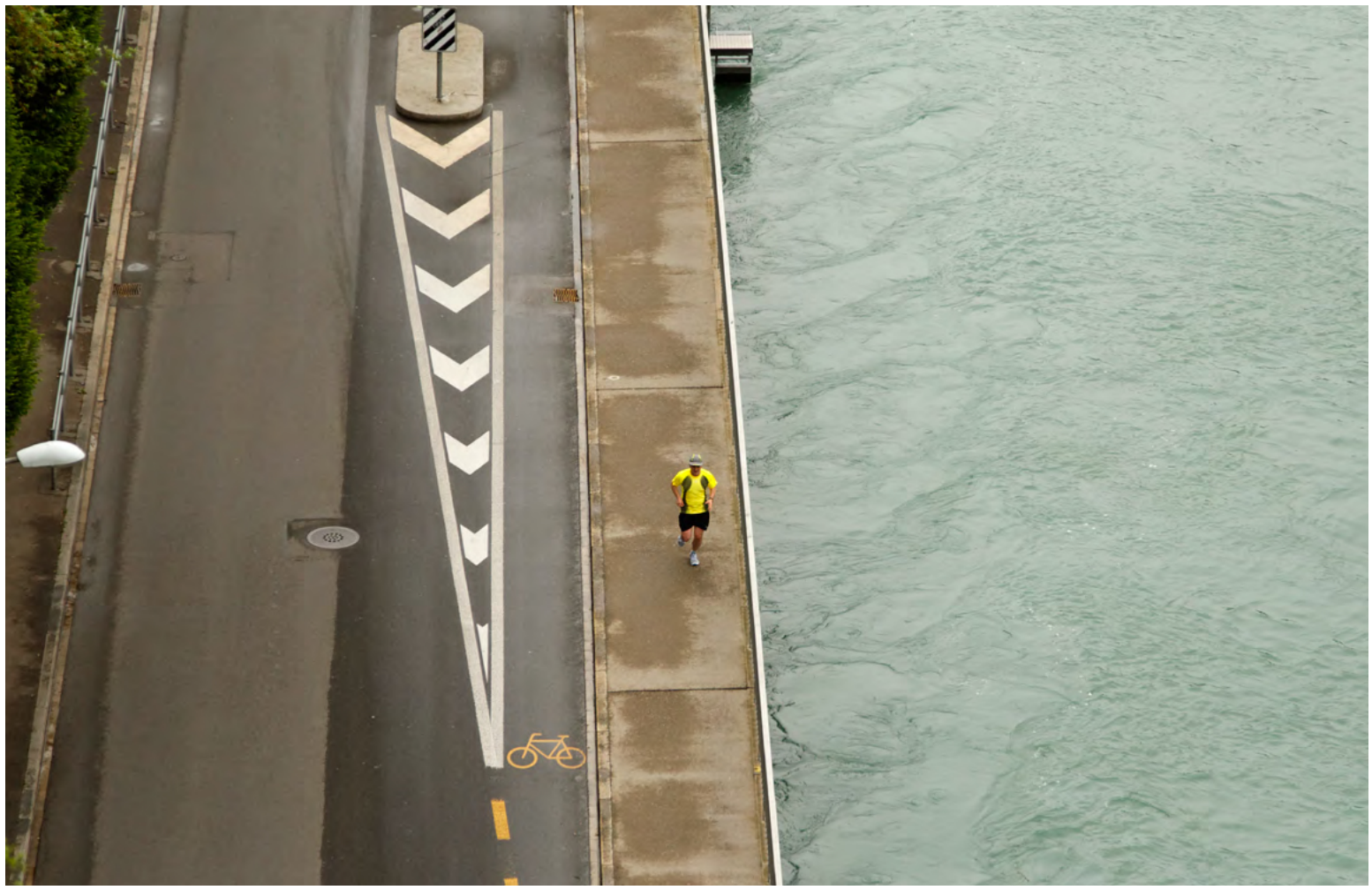
“Where there are lots of people, you’ll see a lot of resource-use conflicts”

Switzerland’s water resources are under greater pressure from social and economic developments than from climate change – although the latter may exacerbate adverse impacts. Accordingly, a National Research Programme has recommended the definition of cross-sectoral goals and long-term planning. We interviewed four of the researchers involved in NRP 61. *By Andres Jordi*



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Increasing settlement pressure jeopardises the water resources.

One of the key questions investigated in the National Research Programme on “Sustainable water management” (NRP 61) was how climate change would affect the water sector. What was your answer?

C. S.: At the start of NRP 61, climate change was the dominant theme. But as the projects progressed, we realized that other factors have a much greater influence on water resources and resource use than the climate. Social and economic developments will be the main factor shaping the water sector over the next 30 to 40 years.

K. L.: But that’s only true of the densely populated, intensively used Central Plateau. In the mountains, climate change will have major impacts on the water balance – take, for example,

glacier melting. According to certain scenarios, around 90 per cent of the glaciers will have disappeared by the end of the 21st century.

What social and economic factors affect water resources?

M. M.: Above all, settlement pressure: the population is growing, as is demand for living space per capita. More and more land is being developed for new housing and additional transport infrastructure. Many areas which are attractive for development overlie important aquifers. Here, construction is often in conflict with groundwater protection. As a result, wells generally have to be abandoned and can no longer be used for drinking water production. In the longer term, resource-use conflicts will arise, as over 80 per cent of Switzerland's drinking water is sourced from groundwater.

K. L.: Another major land user is agriculture. Fertilizers and pesticides adversely affect the quality of lakes, rivers and groundwater. In certain regions of Switzerland, large amounts of water are used for irrigation. Here, unless water management and land use are adapted, water will become scarce sooner or later – even without climate change.

M. M.: One point clearly emerging from NRP 61 is that, where there are lots of people, you'll see a lot of resource-use conflicts. If water supplies are sacrificed, the situation becomes precarious. Here, climate change does enter the equation again. There are indications that, with higher demand for water and reduced reserves, the more intense droughts predicted for the summer period will lead to water shortages in certain regions. This problem could be alleviated by appropriate policy decisions. What would be required is consistency and foresight in the implementation of groundwater protection based on planning regulations.

Is there a potential for further conflicts?

C. S.: In some cases, additional uses are planned for resources which are already under pressure. For example, groundwater will increasingly be used for heating or cooling. Canton Bern

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has already granted a quarter of the groundwater concessions for thermal use. That doesn’t mean that conflicts are inevitable. Different types of use can often be effectively combined, if this is explored in advance. Use of thermal energy from lakes, for instance, appears to be largely unproblematic, as long as it is appropriately designed.

K. L.: There’s a lack of impact assessments in the energy sector in particular – in many cases, thermal use of groundwater is approved without considering possible effects on other types of water use, or on ecosystems. This is why NRP 61 recommends that water management should be more closely integrated into energy policy and other sectors such as spatial planning.

S. H.: It would be helpful if cross-sectoral goals were defined by policymakers. You could then determine what types of resource use are conducive to achieving these goals, and what the costs and benefits are in each case. In a transparent decision-making process, you could then identify the resource-use strategy that most effectively achieves the goals.

M. M.: What’s also needed is long-term planning for the water sector. This planning should identify where action is required, estimate future demands and take stakeholders’ needs into account. If this is combined with the setting of priorities, it will strengthen implementation and relieve the pressure on practitioners, as they’ll know where the priorities lie. For water infrastructure, we developed and tested methods of this kind as part of NRP 61. We showed that it’s worthwhile to plan more carefully and maintain infrastructure proactively. In other areas, such as groundwater management, appropriate instruments have yet to be developed.

S. H.: In fact, NRP 61 developed recommendations in this area. They suggest that what’s needed first of all is a detailed assessment of the current and future situation: what water resources are available? What types of use exist or are foreseeable? In the long term, resource-use conflicts are to be resolved through management planning. And there’s also a need for

improved coordination between the various agencies responsible and between the federal, cantonal and communal authorities.

Many of the recommendations from NRP 61 are expressed in very general terms. Why was this "helicopter view" adopted?

M. M.: Conditions in Switzerland are extremely heterogeneous. For example, each aquifer reacts differently to drought. As a rule, the situation has to be studied at the local or regional level, and the findings then only apply to that specific case. It's not normally possible to make concrete recommendations for Switzerland as a whole. So one of the conclusions of NRP 61 is that solutions have to be adapted to the particular situation, which presupposes a regional analysis.

S. H.: Another point is that society first has to agree on what goals it wishes to pursue with regard to water. There's no agreement at present. Only then can you identify options that enable you to achieve those goals. And the recommendations will vary depending on the goals defined. We went through this process for water infrastructure. With the aid of stakeholder surveys, we identified goals and possible options. Using decision analysis, we then determined those options which perform best for most stakeholders and under various future conditions and can therefore be recommended.

M. M.: It turned out that decision-makers and the community regard good-quality water supply and wastewater disposal, protection of water resources and intergenerational equity as priority goals. That contradicts the conventional view in everyday practice, where discussions are focused on costs. The Swiss people don't want to shift the burden onto the next generation,

"Hydrologists and chemists take different approaches. The close interaction promoted mutual understanding."

Klaus Lanz

Peter Penicka

National Research Programme on "Sustainable water management" (NRP 61)

In NRP 61, scientific foundations and methods were developed for sustainable management of Switzerland's water resources, which are facing growing demands. The impacts of climate change and social developments were studied in a total of 16 projects. The research programme identified risks and potential conflicts associated with water use and developed strategies for sustainable and integrated water resource management. With a budget of over CHF 12 million, NRP 61 ran for four years, officially ending in November 2014. Eawag scientists led five projects and participated in another three. In addition, Eawag researchers were responsible for two of the four thematic syntheses.

>> NFP 61 website

they're prepared to contribute financially – as long as the water sector does its homework. That's also demonstrated by the ongoing efforts to upgrade treatment plants so as to eliminate micropollutants from wastewater.

C. S.: Another important finding from NRP 61 is that we need to pay more attention to the protection of water resources. Urban development and spatial planning play a key role here, and that was previously overlooked.

K. L.: Some of the recommendations of NRP 61 were also rather general because we still know surprisingly little about our water resources and how they are used. How much is used to irrigate farmland, water golf courses, or make artificial snow for ski slopes? A lot of data is not public, or is not even collected by cantons and communes. Compared to the EU, with the Water Framework Directive, Switzerland still has a long way to go. This kind of basic information is essential for long-term planning of water supplies.

C. S.: And it's not just a matter of amounts. Water is also a habitat. Our knowledge of ecosystems is even more limited. Quite a few projects have sought to establish why fish stocks are declining, but we still don't fully understand. And as far as the biodiversity of aquatic ecosystems is concerned, the gaps in our knowledge are even greater.

How can these deficiencies be remedied?

C. S.: What we still don't do to a sufficient extent, in the case of practical implementation projects, is conduct research which goes beyond merely assessing outcomes at the end of the project. To understand why measures to restore rivers or to remove micropollutants at wastewater treatment plants are effective, or not, we need to know what happens within the system. Unless we understand the processes, we won't learn anything and we won't be able to optimize future measures. That's why in 2013 Eawag launched the Ecoimpact research project, which aims to elucidate the effects of micropollutants within complex ecosystems.

How will NRP 61 "live on"?

C. S.: We're pursuing various aspects of NRP 61 in new projects. The decision support meth-

Peter Penicka

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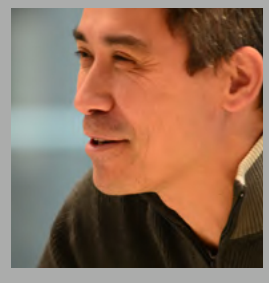
odology which we refined in the “Integrated river water quality management” project is being incorporated into the federal Modular Stepwise Procedure.

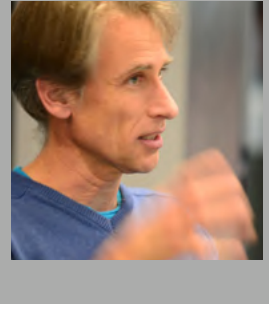
K. L.: In various cantons, NRP 61 has focused attention on the protection of water resources. For example, Canton Thurgau is considering whether it should in future increasingly support water-intensive agricultural operations near Lake Constance. The strong practical focus of the research programme and the close interaction between water professionals and researchers helped to promote mutual understanding. A hydrologist approaches things differently than a chemist or biologist. If you bring the various perspectives together, you can learn a lot and obtain a more integrated picture. We must continue to take a transdisciplinary approach.

Sabine Hoffmann (S. H.)
co-authored Thematic Synthesis 3 on challenges and future options for sustainable water supply and wastewater treatment. She was also involved in research on methods of inter- and transdisciplinary knowledge integration in the NRP 61 synthesis process. The findings are to be fed into future projects of similar complexity.

Klaus Lanz (K. L.)
co-authored Thematic Synthesis 2 on management of water resources and growing user demand.



Max Maurer (M. M.)
co-authored Thematic Synthesis 3 on challenges and future options for sustainable water supply and wastewater treatment. He also led the project on "Sustainable water infrastructure planning".



Christian Stamm (C. S.)
co-authored Thematic Synthesis 2 on management of water resources and growing user demand. He also led the project on "Integrated river water quality management".