

Lesson 2 Embrace the Earth

Mind Your Water Footprint

Despite the fact that approximately 71% of the earth is covered with water, fresh water is actually a limited resource. Only about 2.5% of the earth's water is fresh water, and about 1.2% of that is suitable for drinking. The rest is locked up in glaciers or buried deeply under the ground. If we put all the world's water in a 100-liter bin, the amount of fresh water available for humans to use would be less than a spoonful. Regardless of this scarcity, we use a tremendous amount of 4.3 trillion (4,300,000,000,000) tons of fresh water globally every year, which is equal to filling more than 50 Olympic swimming pools every second. We need to clearly understand the gravity of this situation. One valuable tool to evaluate and track consumption patterns of this vital resource is the concept of a water footprint.

Definition of a Water Footprint

A water footprint is an environmental indicator that measures the amount of fresh water used by a consumer or producer of goods and services. It measures the consumption of fresh water as a resource as well as its use in assimilating waste. A water footprint can be broken down into three components: green, blue, and gray water footprints. A green water footprint refers to the amount of rainwater needed to produce goods and services. A blue water footprint refers to the amount of surface water or groundwater needed to produce goods and services. A gray water footprint refers to the amount of fresh water needed to treat manufacturing wastewater to meet water quality requirements defined by governmental standards.

The Water Footprint of a Smartphone

A smartphone is a striking example of a product that has a serious impact on water resources, with an estimated usage reaching 12,760 liters. First of all, green water sourced from rain is utilized when mining raw materials like minerals and rare metals used in smartphone fabrication. Also, it uses blue water from surface water or groundwater sources in the manufacturing process. In addition, manufacturers are required to meet pollution limits before discharging wastewater into waterways. The water used to treat wastewater is gray water, which is the most significant part of the smartphone's total water footprint, comprising 60% of the total. The remaining water use consists of green water at 29% and blue water at 11%.

The Water Footprint of a Pair of Leather Boots

Leather products also require unexpectedly large amounts of water. The total water footprint to make a single pair of leather boots is estimated to be 25,024 liters. The largest portion of the water footprint of leather boots is gray water, accounting for 55% of the water usage. This gray water is used to treat the pollutants generated from cattle farming and the leather tanning process. The green water footprint is the next largest at 43%. The green water footprint is mainly from feed crops for cows to obtain raw materials. These big gray and green water footprints indicate that cattle farming is responsible for enormous water use. Meanwhile, the blue water footprint is the smallest, comprising 2% of the total water footprint. It is used in the manufacturing process, including tanning and finishing.

How to Shrink Water Footprint

People can reduce their water footprint and contribute to responsible water usage by adopting some simple habits. First, they can cut back on direct water use in daily life. For instance, turning off the tap when it is not in use is the simplest way to save water. Second, it can be beneficial to replace products that have a high water footprint with those that have a smaller footprint. For example, an individual can reduce their water footprint by up to 225,000 liters annually by switching from eating beef to chicken. Lastly, changing small online habits can help reduce a huge water footprint. For instance, deleting emails regularly can save water resources, as a small 1 MW (megawatt) data center uses around 25.5 million liters of water per year to cool down its servers.

Businesses can remarkably cut down their water usage by implementing water-saving measures. One effective way to achieve this is by utilizing technologies to monitor water consumption in real time. For example, a major car manufacturer implemented a water usage tracking system. It resulted in a 76.2% reduction in water use, saving 846.9 billion liters from 2000 to 2022. Recycling and reusing water can also reduce water waste. For instance, a well-known denim factory in Mexico has achieved 100% water recycling in production and saved 156 million liters per year.

While it may be impossible to eliminate our water footprint, it is important to acknowledge that every small action we take can make a meaningful difference. By being mindful of our water consumption and making conscious choices about the products we use and the food we eat, we open the possibility that our water footprint can be significantly reduced. To ensure a sustainable future for ourselves and future generations, it is vital that individuals and organizations raise awareness about the importance of water conservation.

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The Disappearing Aral Sea

The Aral Sea, located in Central Asia between Kazakhstan and Uzbekistan, is known as one of the worst environmental disasters caused by humans. It is called a sea due to its huge size, but it is, in fact, a lake. The Aral was the world's fourth-largest lake in 1960. The area of the lake, however, decreased from 68,000 km² in 1960 to 6,000 km² in 2020. The salt concentration was about 10g/L (grams per liter) on average in 1960, but it reached as high as 170g/L in some parts of the Aral in 2020, which is about five times saltier than the ocean.

Both weather and human involvement have contributed to the shrinkage of the Aral. A severe drought in the 1970s lowered the amount of river water flowing into the Aral significantly. The Aral's diminishment, however, was mainly due to the fact that a massive amount of water from two major rivers feeding the Aral was used for farming. Virtually all of the river water that ran into the Aral has been diverted to irrigate the surrounding fields of cotton and rice.

As the Aral dried up, the fisheries and communities that depended on it collapsed, and the blowing dust from the exposed bottom of the lake, contaminated with agricultural chemicals, became a public health hazard. While efforts to revive the Aral have had some success, the restoration of the Aral to its former state remains a long and challenging task.