

# Urban water systems

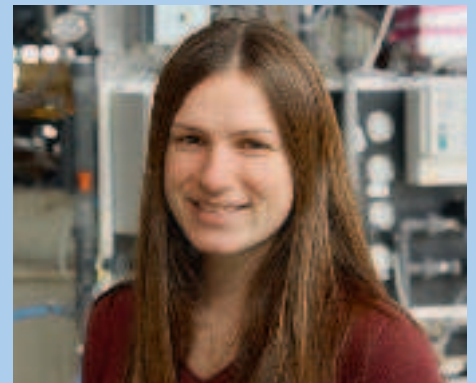
# W a t

**At Eawag, we develop modern strategies for water provision and wastewater management to meet the needs of Switzerland and other industrialized countries. This includes not only engineering solutions for drinking water supplies, sewerage and wastewater treatment plants but also studying and preventing releases of pollutants from urban areas into surface waters. We also focus on the development of sanitation approaches specifically designed for developing countries, which can be implemented in partnership with the people concerned.**

## RESEARCH

### Advancing towards solutions

**Maryna Peter**, who studied Chemical Engineering at the National Technical University of Ukraine, is currently working on her doctoral thesis at Eawag. As part of the EU project TECHNEAU (Technology Enabled Universal Access to Safe Water), she is researching a filter module in which water is purified as it passes through a membrane at low pressure. As this system does not require elaborate maintenance or control, it is particularly suitable for use by households in developing and emerging countries (see p. 10). "For me," says Maryna Peter, "what is attractive about research at Eawag is the process of following something all the way from the initial discovery of a phenomenon to the development of a technology, and advancing step by step towards solutions." Does she dream of patenting a device and reaping financial rewards for her efforts? With a smile, the young woman replies:



"No. If our results help more people to gain access to safe drinking water, then that's sufficient motivation." She adds that she is particularly interested in exploring the underlying mechanisms. As she points out, the manufacturers of a similar system operating at low pressure don't know why it works. "Now that we've identified the opportunities and limitations of our filters, we can use this knowledge to set about improving them."



## TEACHING

### Welcoming argument

**Willi Gujer**, Professor of Urban Water Management at the ETH Zurich, has been a member of the Eawag Directorate since 2001. In 2006, he received the "Golden Owl" from the ETH student association for his outstanding

performance as a teacher. In 2008, he also received the "Credit Suisse Award for Best Teaching". Willi Gujer is convinced that environmental engineering is an attractive field for young students: "A large proportion of humankind does

not have access to safe drinking water – this represents an enormous challenge." In his view, urban water management is a broad discipline, including "not only hydraulics, but also hydrology, microbiology, chemistry and economics". He emphasizes that the multidisciplinary approach also appeals to women. And what is the secret of his exemplary teaching? "It's important that the lecturer should be highly motivated," says Gujer, "and it's all right to expect something of your students; you have to take them seriously. They have a right to learn something rather than just being required to sit through lectures. But you learn most," he concludes, "with active participation. It's a pity there's hardly ever much scope for argument with students."



Tom Kawara

## CONSULTING

### Saving millions

**Bruno Storni** is a computer systems engineer. With his company, he develops and programs electronic control systems for industrial processes and the aerospace sector. As a member of the Gordola local authority, he is responsible for the water supply system. Here, thanks to the consulting services of Eawag (supported by several dissertations), it was possible to shelve a large-scale expansion project dating from the 1990s; as a result, around CHF 10 million and a large amount of energy have been saved to date (see p. 17). Storni comments: "We could have engaged private consultants for certain parts of the work, as we do today with some success. But without Eawag's expertise, the innovative approach, considering both the consumer's and the supplier's perspective, would not have been adopted." The incentives for a genuinely sustainable infrastructure, he believes, remain ineffective – for example, because planning fees are based on the investment volume for the facilities concerned. Storni is convinced that more could be done. The ever-more apparent benefits for his municipality are increasingly turning critics into imitators. "Eawag's high level of credibility has contributed significantly to this process," he adds.



# Eawag consulting: millions of francs saved

**Thanks to studies carried out by Eawag, the municipality of Gordola in Canton Ticino was able to shelve the planned large-scale expansion of its water supply system, saving around CHF 10 million in investments. In addition, reductions in water consumption and the streamlining of distribution led to substantial energy savings – an example that could well be followed elsewhere.**

In many communes, water supply systems are ripe for renewal, and in many cases the infrastructure built in the 1960s and 1970s is now oversized. Planning at that time was based on projected growth which did not always materialize, and water consumption per capita has declined over the last few decades. More-

over, since 1992, “economical use of drinking and process water” has been required under the Water Protection Act, and – in line with the polluter-pays principle – water users rather than taxpayers have been responsible for financing water supply systems and operations. Faced with a CHF 15 million expansion project mothballed since 1993 which appeared excessively elaborate and costly, the local authority of Gordola in Canton Ticino sought expert advice from Eawag.

## Scope for research and education

The situation was analysed by the Urban Water Management department of Eawag under the leadership of Professor Markus Boller, with internal studies being complemented by a number of dissertations at the ETH and at the Zurich University of Applied Sciences School of Engineering (HSZ-T). Work began with an assessment of the current status and a systematic search for water losses from the distribution network. It soon became clear that over 500 m<sup>3</sup> was lost per day – almost a third of the total volume supplied – and presumably this had been the case for years. When the leaks and overflows were rectified, these losses were reduced by 80%. In addition, a system was developed to permit continuous monitoring of the network with the aid of meters installed at strategic points.

## Peak demand reduced

A user survey and an analysis of available data revealed that peak demand in Gordola was attributable solely to the sprinkling of gardens and lawns and the simultaneous filling of swimming pools. The water utility has now introduced regulations whereby private swimming pools can only be

filled at nighttime and according to a schedule. With this simple solution, the local authority has been able to reduce peak demand. Further measures are currently being examined with individual major users. In the near future, for example, a vegetable farm is to be connected to the football pitch watering system, which is not fed with drinking water supplies.

## Producing green power

The local councillor responsible for water supplies, Bruno Storni (see p. 9), is convinced that by saving water, energy savings can also be achieved. As a result of the rectification of leaks, which cost just CHF 20,000, around 120,000 kWh less pumping energy is now required than was specified in the original project. 2008 also saw the replacement of the main pipeline leading from the springs to the distribution network. The way is now clear for the implementation of another proposal emerging from Eawag’s analysis: the 250 m slope down to the village is to be utilized for a small-scale power plant, producing 160,000 kWh of green energy per year – enough to meet the needs of at least 40 households. Experience also shows that greater awareness of drinking water use, associated with water-efficient fittings and appliances, automatically reduces hot-water consumption – with corresponding domestic energy savings.

## Saving water means saving energy, too.



Bruno Storni

The commune of Gordola, lying at the foot of a valley on the Magadino Plain in Canton Ticino. Visible in the foreground is the reservoir, undergoing renovation work.

Gordola has now applied other measures proposed by Eawag, including efforts to educate consumers about potential savings, the reopening of disused springs and improved integration with neighbouring communes to allow regional optimization of water supplies. These modifications naturally required investments. In addition, the water utility had to invest around CHF 3 million in quality assurance and the provision of adequate firefighting water capacity. According to Storni, however, savings of at least CHF 10 million have been achieved over the original CHF 15 million project. ○○○

Contact Eawag:  
Prof. Dr Willi Gujer, willi.gujer@eawag.ch  
Dr Max Maurer, max.maurer@eawag.ch  
Contact Gordola:  
Bruno Storni, storni@adelsy.ch