

## Rainwater usage

# Rainwater suitable as replacement for tap water in individual cases

**A Parliamentary initiative (10.503) launched by National Councillor Adèle Thorens Goumaz (Greens) calls for rainwater to be used more extensively for purposes that do not require drinking water quality. The initiator is hoping to reduce the consumption of drinking water as a result. In addition, the initiative is seeking to increase the amount of rainwater that percolates into the soil. Eawag research projects show that the collection and storage of rainwater is costly, as is any purification required. On the other hand, percolation of rainwater into the soil can help alleviate incidents of flooding.**

National Councillor Adèle Thorens Goumaz (Greens) has launched a Parliamentary initiative (10.503) calling for the Water Protection Act to be changed so that rainwater can be used more extensively for purposes that do not require drinking water quality. Furthermore, the Act should be more strongly geared to allowing rainwater to percolate. This natural process is often limited by heavily sealed ground surfaces. The initiator is justifying her initiative on the grounds that the purification of drinking water is labor-intensive, cost-intensive, and energy-intensive. As a result of climate change, Switzerland is also being threatened with increasing periods of scarce water supply.

### Sufficient water reserves in Switzerland

There are around 230 billion cubic metres of water available in Switzerland divided between lakes, watercourses, ground water and glaciers (see table). According to investigations by Eawag and the Federation, around 60 billion cubic metres flow out of Switzerland each year into neighbouring countries via rivers and streams. Drinking water facilities contribute around one billion cubic metres to the utility networks every year, which represents less than 5 percent of total water resources. Even if climate change is likely to lead to a fall in precipitation and an increase in evaporation losses throughout Switzerland as a whole, studies conducted by Eawag show that supply shortages will be regionally limited even in very dry years: Switzerland's lakes and groundwater reservoirs currently contain water levels that are the equivalent of three years' precipitation (see table).

Over the last few decades, neighbouring water supply networks in many areas of Switzerland have been inter-linked by means of connecting pipes. This has ensured

### Switzerland's water reserves

Water repository	Volume of water [bn m <sup>3</sup> ]	Water level converted to CH area [cm]	Repository proportion [%]	Proportion of annual CH precipitation of 146 cm [%]
Natural lakes	132	321	57	220
Groundwater	50	121	22	83
Glaciers	45	109	19	75
Artificial lakes and water-courses	4	10	2	7
<b>Total</b>	<b>231</b>	<b>561</b>	<b>100</b>	<b>385</b>

The data for glaciers and groundwater is based on estimates. Of the groundwater reserves, some 10 billion cubic metres are usable (source: Water Supply 2025. Eawag/Federal Office for the Environment; data basis 2005).

that even in the extreme summer of 2003, the supply of water was maintained despite falling groundwater levels and a decreasing runoff volume of groundwater (spring discharge). Only the small and very isolated water suppliers had to enforce consumption restrictions, notably in the Arc Jurassien region and in Ticino. In other words, the supply of drinking water can be ensured even during dry periods, through the proper organization and structuring of water supply channels. A scarcity of natural water resources is not the problem. That said, it does make sense to keep water consumption low. On the one hand, this means water is left in nature, while on the other less wastewater is produced, which in turn increases the performance of wastewater purification facilities. Overall water pollution is reduced.

### Water percolation helps to prevent flooding

Where the public supply of water is concerned, it is above all the absorption of precipitation that matters, as more than 80 percent of drinking water comes either directly or indirectly (via springs) from groundwater reserves. The increased use of surfactant chemicals such as pesticides, fire-retarding agents and stabilisers, together with increased environmental pollution (as a result of transportation, for example), makes it increasingly difficult to distinguish between polluted wastewater and unpolluted rainwater. Rain that has run off roofs and building facades can often contain – among other things – traces of heavy

metals such as copper and zinc, as well as organic impurities (biocides, fire-retarding agents). Care must be taken to ensure that the percolation of rainwater does not result in contamination of ground or groundwater. Regulations do exist in this area, but for capacity reasons compliance with these guidelines is not monitored with the same intensity all over the country.

Percolated rainwater is already available for the purposes of extracting drinking water. Moreover, percolation has the effect of counteracting peak flows into Switzerland's water bodies, as the water does not flow directly into rivers, but makes its way there with a significant time lag.

#### The laborious process of rainwater purification

Centrally managed drinking water purification in Switzerland benefits from the high level of water protection that exists in the country, and is therefore a less laborious process when compared to other countries. Experts consider the microbiological and chemical quality of Switzerland's water resources to be very good. Thanks to its high quality, almost half (47 percent) of the groundwater used in Switzerland can be fed into the supply network without purification. 40 percent of groundwater is purified via straightforward methods, typically sand filters. Only 13 percent needs to be purified via a two-level or multi-level process.

By contrast, diverting rainwater into the sewage system requires substantial investment costs, as the volume of rainwater thus derived will in turn define the size and capacity of the sewers, and therefore the construction costs. Another factor is that rainwater is frequently mixed with wastewater in traditional combined sewer systems (which make up 70 percent of Swiss sewers). If the volume of water exceeds the capacity of the sewage treatment plant, this mix of water has to be rerouted to surface watercourses, which in turn places a burden on the environment.

According to the research findings of Eawag, the use of rainwater instead of tap water tends not to lead to financial savings in most locations, as the size and location of drinking water purification facilities is heavily dependent on local extinguishing water requirements. By contrast, the level of water consumption has virtually no impact. The maintenance costs of drinking water conduits would remain just as high if a greater proportion of rainwater were used, as

the networks would need to be maintained in just as good a condition even if less drinking water were consumed. Nor would there be less of a burden on wastewater purification, as roughly the same amount of wastewater would be produced – just as if drinking water had been used. All that remains, therefore, are the savings on the operating costs of supplying drinking water, which account for a quarter of total costs. However, this in turn would have to be set against the additional expenditure required for saving, treating and supplying the rainwater.

Nonetheless, the use of rainwater can be very valuable in individual cases, such as in the garden or for commercial washing and cooling purposes. In other words, it is only logical to make decisions as to whether tap water should be replaced by rainwater on a case-by-case basis.

#### Rainwater as drinking water?

- Switzerland will have sufficient water for its requirements in the future too.
- Rainwater is not clean per se and may contain a number of environmentally relevant substances.
- The percolation of rainwater can help to reduce the extent of flooding events. The percolated water can in addition be used for drinking water production at a later stage.
- In many places, the replacement of tap water by rainwater results in only very low savings – for example, the infrastructure costs for conduits, treatment and wastewater purification remain the same.
- The use of rainwater may make sense in individual cases.

#### Further information

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Publication of the Federal Office for the Environment (FOEN)  
 «Wohin mit dem Regenwasser? – Beispiele aus der Praxis»  
 («What to do with rainwater? – Examples from actual practice»):  
<http://www.bafu.admin.ch/publikationen> [Available in DE only]

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