

Scientists look at triggering rainfall, saving water to tackle droughts

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For the Leeuwarden city council, the research going on in the Water Campus is bringing more than just innovations on water saving technologies. The campus also helped revive the entire area. [[Hindrik Sijens / Flickr](#)]

This article is part of our special report [Rural innovation](#).

Over the past fifty years, droughts have become increasingly common in Europe. Climate change is not only reducing the amount of water available but also affecting how clean it is, with floods bringing soil and other elements into the water supply chain.

“The topic of water is becoming of increasing importance,” said Pieter de Jong, EU representative of the WaterCampus in Leeuwarden, northern Netherlands.

“Climate change will only increase this pressure on available water resources,” added de Jong, who is EU representative for Wetsus, the European Centre of Excellence for Sustainable Water Technology.

Half of EU regions already face water scarcity on a chronic basis. Farmers in Spain, Portugal, Greece, Italy and parts of France have become accustomed to increasing episodes of drought and water stress.

But water shortages are now also becoming an increasing concern in regions like Northern France, Germany, Belgium, the Netherlands, and Luxembourg, which until recently haven't had droughts.

This coincides with a growing population and increasing consumption of energy, food, and consumer goods, which all add pressure on water use.

“If you ask somebody how much water they're using, most people, if they know, might say 120-160 litres per person per day, because that's on your water bill,” said de Jong. “But it's been calculated that, if you look at the overall consumption of water for everything that you do, buy and eat, then actually it's more in the order of 4,000 litres of water per day.”

Triggering rainfall

One way to tackle water shortages could be through triggering rainfall. Rain occurs in two cycles, small cycles caused by evaporation from vegetation or similar geographical features, which rises into the atmosphere and then falls in the same area, and long cycles where water travels a significant distance between evaporation and rainfall.

[One project developed in Leeuwarden, in the Netherlands](#), is attempting to recreate small cycle rainfall, which has decreased over centuries in heavily populated areas, particularly in the Middle East and North Africa, but also in Europe.

“What research shows is, once you have more forests next to the waterfront, next to the seas, you can attract more clouds that enter the country and then you especially need forests also to trigger clouds, to trigger rain,” said de Jong.

The project aims to understand what factors influence evaporation, transport and precipitation and kickstart the water cycle to restore self-reliant ecosystems.

“We’re very hopeful that, with this, we could actually help drier areas and maybe whole countries to become more fertile again. There are plans to work with, for instance, the Middle East or Northern Africa to see if this could be applied on a large scale,” said de Jong who added however that research is still in the early stages.

Water reuse

Other techniques that are being developed in the [Leeuwarden WaterCampus](#) is to collect and store water when it does rain.

Water reuse is becoming increasingly necessary to avoid Europe’s water drying up. Reusing water in homes, can help reduce demand for tap water and also decreases energy usage.

Hydraloop, [a start-up based in Leeuwarden](#) that won three Consumer Technology Association awards in 2020, aims to introduce a greywater recycling system that would recycle and reuse 85% of the water from showers and other home appliances to water the garden or flush toilets.

The start-up [estimates that homes could save more than 45% on mains water with its technology](#). Moreover, up to 45% of sewage emission could be reduced while saving energy and reducing associated carbon emissions.

Fork to farm: recovering nutrients to restore soil

Other technologies developed in the WaterCampus are related to water reuse in agriculture. Earlier this year, the European Commission introduced its ‘farm to fork’ strategy as part of efforts to produce healthy, sustainable food.

However, water treatment plants were never designed to remove these nutrients and return them to farms, meaning they can be lost or become pollutants.

“We’ve actually removed humans a little bit from the natural place in the global ecosystem. Next to the farm to fork strategy, you might also need the fork to farm strategy to get all the nutrients that we as humans accumulate back towards those fields,” said de Jong.

Soil needs nutrients like phosphate, leading to the EU importing it, relying on complex geopolitics and creating a larger carbon footprint.

“The main challenge for European biodiversity loss, besides losing the habitats themselves, is because of nutrients. You see eutrophication in rivers, lakes, seas, forests and natural habitats. As former Commissioner Vella used to indicate, the nutrient problem in the sea causes 30 times more negative impact than plastics,” said de Jong.

New initiatives aim at taking these nutrients from water treatment plants back to the soil, closing the loop of the supply chain.

One [EU supported project, Scalibur](#), is producing biopolymers that consume fatty acids in wastewater treatment plants that can be used as biodegradable capsules and reduces plastic pollution. Those also have the added benefit of creating a “slow-release fertiliser”, which increases nutrients in soil.

Fixing local problems

For the Leeuwarden city council, the research going on in the WaterCampus has brought more than just innovations on water saving technologies. The campus also helped revive the entire region, which used to suffer from the traditional ills of deprivation in rural areas: remoteness, low paid jobs and depopulation.

The city is now bustling with activity brought by international students, academics and business representatives who tend to have higher wages and purchasing power than the local average.

“What we learn when we look back in our history is that we saw what were the most vulnerable parts of our socio-economic situation, so low education, polluted areas, and how we could use

that vulnerability of our city to turn it around,” said Friso Douwstra, Vice Mayor of Leeuwarden.

According to Douwstra, there are also lessons to be learnt at EU level on how European funds can help rejuvenate rural areas: “Choose where you put your money and your effort and focus. Put all the strength of the EU on a topic in a specific area and dare to choose,” the Vice Mayor said.

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