presently accessible can result in large water savings and massive water pollution reduction.

It would be fantastic if customers were better educated and had more options. Today, purchasing water-friendly items is challenging due to a lack of essential information. Governments must promote more product transparency by requiring corporations to demonstrate compliance with specified minimum production norms. This is important not only for customers at the end of the supply chain, but also for businesses looking to source responsibly.

Water footprint standards will also be valuable for governments when giving water footprint licences to individual users, because permits may be limited to what is strictly necessary for a certain sort of output. The final step is to encourage more equitable water consumption across communities.

Consumers in the United States and Southern Europe have roughly double the worldwide average water footprint. Because the amount of water available per person on the planet is finite, we must share it and agree on what direct and indirect levels of water consumption per person are reasonable. This will likely result in significantly different viewpoints and will necessitate high-level political action.

As we seek a solution to the difficulties of climate change, we may expect similar conversations and compromises. Because of predicted population growth, average yearly consumption per person will have to decline from 1,385 cubic metres in 2022 to 835 cubic metres by 2100 if we wish to stabilise our overall water footprint and prevent it from increasing further. While we can easily exist on that quantity of water, many of us will need to change our habits in order to minimise our direct and indirect water use.

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GROUP

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