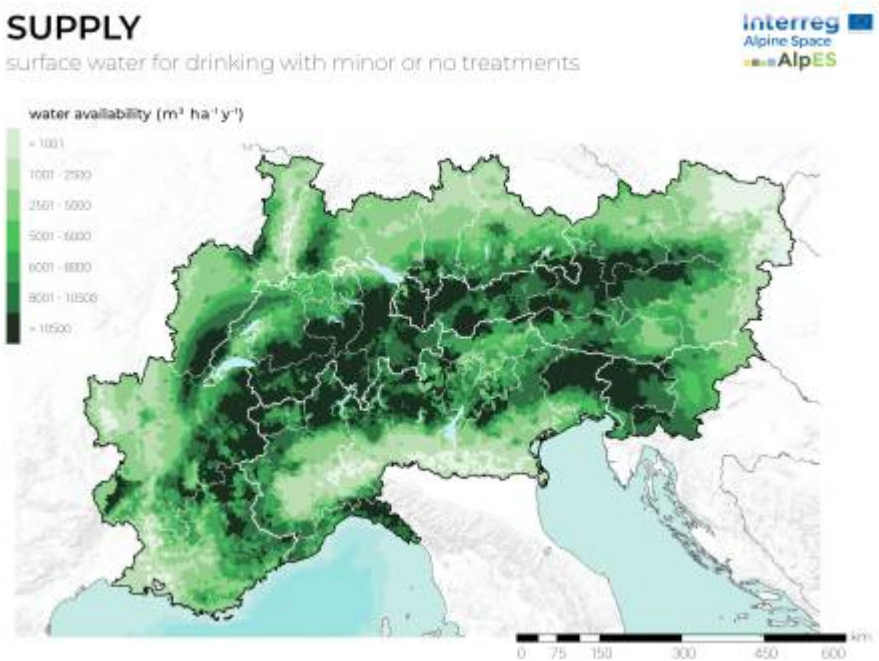
Surface water for drinking with minor or no treatments in the Alps

Clean water is a good that is so fundamental in our lives that we often take it for granted. Everyday we drink it, bathe in it, and eat crops grown with it. The Alps are a vital water source in the region, supporting life for millions of people across Europe. The iconic, high elevation mountains her store millions of cubic meters of water in natural and artificial lakes and as snow and ice. They also provide a consistent flow of water downstream to the Danube, the Rhone, the Po, and the Rhine. It is for this reason that the Alps are sometimes referred to as Europe's "water tower". Understanding just how much we rely on this water, and how much nature provides us with, is a vital undertaking in a changing world. We need this information in order to effectively manage and value Alpine resources as populations grow, technology develops, and climate changes. "Surface water for drinking with minor or no treatments" is a set of indicators that measures exactly how much water with drinking quality is supplied for, demanded by and flows into Alpine communities. These three facets serve to inform adaptive, integrated natural resource decision making. Descriptions of each facet can be found alongside its respective map in the following pages.

Supply



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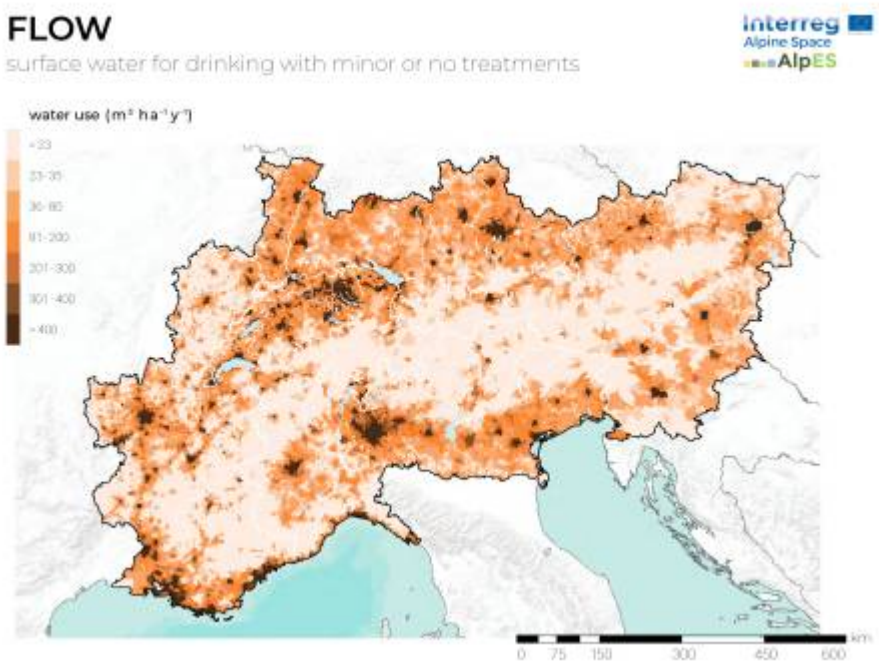
The Alps are widely known as the "water tower" of Europe, as their glaciers, soil, artificial and natural lakes are very important for the storage of water. The abundance of water is due to a combination of climatic and topographic characteristics: (1) the uplift and subsequent cooling of air which then turns into rain, (2) the low rate of net radiation, (3) lower temperatures and frequent snow cover and (4) shorter vegetation periods, which together result in lower evaporation and higher annual runoff (Permanent Secretariat of the Alpine Convention, 2009).

As a result, the supply indicator map delineates very clearly the Alpine mountain range, which scores high supply values, whereas the peripheral zones of the Alpine Space Cooperation Area, which are mainly flatlands, have a much lower water runoff. Surface water is not the only drinking water source in the Alpine countries; in some regions of the Alpine Space, ground water alone meets the demand for drinking water supply (Permanent Secretariat of the Alpine Convention, 2009). The overall high values of this indicator denote that there is little concern for surface drinking water supply in the Alpine Space, at least in the near future.

Flow



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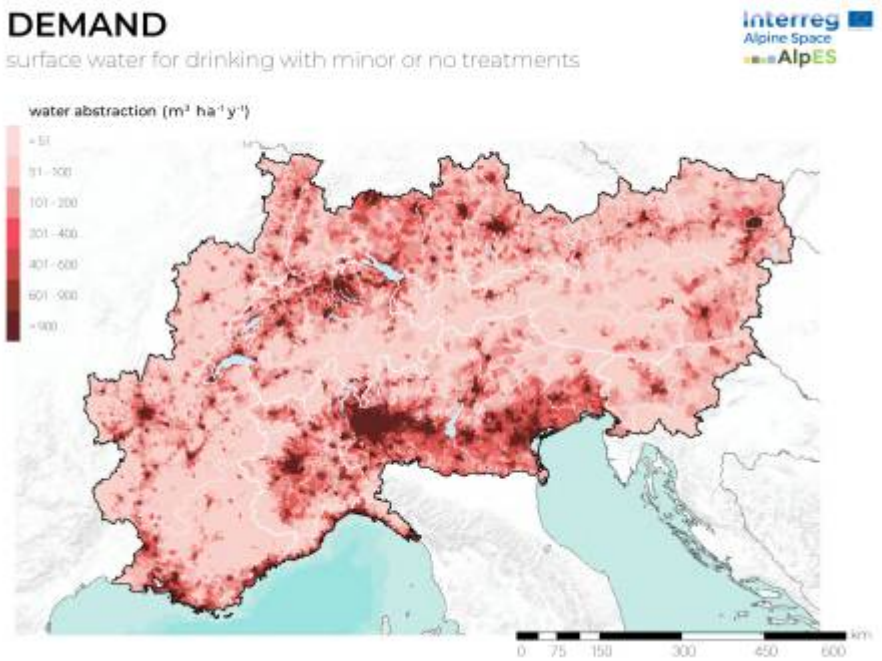
The flow indicator for the ES “Surface water for drinking with minor or no treatments” measures the total water utilization through the public water supply system at the point of delivery, i.e. taps and faucets. The Alps are a major provider of water for the whole Alpine Space, and the water quality of the Alpine springs is excellent. However, the rising number of residents in many cities in the Alpine Space is adding pressure on the drinking water resources. Furthermore, changes in precipitation (rain, snow and hail) and the concurrent melting of perennial glaciers due to climate change are threatening to alter the entire Alpine water cycle. The water supply and its water quality may be affected by such changes, potentially transforming the provision of drinking water into a long-term problem for the regions that depend primarily - or entirely - on Alpine water sources (EEA, 2010). In this indicator, drinking water usage is assumed to be proportional to the population numbers, comprising both residents and tourists. In fact, when looking at the flow indicator map, the main cities of the Alpine region are highlighted; Zurich and Munich in the north, Vienna in the east and Milan in the south are easy to spot. On the other hand, the mountainous areas where the population is sparse score far lower values of water use. High values of this indicator indicate a trend for elevated water consumption and potentially excessive water waste, and may become problematic in the future, putting a strain on the Alpine water sources.

Demand



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The demand indicator for the ES “Surface water for drinking with minor or no treatments” represents the total abstraction of freshwater per municipality on an annual timescale. It is the amount of water that is removed from springs, reservoirs, and other sources every year to be used in the public water system, whether or not this water is then withdrawn at a tap or faucet. Similar to the previous map, the water abstraction and usage are elevated where population densities are higher; the municipalities with the highest demand are metropolitan areas, cities and other settlements. Nonetheless, the two maps also present interesting differences: the demand is relatively higher than the flow in areas like the Po valley, especially in the permanently irrigated areas surrounding Milan (see the CLC12 layer in the WebGIS), and in popular tourist destinations and ski resorts. Therefore, this high quality water is likely being used for irrigation, snow cover at ski resorts and tourist consumption. High values of this indicator may become unsustainable if they exceed the available supply, especially because the aforementioned uses are likely to increase with climate change (FAO, 2016).