MANAGEMENT WATERSHED INTEGRATED APPROACH

Watershed Management

Guiding Principles for Integrated Management of Water in Switzerland

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Office for the Environment (FOEN)

Federal Office of Energy (FOE)

Federal Office for Agriculture (FOAG)

Federal Office for Spatial Development (ARE)

WATER AGENDA 21

Why watershed management?

The pressure on water resources, increasing conflicts of interest and complex river systems represent a huge challenge. The small-scale, sectoral structures of water management are now reaching their limits. The integrated management of water in the catchment area – watershed management for short – requires a new level of consideration: water bodies are to be viewed in the context of the whole river system and managed as a unit within their watersheds. This allows efficient and targeted water management through regional coordination, transparent balancing of interests and clear priority setting.

This document introduces the principles of this approach. It serves as a policy framework for the water management stakeholders in cantons, regions and communes. The Guiding Principles have been developed by the network of stakeholders in Swiss water management called Water Agenda 21, and are therefore widely supported. They can provide the impetus for modern water management which covers both protection and user interests. They will be substantiated in the future by implementation supports where they are needed. Successful implementation requires committed stakeholders at all levels who direct their activities towards jointly developed goals at watershed level.

Stephan Müller
Federal Office for the Environment
President of Water Agenda 21

Martin Würsten
Office for the Environment, Canton Solothurn
Vice-President of Water Agenda 21

From constitutional article to integrated approach

Watershed management is derived from the Federal Constitution, the main objectives of water management and the vision of Water Agenda 21. The aim is efficient and sustainable realisation of the main objectives through coordination.

The mission

The basis for the Water Agenda 21 vision and these Guiding Principles is the Federal Constitution. Two articles are central:

- Article 76[1]: The Confederation shall within the scope of its powers ensure the economic use and the protection of water resources and provide protection against the harmful effects of water.
- Article 73: The Confederation and the Cantons shall endeavour to achieve a balanced and sustainable relationship between nature and its capacity to renew itself and the demands placed on it by the population.

The aim of the Confederation's environmental and resources policy and the sustainable development strategy is conservation and sustainable use of the natural resources which are the basis of human life. They demand a focus on long-term goals, an increase in personal responsibility and an intersectoral approach.

The main objectives

Water management covers all human interventions in relation to water bodies and water resources. The main objectives of water management are

- exploitation and use of water resources,
- protection, conservation and restoration of the ecological, landscape and social functions of the water bodies,
- protection of people and property against the adverse effects of water.

The vision

The members of Water Agenda 21 call for and promote a water management which

- pursues the principles of sustainable development,
- addresses conflicts of interest from a holistic point of view,
- is predominantly regional, with the watershed as the reference area,
- is developed in transparent procedures which incorporate all the relevant interests and concerned parties,
- supports initiative and independent action by all the stakeholders,
- accepts responsibility in relation to neighbouring countries.

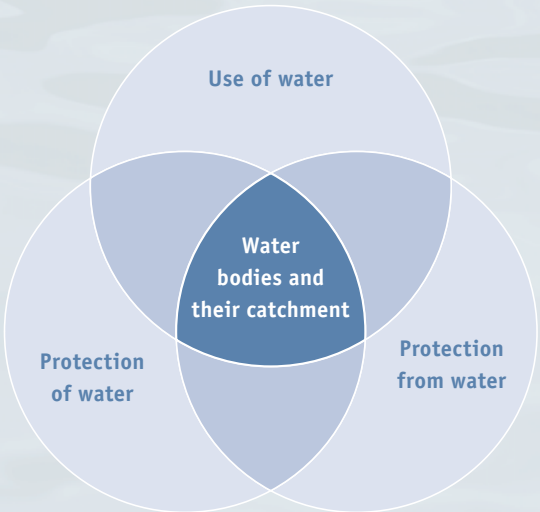
The watershed management approach based on these principles pursues long-term goals. The main objectives of water management should be met efficiently and sustainably through coordination.

Lake Silvaplana (centre), Lake Champfèr (right), Lake Sils (back): watershed management means looking beyond each individual water body.

Definition of watershed management

Integrated management of water in the catchment area – watershed management for short – is an intersectoral approach to management of water resources, water bodies and water infrastructures. It is based on long-term goals and proceeds in a continuous cycle of planning, implementation and monitoring processes. The reference area is the watershed.

The various main objectives of water management coincide at the watershed and must be coordinated.



Vision and continuity achieve the goal

Watershed management is built on long-term goals. The management process proceeds in a cycle spanning several years. Clear priorities support efficient and targeted use of the resources.

Thinking in process cycles
The management of water must be seen as a continuous cyclical process, with a cycle lasting four to eight years. Each management cycle includes
- target definition and action planning,
- project planning, implementation, operation and maintenance,
- monitoring and evaluation of effectiveness.

Long-term planning
Long-term development goals form the basis for the planning. They can, for example, be defined in a development concept. The goals are oriented according to the local conditions and take into account the objectives of other activities with spatial relevance, the principles of protection and use and the sectoral subgoals stipulated in the legislation. They are reviewed and adapted in the course of the cyclical process with a view to forward planning.

Setting priorities
The planning defines the spatial, temporal and thematic priorities of water management in an action plan. The priorities are set in line with ecological, economic and social criteria. Where necessary, they are based on balancing the conflicting interests for use and protection. The purpose of the priorities is to obtain optimum use of resources so that the long-term development goals can be achieved.

The action plan incorporates the existing master and spatial planning and relevant sectoral strategic planning. In turn these plans must integrate the water management measures with spatial relevance within the planning process.

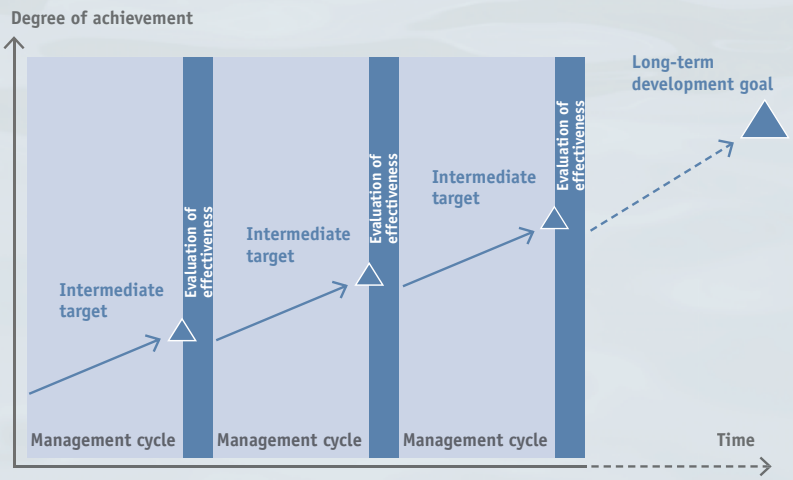
Checking the impact
The condition of the water resources, water bodies and water infrastructure is monitored. The information is used for evaluation of the effectiveness of the measures, enhancement of system awareness and early detection of challenges, which must then be included in the target setting.

Upgrading in populated areas: the successful revitalisation of the Versoix River (GE) is the result of careful planning.

Example: Canton Geneva water management instrument

Canton Geneva has codified water management by watersheds in the Cantonal Water Act. The instrument for integrated management is called SPAGE (Schéma de protection, d'aménagement et de gestion des eaux). The management cycle lasts six years and comprises four phases: deficit analysis, action plan, implementation and evaluation of effectiveness. Multiple repetition of this management cycle brings the long-term development goals closer.

Long-term planning: multi-annual management cycles with intermediate targets form stages on the road to the long-term development goals.



The watershed as reference area

Modern water management is orientated towards the limits set by the water: the watershed represents the reference unit. In this way water resources and water bodies can be understood and managed as a system.

Action and intervention performed as part of water management affects the conditions elsewhere. There are many different interdependencies and interactions between

- upper and lower reaches,
- surface water bodies and groundwater,
- water/land use and water balance.

In order to understand these connections, water resources and water bodies must be considered as a spatial system.

Defining the watershed as reference area

The reference area in which the interactions occur is used for management: the watershed. This functionally defined area often extends beyond the political/administrative boundaries. It is an appropriate basis for considering reciprocal impacts, accounting for cumulative effects and coordinating strategies, goals and actions. Use of the watershed as the reference area therefore promotes effective and sustainable water management.

Selecting the size of the watershed

The watershed must be large enough for coordination between the sectors and measures. But it should be sufficiently limited for direct reference to the water bodies and actions for all the parties involved. Depending on the problem and the sectors affected, the water management follows

- natural hydrologic or hydrogeologic catchments,
- technical catchment limits, e.g. of wastewater treatment plants, drinking water supplies or hydropower plants.

Supplementary, political/administrative boundaries may also be considered.

Including different points of view

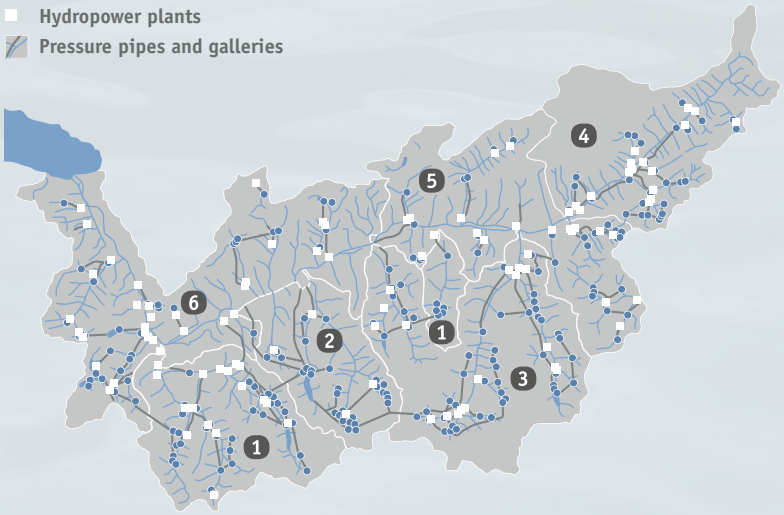
A watershed is not an enclosed unit; it is part of a nested system with interfaces to adjacent, upstream and downstream watersheds. It can be viewed as part of a larger and ultimately international river basin. These other levels and scales are taken into account in the target setting and planning.

The Mattmark reservoir (VS) is an important factor in the river system.
The feeders to the reservoir were included in the definition of the watershed.

Example: catchments for the Canton Valais residual water remediation

For its residual water remediation, Canton Valais did not look primarily at the individual installations; it undertook overall planning at watershed level. Six groups of catchments were formed, which addressed man-made links for hydropower use as well as the natural watercourses. This approach gives an overview of the natural and technical relationships within the system, allowing coordinated planning.

Canton Valais showing catchments. The dense hydropower infrastructure network is part of the river system.



Coordination between the sectors is crucial

The purpose of watershed management is to coordinate the different interests and requirements regarding water bodies and water resources. Interfaces must be considered and conflicting concerns balanced.

Integrated management
Where conflicts arise or may arise in the future between claims to protection and use, or in relation to dependencies due to technical and organisational factors, they must be addressed in an integrated manner. The stakeholders in the relevant sectors of the watershed are brought into the planning process.

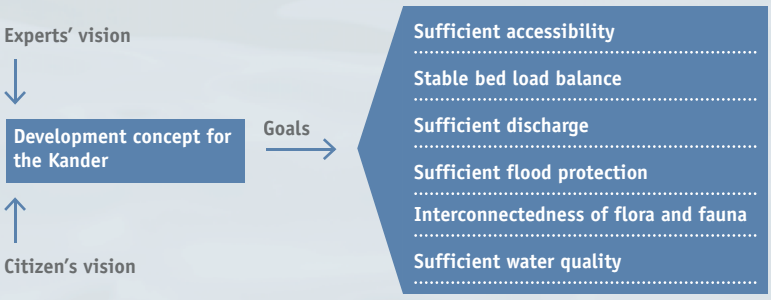
Consideration of interfaces
Because interests and claims to use of water resources and water bodies do not always originate from the traditional water management sectors, watershed management covers all relevant sectors. Interfaces with spatial planning, agriculture and forestry, nature and landscape conservation and other sectors with spatial relevance are also included. Spatial planning and land management instruments can provide a mandatory safeguard for the watershed management plans.

Transparent balancing of interests
Watershed management includes a traceable procedure for balancing the interests between competing use and protection targets. The interests are assessed in thematic, spatial and temporal terms and are balanced against each other. This balancing of interests is transparent and involves the concerned parties. In addition to functional criteria it may also cover strategic and political issues.
Next to compromise solutions this may lead to spatial prioritisations, such that the development goals are achieved for the watershed as a whole.

Assessing and deciding together: professionals from different fields meeting on the banks of the Kander (BE).

Example: development concept for the River Kander
The project of Canton Bern Kander.2050 – "läbigs Kanderwasser" pursues long-term objectives in the areas of flood protection, ecology and utilisation. The development concept for the Kander defines the framework for the individual hydraulic engineering projects. The concept is based equally on a vision developed by experts and a citizen's vision developed by local people. So the needs of society and hydraulic engineering expertise are brought into harmony.

The long-term goals were defined in the development concept for the Kander on the basis of an experts' vision and a citizen's vision.



Prerequisites for successful management

After the initial phase, successful watershed management rests on four cornerstones: steering, funding, participation and monitoring.

Initiative
Watershed management can be activated by the Canton or the parties concerned. The Canton acts if an assessment of the current situation indicates a need for coordination between the sectors and within the watershed. Success is most likely to be achieved by a joint commitment by the parties concerned and the Canton. For intercantonal and international watersheds the Confederation can take on a coordinating and supporting role.

Steering
A steering board is essential for the management process. The steering board is responsible for target setting, planning, monitoring and coordination of implementation. The responsible authorities for the relevant sectors are generally represented on the steering board: Canton, communes and other competent bodies with responsibility for implementation. The organisational structure is adapted to the local conditions. The measures can be implemented by existing responsible bodies.

Funding
The funding for the steering functions must be arranged at the outset. Implementation is generally funded through existing responsible bodies or mechanisms defined during activation. The watershed management also examines the funding in the light of the polluter and beneficiary pays principles. Priority measures may be promoted by special funds established at the watershed level.

Participation
The watershed management is developed and implemented in transparent procedures involving all the main interests and concerned parties. Participation has an important role in the strategic planning in particular. It reveals coordination requirements, synergies and duplication, promotes system awareness and increases acceptance of the measures. Participation assists the political decision making.

Monitoring
Coordinated monitoring is indispensable for the planning and evaluation of effectiveness. Systematic observation and acquisition of data about the water resources and water bodies helps to establish a common system awareness.

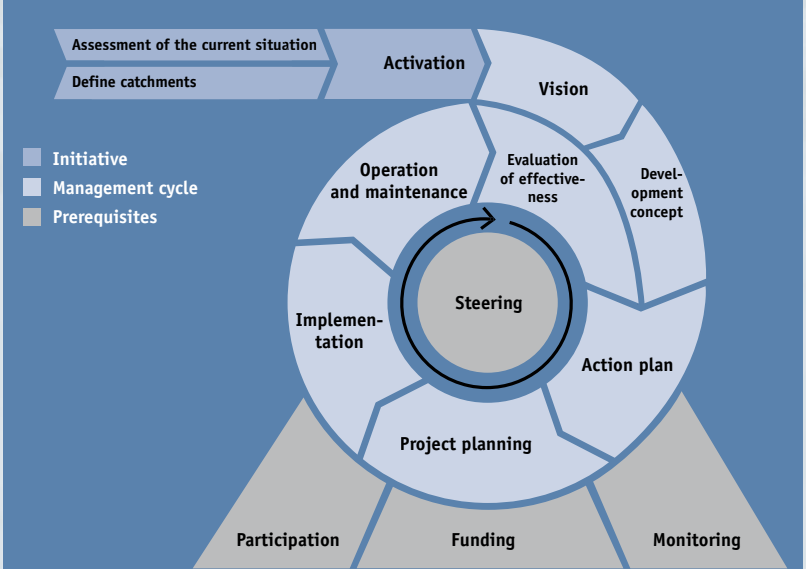
The Birs during the 2007 floods: the common system awareness and intercantonal coordination are also conducive to flood protection.

Example: Intercantonal River Birs Watershed Management Commission

The five riparian cantons of Jura, Bern, Solothurn, Basel-Stadt and Basel-Land have developed a joint regional wastewater management plan for the watershed of the River Birs. A steering committee has managed the initial phases up to the action plan. The North West Switzerland Intergovernmental Conference has appointed the Birs Commission to implement it. This body replaces the steering committee and will ensure joint implementation of the planned actions throughout the watershed in the future.

The cyclical process of watershed management

The cyclical process of watershed management requires clearly defined steering, regulated funding, participative action and continuous monitoring of the river system.



Four good reasons for watershed management

Integrated management of water in the catchment area generates high efficiency and is flexible in time and space. Watershed management is a future-oriented approach and leads to sustainable solutions.

With the watershed as reference area, the integrated management of water is primarily based on the natural system. The area in which the interactions occur and the decision-making scope coincide. The problems are solved where they are caused.

Efficient
The water management is directed towards medium and long-term time horizons. With careful intersectoral planning and decision-making processes, the resources are used to optimum effect.
By taking a regional view, synergies and economies of scale can be exploited. By combining forces, the cost efficiency and professionalism of the management can be enhanced.

Customised
The watershed management can be adapted – in terms of space, content and organisation – to the river system concerned and the needs of the stakeholders involved. Within the cyclical management process, the goals and measures are also regularly reviewed and adapted to the altered conditions if necessary.

Future oriented
In Europe and in Switzerland, a change of perspective is already taking place from small-scale, sectoral action to consideration of the river system as a whole. A few cantons are enshrining these principles in their legislation and implementing successful projects. These Guiding Principles set out the basic framework for further development and implementation.

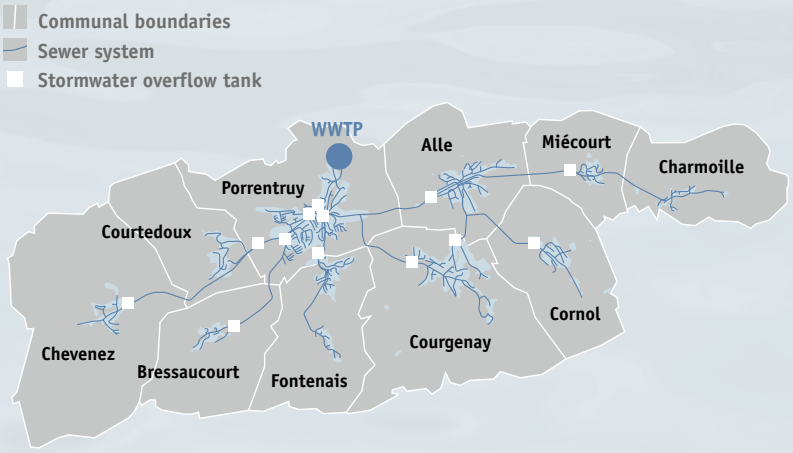
Durable
Integrated management in the watershed focuses on the long term. By including the concerned parties in the planning, building upon a common system awareness and by transparently balancing interests, better solutions with greater acceptance can be formulated and implemented in the long term.

The Porrentruy wastewater treatment plant purifies the wastewater from ten communes. This cooperation increases efficiency and reduces costs.

Example: Porrentruy wastewater treatment plant: regional solution

The Porrentruy wastewater treatment plant (Canton Jura) is subject to a high percentage of sewer infiltration water. This percentage is to be reduced from 75% to 50%. The General Wastewater Management Plan for the whole catchment area of the plant shows that costs of CHF 4.9 million would result if each of the ten connected communes had to reach this target on its own. But if the target is set globally for the whole catchment area of the plant, somewhat less then one million would be sufficient thanks to carefully selected measures.

The Porrentruy wastewater treatment plant (JU) catchment area



“The integrated approach to water takes us forward”

In modern water management, cooperation is intensifying between different levels – from policy through administration to implementation. Four people comment on watershed management from different perspectives.

Water management has become more complex – in particular the increasing trend for different interests to overlap. What is needed to overcome these challenges is greater cooperation between politicians, administrators, private industry and civil society. We need to rethink our understanding of our roles and seek new institutional models, processes, procedures and instruments. Watershed management is a way of developing shared values and promoting system awareness. By planning for the long term and regularly reviewing our targets and actions, we can increase the confidence of all the parties concerned.

Barbara Egger-Jenzer
Cantonal Executive Council Canton Bern, Head of Directorate for Public Works, Transports and Energy

Watershed management is pioneering work at the moment, but I am convinced that in a few years’ time we will scarcely remember how things once were. Canton Uri took part in the study on the Lake Lucerne watershed in the 1990s and developed an awareness of watershed planning at that early stage. The recent establishment of “Abwasser Uri” was an important milestone. All the communes in Uri now handle wastewater matters jointly. Flood protection, small hydropower plants or support for the lake trout which is threatened with extinction: we can only find the right answers to these questions if we view the system as a whole – this is the logic on which watershed management is based.

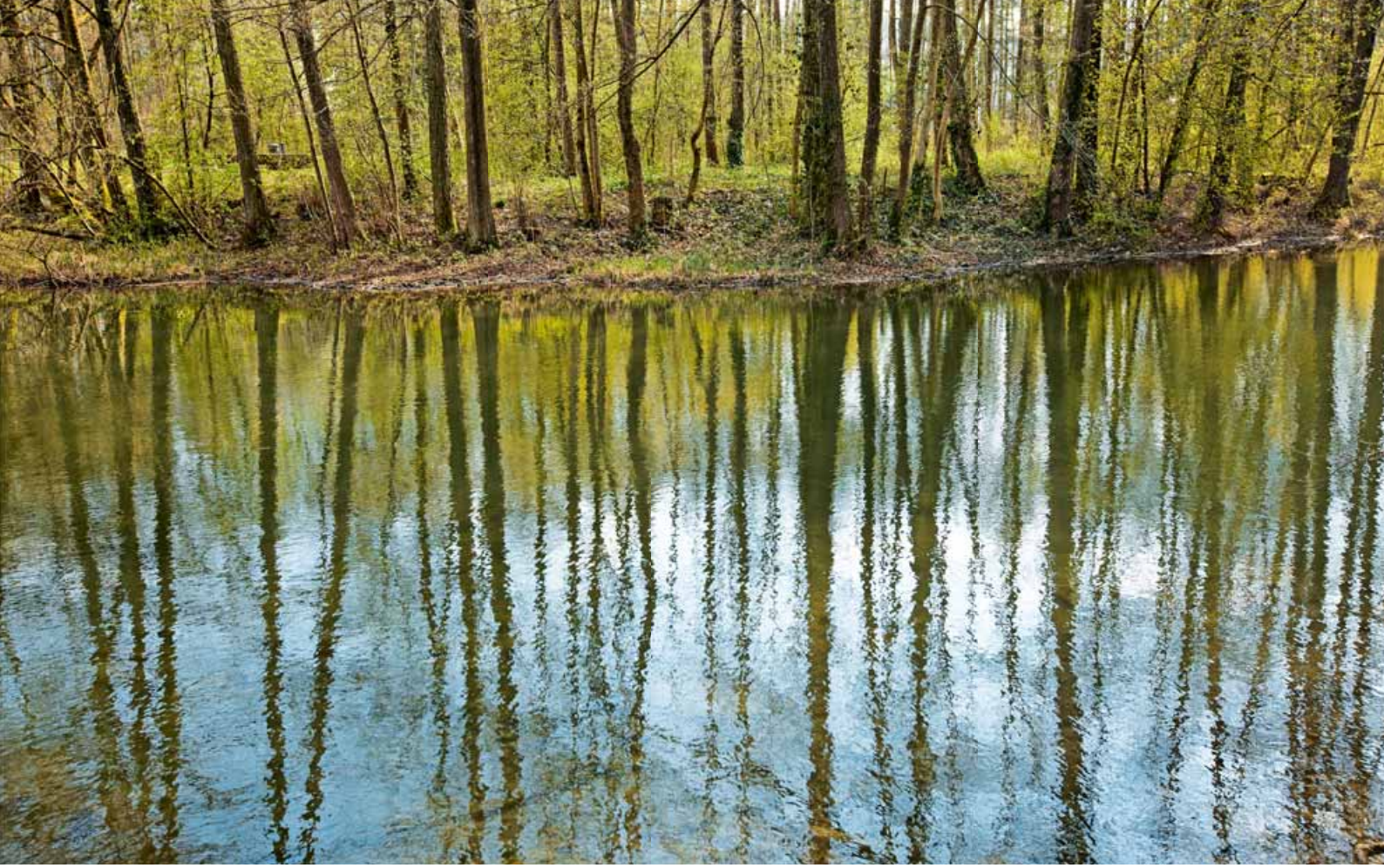
Benno Bühlmann
Head of Canton Uri Office of Environmental Protection

The autonomy of the communes is important to us, but there are matters that a commune cannot resolve in isolation. Water is a prime example. It is an important asset for the whole region which raises complex questions and knows no communal boundaries. The River Furtbach is heavily used for agriculture. Because of this, and because little fresh water flows into the stream, its water quality is not always the best. To resolve this problem, we amalgamated with the other six communes in the Furt valley – all recognising that action needed to be taken. The Furtbach Water Action Plan is the result of constructive cooperation among the communes and with the Canton.

Peter Staub
Former Mayor of Dällikon (Canton Zurich)

Management of water in all its aspects is becoming increasingly difficult, particularly for smaller communes. The watershed management which will enter into force in the Val-de-Ruz basin with the creation of a water syndicate in 2011 unites drinking water, wastewater, agricultural drainages and maintenance of water bodies under one umbrella. This professionalisation benefits everyone. By efficient investments we can make cost savings of up to 25%. Standard tariffs for all consumers and a 24-hour on-call service are just two of the improvements that are possible by amalgamating the 22 management units into one syndicate. I am convinced that water has to be managed at watershed level.

Stéphane Bianchini
Manager of the Val-de-Ruz Water Syndicate SEVRE (Canton Neuchâtel)



"Either the rivers must be left freely to nature or, if we start changing their banks, this must be done in full knowledge of all their conditions and with the widest possible expert knowledge."

Hans Conrad Escher (1767–1823),
head of the River Linth correction project

Literature

Eintauchen in die Wasserwirtschaft (Federal Office for Water and Geology, 2003)

Guiding Principles for Swiss Watercourses – promoting sustainable watercourse management (Federal Office for the Environment, Forestry and Landscape, Federal Office for Water and Geology, Federal Office for Agriculture, Federal Office for Spatial Development, 2003)

Wegleitung Grundwasserschutz (Federal Office for the Environment, 2004)

Hochwasserschutz an Fliessgewässern – Wegleitung (Federal Office for Water and Geology, 2001)

Der Regionale Entwässerungsplan (REP) – Empfehlung für die Bearbeitung des REP im Rahmen einer ganzheitlichen Gewässerplanung (Swiss Water Association VSA, 2000)

Sustainable Development Strategy: Guidelines and Action Plan 2008-2011 (Swiss Federal Council, 2008)

Wegleitung Landwirtschaftliche Planung – Position und Entwicklung der Landwirtschaft im Zusammenhang mit raumrelevanten Vorhaben (Federal Office for Agriculture, 2009)

Important statutes

Federal Constitution, Article 76 (Economic use and protection of water resources)

Federal Constitution, Article 73 (Sustainable development)

Federal Constitution, Articles 44 and 50 (Cooperation of the Confederation, cantons and communes)

Waters Protection Act, Article 1 (Holistic approach)

Spatial Planning Act, Articles 1 and 2 (Coordination of activities with spatial relevance)

Hydraulic Engineering Act, Article 3 (Coordination of measures)

Water Rights Act, Article 39 (Consideration of the public interest)

Waters Protection Ordinance, Article 4 (Regional wastewater management planning)

Waters Protection Ordinance, Article 46 (Coordination)

UNECE: International Convention on the Protection and Use of Transboundary Watercourses and International Lakes – Protocol on Water and Health, Article 5 (Integrated management in the catchment area)

Imprint

Publisher:
Water Agenda 21 and Partners

Content: Olivier Chaix, Patrizia Dazio, Martin Pfaundler, Stefan Vollenweider

Support:
Water Agenda 21 working group

Concept and editing: naturaqua PBK

Translation: James Morris, Blackawton (UK)

Graphics and design:
grafikwerkstatt upart

Photo credits:
Cover photo: FOEN/AURA;
Inside front cover: top FOEN/AURA, bottom iStockphoto;
p. 5: Andreas Strauss/LOOK;
p. 7: FOEN/AURA;
p. 9: Kraftwerke Mattmark AG;
p. 11: FOEN/AURA;
p. 13: KEYSTONE/Georgios Kefalas;
p. 15: FOEN/AURA;
p. 17: FOEN/AURA; Inside back cover: top FOEN/AURA, bottom iStockphoto.
The portrait photos on page 16 were kindly supplied to us by the interviewees.

Citation: Water Agenda 21 (pub.), 2011: Watershed Management. Guiding Principles for Integrated Management of Water in Switzerland. Bern, 20 pages.

Note: this brochure is also published in German, French and Italian and is available on the Internet.

Available free as print version or pdf download: FOBL, Distribution of Publications, CH-3003 Bern,
Tel. +41 (0)31 325 50 50,
Fax +41 (0)31 325 50 58,
e-mail: verkauf.zivil@bbl.admin.ch
Website:
www.environment-switzerland.ch/ud-1032-e
or www.wa21.ch

Order numbers:
English: 810.400.049eng
German: 810.400.049d
French: 810.400.049f
Italian: 810.400.049i

WATER AGENDA 21 MEMBERS

Federal Office for the Environment (FOEN)
www.environment-switzerland.ch

Federal Office of Energy (FOE)
www.swiss-energy.ch

Eawag: Swiss Federal Institute of Aquatic Science and Technology
www.eawag.ch

Conference of the Heads of the Cantonal Offices for Environmental Protection in Switzerland (KVU)
www.kvu.ch

Swiss Gas and Water Industry Association (SVGW)
www.svgw.ch

Swiss Water Association (VSA)
www.vsa.ch

Swiss Water Management Association (SWV)
www.swv.ch

Pro Natura
www.pronatura.ch

WWF Switzerland
www.wwf.ch

Foundation for Environmental Protection Practice in Switzerland (PUSCH)
www.pusch.ch

Water Agenda 21 is the stakeholder network of water management in Switzerland. It promotes and demands water management which is based on the principles of sustainable development.

PARTNERS

Federal Office for Agriculture (FOAG)
www.foag.admin.ch

Federal Office for Spatial Development (ARE)
www.are.admin.ch