

## Integrated water protection

- A greater appreciation is required of the important role played by intact ecosystems in the production of clean drinking water
- Goals to be pursued in Switzerland: more habitats for fish, adequate residual water flows and less chemical pollution of water resources

### Threats facing humans and the environment

#### Internationally

**Global water crisis.** More than a billion people do not have access to safe drinking water, and two-fifths of the world's population (2.4 billion people) lack adequate sanitation. The global water crisis is essentially due to unsustainable management of water resources and to the destruction of key water-related ecosystems, such as upland forests, wetlands and soils.

**Disrupted ecosystems.** Over the last century, the disappearance of 50% of the world's wetlands and the loss of 75% of primary forest cover in a third of the watersheds of rivers and lakes have adversely affected functions of these ecosystems such as water supply and flood control.

**Social tensions.** In a river basin, upstream activities such as deforestation can seriously impair the availability and quality of water downstream. Payments for ecosystem services can ensure that valley dwellers (and the business sector) have sufficient water while the poorer upstream communities are compensated for their contributions to the protection and sustainable use of ecosystems, such as forests.

### Importance of ecosystem protection

Ecosystems – especially forests, soils and wetlands – capture, filter, store and re-release water. The protection and sustainable use of ecosystems is essential if adequate supplies of good-quality water are to be secured

#### In Switzerland

**Font of water for Europe.** Switzerland's location in the Alpine region at the centre of Europe makes the country a font of water for the whole continent. Here, 6% of Europe's freshwater reserves can be found, as well as the sources of rivers that flow into the Mediterranean or the North Sea. As a result, Switzerland has a special responsibility, extending beyond its national boundaries.

**Lack of semi-natural watercourses.** 12,500 km of Switzerland's 61,000 km of watercourses are classified as non-natural. In particular, barrier-free connections are often lacking between rivers and tributary streams. Such connections are important in enabling brown trout ready for spawning to swim upstream to spawning grounds and juvenile habitats in side channels.



Watercourses needn't stick to the straight and narrow ...

**Inadequate water quality.** In some cases, fish are unable to thrive as a result of inadequate water quality. In addition to hormones and pesticides, particular mention should be made of nitrite and ammonium. In many watercourses in the Central Plateau, concentrations of these

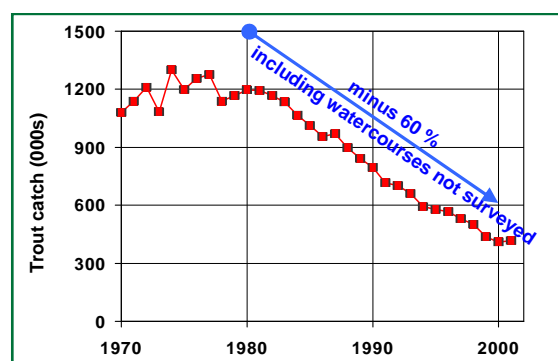
nitrogen compounds still exceed the limits specified in water quality regulations.

**Fish: “barometers” of water quality.** SAEFL’s latest statistics on fish yields indicate a dramatic decline in anglers’ catches: while 1.5 million brown trout were caught in 1980, the total today is a mere 0.6 million (cf. Figure; source: catch statistics, Fisheries Section, SAEFL). This represents a drop of 60% and suggests a corresponding decline in stocks. A similar picture has been found for other species of fish.

**Micropollutants and endocrine disrupters.**

The past 30 years have seen a marked decline in chemical pollution of water resources. One problem that remains, however, is chronic exposure to micropollutants, i.e. hundreds of substances that are released from diffuse sources or discharged from wastewater treatment plants without being fully degraded. One group of micropollutants, known as endocrine disrupters, includes various chemicals, natural steroids from humans and animals, and the synthetic hormone ethinyl estradiol, which is used as an oral contraceptive. In a study involving 41 sewage works, several cases were found in which male trout had produced the yolk protein vitellogenin – a sign of feminization.

Anglers' trout catches from Swiss watercourses



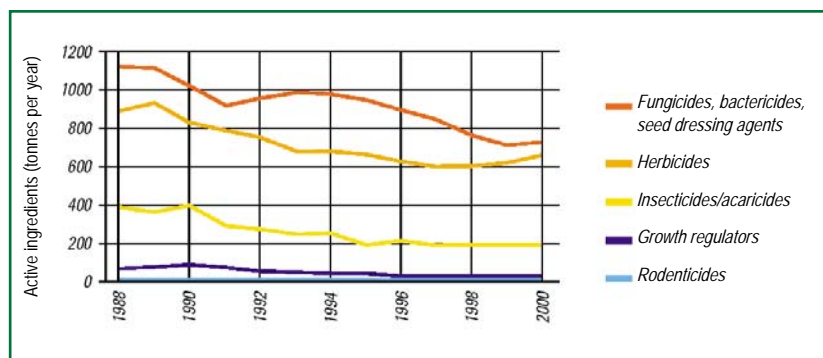
**Pesticides in streams and groundwater.** Since 1988, the quantities of pesticides used in Switzerland have been significantly reduced. However, this decrease has generally been offset by the application of more effective products, and pesticides are regularly detected in cantonal analyses of surface waters.

A study of groundwater monitoring stations throughout Switzerland indicated that traces of pesticides and breakdown products had been detected at more than half of the 455 stations in-

volved. The concentrations were generally beneath the limits specified (set at a low level as a precautionary measure), and there is no immediate risk of toxic effects. Nonetheless, this represents unacceptable pollution of the country’s most important source of drinking water – groundwater accounts for 80% of all drinking water supplies.

**Agricultural pesticide inputs**

Little information is available on pesticide toxicity



Source: Swiss Society of Chemical Industries (SGCI), 2001

**Damage caused by inadequate residual flows.**

In the absence of adequate residual water flows down stream of dams, river channels become impassable to fish, food supplies are insufficient and successful reproduction becomes impossible. Fish stocks and species diversity decline. A further consequence is that the rare and valuable biological communities found in alluvial forests are no longer able to survive. Pollutants are not diluted, and the self-cleansing capacity of watercourses is severely reduced. A lack of water also has serious impacts on the reproductive success of various terrestrial species, e.g. numerous insects, amphibians and reptiles.

**Melting of glaciers.** Over the past 30 years, Switzerland’s glaciers have lost at least a quarter of their total ice mass as a result of the warmer climate. Studies of discharge regimes indicate that water flows in rivers which have their source in high mountains have increased in the winter and spring.

**Action taken to date**

**Internationally**

**Integrated water resources management.** The concept of protection and sustainable use of water-related ecosystems has been promoted

by Switzerland on the basis of the country's own experience; as a result, integrated water resources management (IWRM) – and the idea of services provided by ecosystems – is now recognized politically at UN level (e.g. ministerial consultations at the 8th Special Session of the UNEP Governing Council/Global Ministerial Environment Forum, South Korea, March 2004, and the 12th Session of the UN Commission on Sustainable Development, New York, April 2004).

**Progress within the EU.** In the EU, the Commission has submitted to the Council of Ministers and Parliament a proposal for a new directive concerning a system known as REACH (Registration, Evaluation, Authorization and Restriction of CHemicals). This is designed to amend various aspects of existing regulations in a fundamental manner. One of the proposed changes involves the introduction of authorisation requirements for substances that are persistent and bioaccumulative or toxic to reproduction.

**OSPAR Commission for the Protection of the Marine Environment of the North-East Atlantic.** Under the regional OSPAR Convention, which has been ratified by Switzerland, a strategy on hazardous substances has been adopted. The ultimate aim of this strategy is to eliminate marine pollution by 2020, achieving concentrations near background values for naturally occurring substances and close to zero for synthetic substances.

### In Switzerland

**Improved water quality thanks to bans on chemicals.** As part of the ongoing overhaul of Swiss chemicals legislation (“PARCHEM” project), use of the hormonally active surfactant nonylphenol ethoxylate is to be prohibited in detergents, textile and leather finishing agents, and pesticides. A general ban is also to be imposed on the use of substances toxic to reproduction in products that are available to the general public, e.g. certain plasticizers (phthalates).

**Micropollutants and the Substances Ordinance.** In Switzerland, the production and use of certain substances that are hormonally active or toxic to reproduction (DDT and other organochlorine pesticides, PCBs) was prohibited as early as 1986, with the introduction of the

Ordinance on Environmentally Hazardous Substances.

**Changes in use of sewage sludge.** In view of its pollutant content, the application of sewage sludge to fodder and vegetable crops has been prohibited since 2003; a general ban on spreading will take effect from 2006.

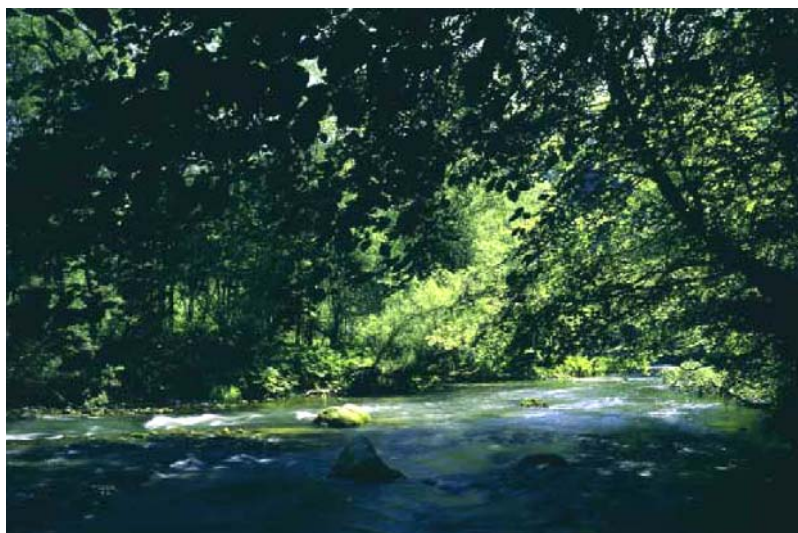
**Adequate residual flows.** Since the Water Protection Law came into effect on 1 November 1992, new/higher levels have been specified for residual water flows at more than 60 abstraction points in connection with the renewal of concessions for existing hydropower plants.

### Agenda for the future

#### Internationally

**Importance of water-related ecosystems for IWRM.** Not only environment ministers but also those responsible for development and water need to be convinced of the arguments for protection and sustainable use of ecosystems in integrated water resources management (IWRM). In any project, ecosystems should be regarded as “basic infrastructure” for water supplies and sanitation. To ensure that this approach is fully adopted, cooperation is required between the various authorities responsible for national implementation of global environmental agreements (on wetlands, desertification, climate change and biodiversity) – including the authorities responsible for water supply/sanitation and flood protection measures; in this way, the coherence and consistency of national water policies can be improved.

**Payments for ecosystem services.** Within national river basins, there is a need to develop and promote payments to poorer mountain inhabitants for ecosystem services, as their sustainable use of upstream ecosystems ensures that downstream city dwellers receive good-quality water supplies. This will require the involvement of the private sector, whose economic survival depends on these water supplies. In certain Japanese and South American cities, water bills include a charge for reforestation in the watershed of the river that serves the local population. Irrigation associations pay forest owners for sustainable forest management, thereby securing a regular supply of good-quality water. Similar contracts are signed by dam owners, not only to ensure



Source: Michel Roggo

Rehabilitated rivers: greater species diversity and improved flood control

regular supplies but also to prevent their infrastructure from being choked by silt.

**Protection and sustainable use of ecosystems.**

This is not a luxury for rich countries, but a necessity for all countries. The costs involved in this preventive approach have been shown to be much lower on a long-term basis than the costs of any restoration project, or of building/maintaining water-related infrastructure.

**International water mechanism/platform.**

Concrete steps should be taken to improve the coordination of water-related activities within the UN system, and to evaluate the possibility of establishing an international water mechanism/platform, bringing together all the various stakeholders.

**In Switzerland**

**Harmonization with EU regulations.** Keeping in step with the EU, authorization requirements are to be introduced for substances that are persistent and bioaccumulative or toxic to reproduction (implementation of REACH system).

**Controlling micropollutants.** There is a need to identify and establish the origins of micropollutants that occur in the environment individually or as mixtures of substances and have adverse impacts on aquatic habitats. A programme should then be developed for the reduction of micropollutant inputs into water resources. SAEFL is tackling the issue of problematic micropollutants by establishing a priority project entitled “Reduction of water pollution and conservation of resources”.

**Enhancing aquatic habitats.** In recent decades, rivers, streams and lakes have suffered serious damage. These ecosystems should now be restored to a natural state. Watercourses need sufficient space to develop their natural dynamics. Rehabilitation of rivers and streams not only restores species diversity but also permits more effective flood control.

**Restoring channels deprived of residual flows.**

In many channels downstream of dams, residual water flows are inadequate or non-existent. These watercourses are to be restored as far as is economically acceptable by 2012, and fully restored upon renewal of concessions.

**Incentives for reduction of nitrate levels in water.**

An example: in the mid-1990s, the village of Wohlenschwil in the canton of Aargau had too much nitrate in its drinking water (53 mg/L). A total of 23.5 hectares of intensively cultivated land was transformed into unfertilized meadows. Thus, nitrate concentrations in water were effectively lowered to 25 mg/L. Farmers are compensated for their loss of earnings through payments for ecosystem services amounting to CHF 2,000 per hectare per year.

**Useful links**

- “Declining Fish Yields Network” project: <http://www.fischnetz.ch>
- <http://www.environment-switzerland.ch>
- <http://www.unep.org/unep/program/natres/water/>
- <http://www.bwg.admin.ch>

**Further information**

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SAEFL is an agency of the Federal Department of Environment, Transport, Energy and Communications (DETEC)