

12. Planetary boundary 6: Global Water Use

Introduction

Fresh water is a natural resource essential for human activities. The current freshwater use planetary boundary has been set at 4,000 km³/year blue water consumption, the lower limit of a 4,000–6,000 km³/year range that is considered a danger zone. Each year, about 3,800 km³ of fresh water are consumed per year in the world. This water is very unevenly distributed on the planet. The volume of renewable fresh water available annually per inhabitant ranges from less than 100 m³ in the Arabian Peninsula, to more than 30,000 m³ in Northern Europe. During the 20th century, water withdrawals have increased twice as fast as the size of the population. This strong increase concerns in particular agriculture which still takes 70% of the total volume (FAO, 2016). Despite a slowdown since the 1990s, water withdrawals should continue to grow by 1% per year by 2050, driven in particular by the increase in industrial uses and the cooling needs of power plants (UN, 2015) .

12.1. Issues related to the consumption of water

Human activities disrupt the hydrological cycle and alter the available freshwater resource. For example, withdrawing more water than its natural renewal allows risks drying up or salinizing groundwater tables (Dalin et al., 2017), rivers or the disappearance of lakes and wetlands. Human activities are the source of polluting emissions, which are even more concentrated during the event of water resources reduction. Finally, climate change should lead to a decrease in the volumes of fresh water renewed annually in certain regions of the world, in particular the Mediterranean rim, southern Africa, part of North America and Central America (Milly, 2005) .

The challenge is therefore to have enough good quality water for all uses, leaving some for the proper functioning of natural ecosystems, on which human activities also depend. Limit values for the use of fresh water not to be exceeded have been defined on a planetary scale and on the scale of the watersheds. They represent the part of the renewable water resource that human activities can use without compromising ecosystems in the long term. Globally, this share is estimated at 4000 km³ of fresh water consumed per year (Rockström et al., 2009).

12.2. Water resource exploitation index (WEI +)

The water resource exploitation index (WEI +) is defined by the AEE as the share of water consumed in relation to the renewable water resource, over a period and a given geographical area (ETC / ICM, 2016). It varies according to the year, the season and the level of water demand linked to human activities. In watersheds modified by humans, the renewable water resource is renaturalized by adding the volume of water consumed to the volume flowing into the rivers. The flows considered in this document take into account the inflow of water reservoirs into the rivers. The volumes transferred artificially from another sub-basin are not identified.

12.3. Water footprint

The water footprint is a measure of humanity's appropriation of fresh water in volumes of water consumed and/or polluted. There are 3 different kind of water footprint:

- **Green water footprint** is water from precipitation that is stored in the root zone of the soil and evaporated, transpired or incorporated by plants. It is particularly relevant for agricultural, horticultural and forestry products.
- **Blue water footprint** is water that has been sourced from surface or groundwater resources and is either evaporated, incorporated into a product or taken from one body of water and returned to another, or returned at a different time. Irrigated agriculture, industry and domestic water use can each have a blue water footprint.
- **Grey water footprint** is the amount of fresh water required to assimilate pollutants to meet specific water quality standards. The grey water footprint considers point-source pollution discharged to a freshwater resource directly through a pipe or indirectly through runoff or leaching from the soil, impervious surfaces, or other diffuse sources.

To go further:

About water footprint: <https://youtu.be/b1f-G6v3voA>