



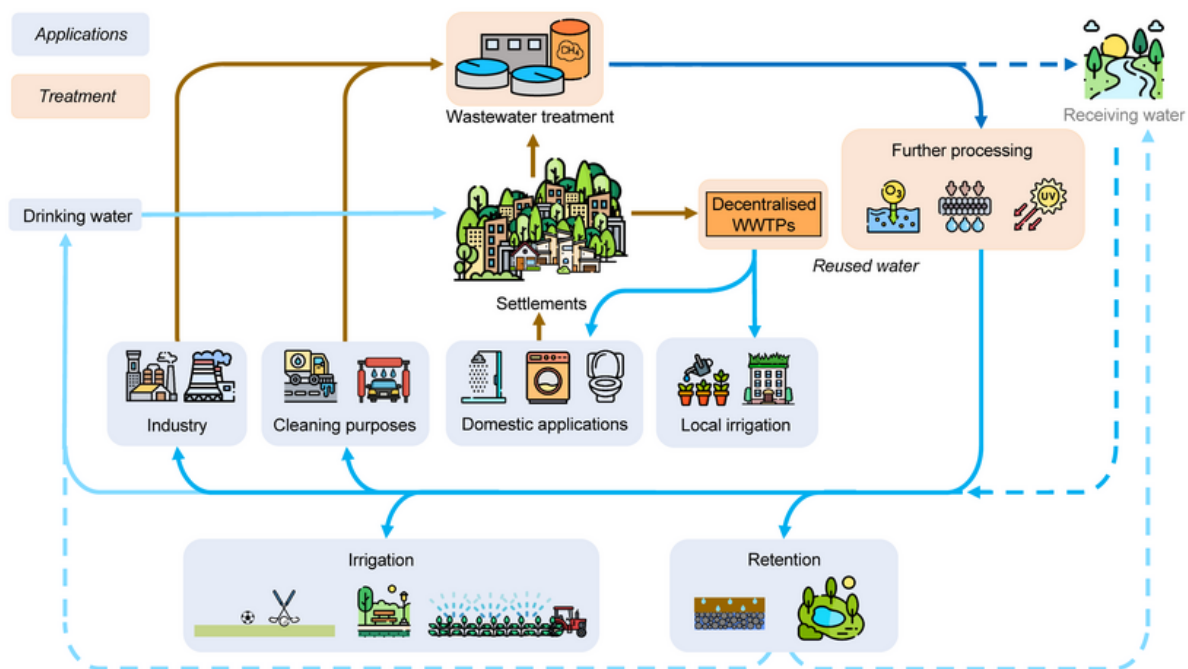
Dry summers: reusing treated wastewater could help

October 17, 2024 | Claudia Carle

Topics: Wastewater | Society | Climate Change & Energy

With climate change, hot and dry summers are becoming more frequent, causing water shortages in some regions of Switzerland. Reusing treated wastewater could help to solve this problem. This has been demonstrated by an Eawag team on behalf of the FOEN and some cantons. The researchers also explain what still needs to be done to put the option into practice.

Switzerland is often considered the “moated castle of Europe”. But the hot, dry summers of recent years have shown that even in our water-rich country, water can occasionally become scarce in some regions. Due to climate change, such situations will become more common. In addition to the scarcity of water supply, demand for water also increases during such periods, for example for irrigation in agriculture or for cooling. The sustainable management and use of water resources is needed to prepare for the future. As part of the recently completed “Water Reuse in Switzerland” project, the aquatic research institute Eawag investigated whether the reuse of treated domestic wastewater could also be an option. This water would be available for irrigation of agricultural and green areas, for household use in washing machines and for toilet flushing, or for use in industry as cooling and process water. This reduces the amount of water that needs to be taken from groundwater or surface water to meet demand.



Reuse is possible for both treated wastewater from centralised treatment plants (WWTPs) and from decentralised plants that treat wastewater where it is produced so that it can be reused without long transport distances. (Graphic: Eawag, adapted from Kompetenzzentrum Wasser Berlin (2024), icons from flaticon.com)

In the USA, Australia, Singapore and southern Europe, where water scarcity is part of everyday life, domestic wastewater has long been treated for reuse – in some case to drinking water quality. In Switzerland, however, this has not yet been an issue. Water reuse where the water seeps away – as in the irrigation of agricultural land – is currently prohibited under water protection legislation. All other uses, such as reuse in buildings, do not pose a problem for water protection, but there is a lack of legal provisions and quality requirements for the protection of human health.

Cantons see a need for water reuse

The EU is already one step ahead here. Its aim is to promote water reuse in the member states. In 2023, an ordinance came into force that enables the reuse of treated urban wastewater for agricultural irrigation and sets out minimum requirements for this. However, it is up to the member states whether they implement this regulation. Germany, France, Italy and Spain, for example, do this, but as of yet, Austria does not.

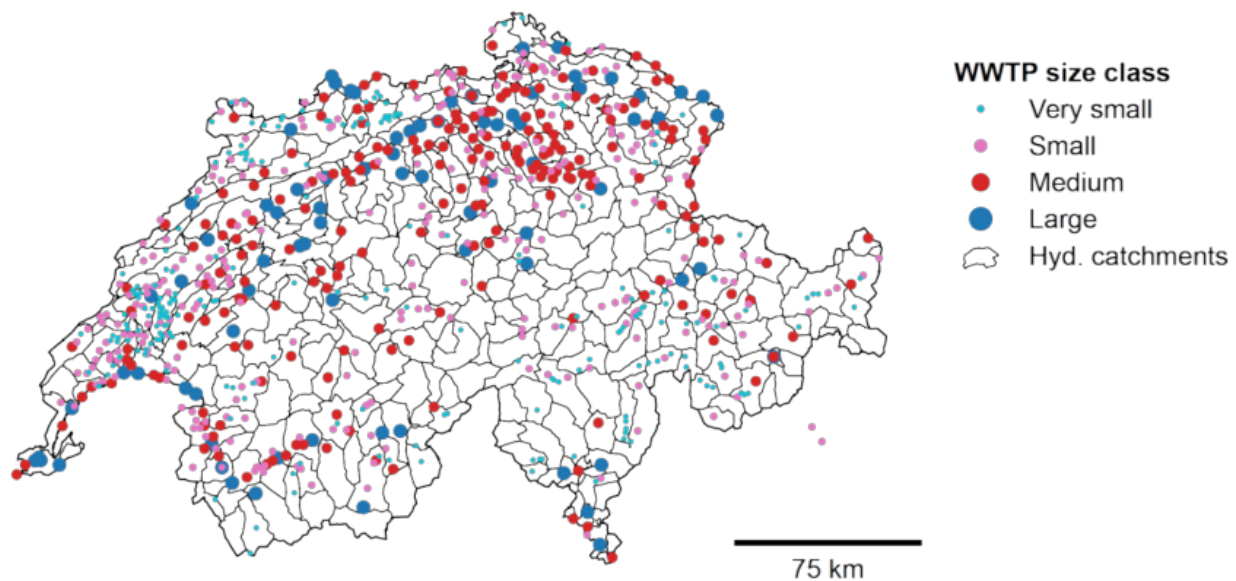
Whether there is a need for water reuse in Switzerland has been investigated by researchers from the Eawag Process Engineering Department, under the direction of Eberhard Morgenroth, as part of the “Water Reuse in Switzerland” project, which involved a survey of cantonal water authorities. Accordingly, 19 cantons see a need for water reuse for various applications, including irrigation, 13 of them as an emergency measure during dry periods.

Only four cantons state that they do not foresee any need for water reuse in their canton.

The project therefore took a closer look at the issue of water reuse in Switzerland, compared supply and demand, identified opportunities and risks, and derived recommendations for action from this basis.

Supply and demand could be well matched

There is a good correlation between the spatial distribution of the locations in Switzerland where treated wastewater is produced and where there is a demand for its reuse. This is because the largest volumes of treated wastewater are produced in the large wastewater treatment plants in the densely populated regions, particularly in the Central Plateau. This is also where most of the potential users of treated wastewater are located – agricultural land, industry, households and urban green areas.



Most of the largest wastewater treatment plants are located where the demand for water is highest (Graphic: Eawag).

A further initial estimate by the researchers also shows that the quantities of treated wastewater that accumulate in dry weather would be sufficient to cover the current irrigation needs in agriculture and settlements.

According to Eberhard Morgenroth: “Water scarcity is always a local problem. It is therefore necessary to identify the options for water supply that minimise the transport of water and where supply and demand also match in terms of timing.” Depending on the local conditions, the best solution may be the use of conventional water resources, decentralised water reuse in buildings or the use of treated wastewater from centralised wastewater treatment plants.

Dealing with risks

When treated wastewater is reused, it is not returned to the bodies of water, or only at a later stage. The researchers therefore wanted to know whether this could become a problem for

the levels in the bodies of water. They investigated what proportion of the water volume in the respective water bodies is contributed by the effluent from the wastewater treatment plants. Their conclusion: at most wastewater treatment plants, it would be possible to reuse wastewater without exceeding the maximum amounts that are legally permitted to be withdrawn from bodies of water. Thus, in most cases, reusing water would not affect the natural functions of the water body. "Nevertheless, it will always be necessary to decide whether water should be reused for other purposes or returned to the bodies of water," says Eberhard Morgenroth.

Depending on its origin and treatment, treated wastewater may still contain various contaminants. To ensure that reuse is unproblematic for humans and the environment, water quality requirements would therefore have to be defined for each intended use, as is already the case of in some countries. For example, the EU has a tiered system of requirements for the quality of reused water for agricultural irrigation, depending on whether, for example, energy crops or food crops are grown in the field. In the USA, there are established standards for direct reuse in buildings for toilet flushing. According to the researchers, there has to be comprehensive risk management. This begins with the selection of the wastewater treatment plant whose wastewater may be used in the first place, and continues with further treatment steps for the purified wastewater, right up to the specifications for the type and timing of irrigation.

Three questions for Eberhard Morgenroth

Is water reuse an option that can contribute to sustainable water resource management in Switzerland?

Yes, but robust water management requires a range of possible courses for action in the event of water scarcity. In Switzerland, water reuse should be part of the portfolio for sustainable water resource management, along with increasing efficiency in water use and the development of conventional water resources.

What needs to be done next to enable water reuse in Switzerland?

With the growing interest in water reuse, it is important for Switzerland to formulate clear framework conditions and requirements. There are good examples in the EU and beyond from which we can learn how to implement and manage water reuse in practice.

How is Eawag contributing to this?

In the final report on the project, we provide clear recommendations on the next steps to be taken to further develop water reuse in a structured way. Eawag aims to contribute to the development of guidelines and frameworks for water quality, operation and monitoring of water reuse facilities, as well as to the further development of robust water treatment technologies. We also want to study the conditions under which the population accepts the reuse of treated wastewater and to compile experiences from existing pilot projects in Switzerland. Eawag has an excellent international network in the field of water reuse and is currently further expanding its expertise in this area.


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von gereinigtem Abwasser kann konventionelle W
asserressourcen entlasten und den Wasserverbrauch senken. Sie ist eine mögl
iche Handlungsoption im integralen Wasserressourcenmanagement, wenn der Nutz
en im lokalen Kontext den notwendigen Aufwand (zusätzliche Aufbereitung, In
frastruktur, Kosten, Energie) überwiegt. Im vorliegenden Projekt wurde unte
rsucht, ob die Wasserwiederverwendung eine relevante Option für das Wasserr
essourcenmanagement in der Schweiz sein könnte. Dazu wurden bestehende Date
n zur Wasserverfügbarkeit und zum -Verbrauch analysiert und eine Umfrage zu
m Thema bei den kantonalen Umweltfachstellen durchgeführt. Aufgrund des Kli
mawandels kommt es in der Schweiz bereits heute häufiger zu Trockenheitsper
ioden, insbesondere im Sommer. Die damit verbundenen Hitzeereignisse führen
zu einem Anstieg des Wasserbedarfs für verschiedene Anwendungen (Bewässer
ung in der Landwirtschaft und in den Städten, Kühlwasser etc.). Auf lokale
r Ebene haben Vertretende von 19 der 26 Kantone einen Bedarf für die Wasser
wiederverwendung für verschiedene Anwendungen, besonders für die Bewässer
ung, festgestellt. Zudem wird erwartet, dass dieser Bedarf mit dem fortschre

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itenden Klimawandel ansteigen wird. Ausserdem weist die Wasserwiederverwendung Synergien mit anderen Massnahmen im Wasserressourcenmanagement auf, z.B. mit der Speicherung von Wasser für Zeiten mit erhöhtem Bedarf. Für die Wiederverwendung von Wasser müssen klare Vorgaben bezüglich Qualität, nutzbarer Menge und technischer Rahmenbedingungen definiert werden, um Mensch und Umwelt nicht zu gefährden. Um Wasserwiederverwendungsprojekte langfristig erfolgreich umzusetzen zu können, muss zudem die soziale Akzeptanz gewährleistet sein. Derzeit ist die Wasserwiederverwendung im Schweizer Recht nicht explizit geregelt; im Prinzip ist nur die Bewässerung implizit verboten, während alle anderen Anwendungen grundsätzlich erlaubt sind, jedoch ohne Vorgaben zur Umsetzung oder... (7789 chars) serialnumber => protected" (0 chars) doi => protected'10.55408/eawag:32884' (20 chars) uid => protected32884 (integer) _localizedUid => protected32884 (integer)modified _languageUid => protectedNULL _versionedUid => protected32884 (integer)modified pid => protected124 (integer) 1 => Snowflake\Publications\Domain\Model\Publicationprototypepersistent entity (uid=33722, pid=124) originalId => protected33722 (integer) authors => protected'Knabl, M.; Rist, B.; Morgenroth, E.' (50 chars) title => protected'Réutilisation de l'eau en Suisse. Besoins, opportunités, risques et reco

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sources en eau conventionnelles et réduire la consommation d'eau. Elle constitue une option d'action possible dans la gestion intégrée des ressources en eau, si les avantages dans le contexte local l'emportent sur les dépenses nécessaires (traitement supplémentaire, infrastructure, coûts, énergie). Le présent projet a cherché à savoir si la réutilisation de l'eau pouvait être une option pertinente pour la gestion des ressources en eau en Suisse. Pour ce faire, les données existantes sur la disponibilité et la consommation d'eau ont été analysées et une enquête sur le sujet a été menée auprès des services cantonaux de l'environnement. En raison du changement climatique, les périodes de fortes chaleurs sont de plus en plus fréq

pplications (irrigation pour l'agriculture et dans les villes, eau de refroidissement, etc.). Au niveau local, les représentants de 19 des 26 cantons ont identifié un besoin de réutilisation de l'eau pour diverses applications, en particulier pour l'irrigation. De plus, on s'attend à une augmentation de ces besoins avec le changement climatique en cours. En outre, la réutilisation de l'eau présente des synergies avec d'autres mesures de gestion d

doit être soumise à des exigences claires en termes de qualité et de quantité utilisable et des directives techniques doivent être établies, afin de ne pas mettre en danger l'homme et l'environnement. De plus, pour que le

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Knabl, M.; Rist, B.; Morgenroth, E. (2024) Réutilisation de l'eau en Suisse. Besoins, opportunités, risques et recommandations dérivées à l'attention des responsables, 196 p, [doi:10.55408/eawag:33722](https://doi.org/10.55408/eawag:33722), [Institutional Repository](#)

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Eawag Federal Office for the Environment (FOEN) Office of Waste, Water, Energy and Air of the Canton of Zurich Canton of Bern Office for Water and Waste Canton of Solothurn Office for the Environment Directorate-General for the Environment of the Canton of Vaud

Related Links

Website of the "Water Reuse in Switzerland" project

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