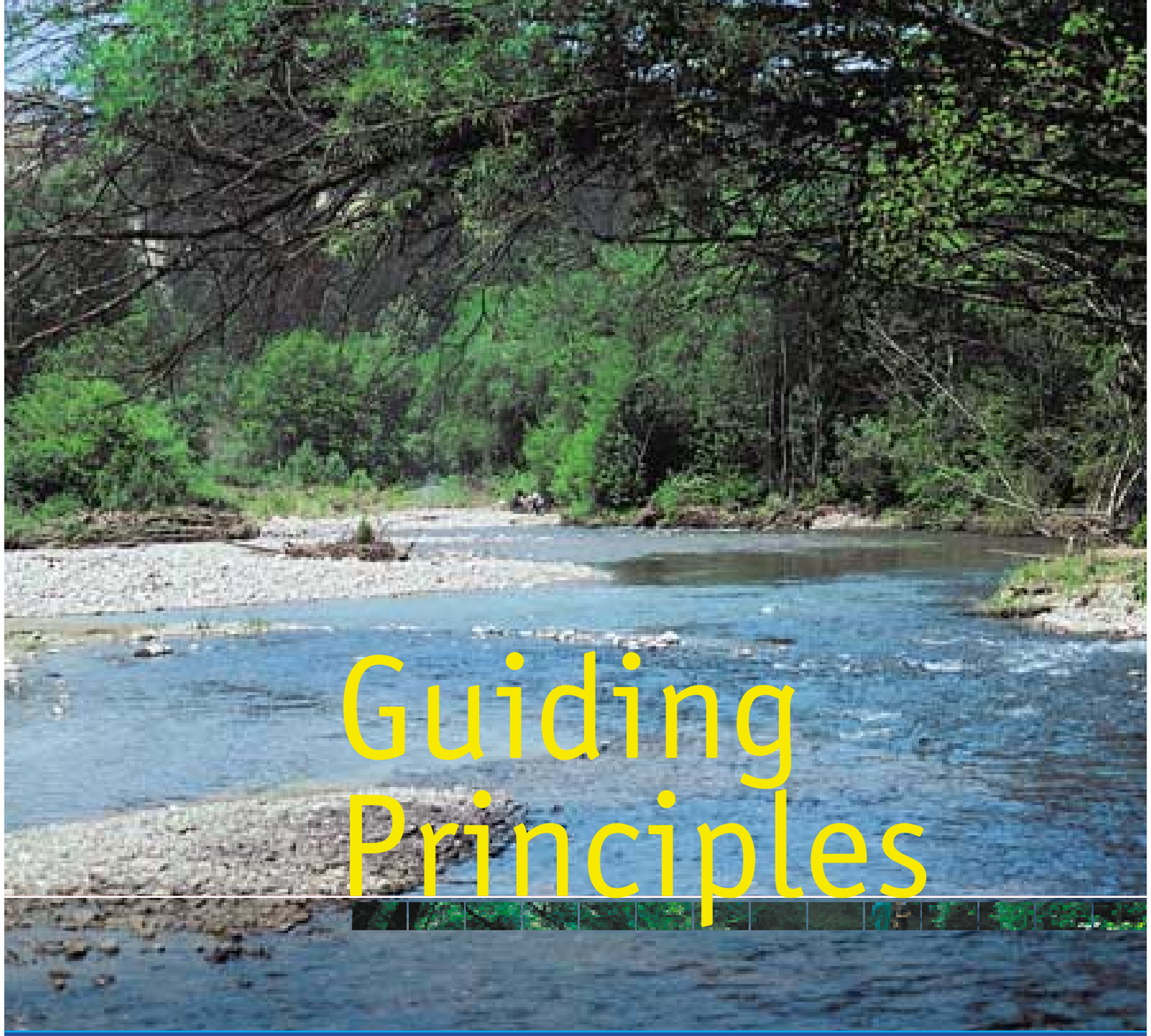

Guiding Principles

for Swiss watercourses

Promoting sustainable watercourse management

Swiss Agency for the Environment, Forests and Landscape SAEFL

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UFAEG
UFAEG
FOWG

Bundesamt für Landwirtschaft
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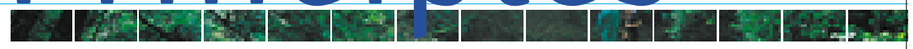
are
Federal Office for Spatial Development

Guiding Principles



Space for watercourses
Water flow
Water quality

Vision for the future of our watercourses

Watercourses are a vital natural resource for humans, wildlife and plants.
Watercourses need to be protected and their functions safeguarded in the long term. It is essential that future measures should be coordinated so as to realize the vision of near-natural Swiss watercourses.

The "Guiding Principles for Swiss watercourses" set goals and call for action.

Watercourses fulfil many different functions: they shape landscapes, and transport water and sediment. They serve as life-giving arteries in our landscapes and help to maintain the natural balance of our ecosystems. They replenish groundwater resources. First and foremost, however, they are living, dynamic entities, which carve out their own path, sometimes overflowing their banks in the process. But they have often been straitjacketed by humans.

As a result of human interventions, watercourses may no longer be able to fulfil their various functions:

- Confined channels and reinforced banks can increase the risk of flooding.
- Over-intensive industrial or agricultural land use too close to the water can adversely affect water quality.

These insights are reflected by national legislation in the areas of hydraulic engineering, water protection, spatial planning and agriculture. It is now possible to reconcile demands for adequate watercourse corridors, effective flood protection and the maintenance of water quality.

The success of this integrated approach has been demonstrated in practice. The examples of good practice that can already be found throughout Switzerland should now increasingly be followed.

Emphasis is placed on three development goals:
Adequate space for watercourses
Adequate water flows
Adequate water quality

These goals can be achieved by complying with the principles of sustainability – specifically, by giving equal weight to the social, ecological and economic aspects of watercourse management. In the long term, this will lead to the preservation of natural watercourses.

In the "Guiding Principles for Swiss watercourses" – issued by the Swiss Agency for the Environment, Forests and Landscape (SAEFL), the Federal Office for Water and Geology (OFEG), the Federal Office for Agriculture (FOAG), and the Federal Office for Spatial Development (OSD) – the goals for the development of our watercourses are explained for experts and other interested readers. By taking an integrated approach, the federal authorities in these four areas wish to set an example and at the same time to promote sustainable watercourse management at all levels.
The Guiding Principles outline measures that can be adopted by cantonal, regional and local authorities. They are also designed to showcase examples of good practice for professionals and other interested citizens. There is no lack of knowledge – but action is now required to implement it.


1

Example of good practice

Canton of Geneva's exemplary watercourse rehabilitation programme

Rehabilitation efforts on the Allondon 1 and below the Verbois dam (Teppes de Verbois site) 2 are restoring natural watercourse dynamics and re-establishing habitat diversity and connectivity. These measures provide benefits not only for the specialized flora and fauna (e.g. the Beautiful Demoiselle, "Calopteryx virgo meridionalis") 3 but also for city-dwellers in search of relaxation 4 – a particular boon for the "city-canton" of Geneva.


2


3


4

In 2001, the canton of Geneva received the Watercourse Award, sponsored by the Water Management Association, the Biological Engineering Association and Pro Natura. The award was well deserved, as the canton has made the rehabilitation of its watercourses a priority concern since 1997. Under a CHF 31 million programme based on five specially drafted laws, rehabilitation of the numerous streams and channels in the catchment area of the canton is to be implemented over the next few years. The measures, which are covered by cross-border management agreements ("contrats de rivières") in the Lake Geneva/River Rhône basin, address a wide variety of aspects, including "Watercourse corridors", "Habitat diversity and landscape quality" and "Water quality". Since 2001, measures have been implemented below the Verbois dam (Teppes de Verbois restoration project) on the Rhône. The success of these measures can be seen by the fact that beavers have already become re-established in the area.

Rehabilitation work has now also been commenced on the Aire and Seymaz watercourses.
(For more information, see www.geneve.ch/nature)

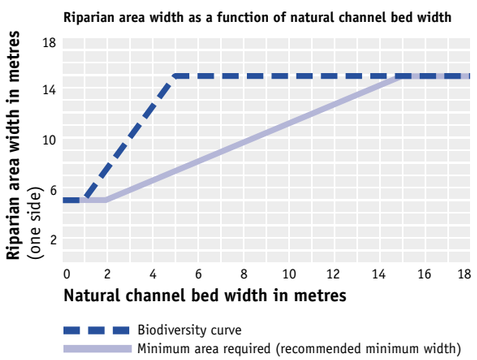
Development goal: “Adequate space for watercourses”

The first development goal is based on the fact that our watercourses often lack adequate space. Accordingly, the Hydraulic Engineering Ordinance (WBV) stipulates that cantonal authorities are to define the minimum area that is required to safeguard the natural functions of a watercourse.

Adequate space for the natural development of a watercourse in terms of area and time means:

- a cross-section that is adequate to accommodate flood run-off, and for sediment transport and drainage of agricultural land and settled areas;
- adequate space for the development of natural structural diversity in aquatic, amphibian and terrestrial habitats;
- adequate space for the flourishing of biological communities appropriate to the habitat and for habitat connectivity;
- sufficient room for recreational activities, enabling the population to perceive and identify with the cultural landscape;
- land use at a sufficient distance from the watercourse to ensure that water pollution is avoided.

Key chart



Measures for the definition of adequate space for watercourses:

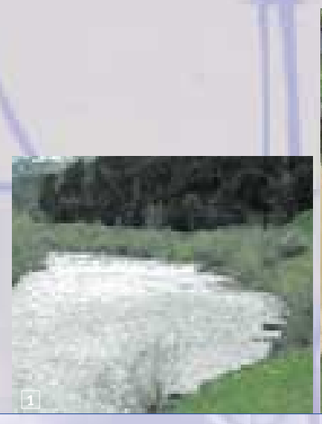
Flood protection measures affecting watercourses should involve minimum intervention. The principle to be applied is: “Use retention measures wherever possible, culverting when necessary.”

The minimum area required for watercourses is to be included as a principle in cantonal master plans and implemented in land-use plans. This means that:

- For all watercourses, the aim should be to secure the minimum area required (see chart). This is designed to safeguard natural watercourse functions to the minimum extent necessary. Provision should be made for buffer strips as appropriate; depending on the circumstances, these will correspond at least to the fertilizer-free strip in accordance with the Ordinance on Environmentally Hazardous Substances or to the buffer zone key (recommended minimum width).
- In national priority areas (sites of national conservation interest/NIN; sites of national importance included in inventories) and in other priority areas to be designated by the cantonal authorities (e.g. protected areas, water protection zones, fish sanctuaries), the aim should be to establish the area required with the aid of the biodiversity curve (cf. chart). This is designed to safeguard and promote the natural diversity of animal and plant species adapted to the habitat (increased watercourse width, wildlife corridor).
- In sites (e.g. alluvial zones) of national importance included in inventories, in sites designated as protected areas, and in zones under extensive management, the aim should be to establish the area required in the form of a meander belt, if a goal of this type has been specified. The meander belt (allowing adequate room for the formation of meanders, branching, limited bank erosion) is designed to ensure that the watercourse is integrated into the landscape in a near-natural manner (key parameter: meander belt width).

Example of good practice

Integrated approaches for the River Thur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2

The cantons of Appenzell Inner Rhodes (AI) and Outer Rhodes (AR), St. Gallen (SG), Thurgau (TG) and Zurich (ZH) have resolved that the River Thur – stretching for 127 km – is to become a “river with a future for humans, nature and landscape”. For this reason, the area required for the river is determined in a binding manner for landowners on a case-by-case basis, depending on the particular flood hazard and type of land use.

At the land-use planning level, the required space may be demarcated using watercourse building lines and set-back lines. Within the framework of landscape development concepts, corridors are designated to ensure habitat connectivity. In recreation zones, consideration is also to be given to the need for additional space (e.g. for footpaths and rest areas). In areas liable to flooding, retention zones are planned to alleviate the flood risk (e.g. at Alt St. Johann).

In little-used areas and alluvial zones, additional space is to be provided so that the River Thur can develop dynamically (designation of a meander belt). For further information, see the brochure “Die Thur, Ziele für den Wasserbau” (“River Thur, hydraulic engineering goals”) published in 2001 by the cantonal hydraulic engineering agencies of AI, AR, SG, TG and ZH.

Another aim which is also extremely important on the River Thur is the restoration of natural channels, e.g. through widening above Wattwil (SG) 1, or in the Schaffäuli alluvial zone near Neunforn (TG) 2. The programme also involves the creation of areas suitable for recreational activities 3, e.g. where the River Glatt joins the River Thur near Oberbüren (SG). In this way, the public’s awareness of the need for sustainable use of watercourses can be raised.


3

Development goal: “Adequate water flows”

The second development goal is concerned with ensuring that water flows in our watercourses are adequate over the long term. In cases where water is used too intensively by humans, new approaches are required, since sufficient quantities of water are a prerequisite for valuable habitats for plants and wildlife in and along watercourses.

Adequate water flows – with a near-natural regime, including sediment transport – involve:

- the preservation of adequate aquatic habitats
- appropriate residual water levels in cases where water is abstracted or utilized.

Measures to secure adequate water flows

When watercourses are utilized, consideration is to be given to the natural functions of the hydrological cycle. This means that:

- Wherever water is utilized, residual water flows should be optimized with a view to preserving adequate aquatic habitats and other sensitive habitats dependent on water. If water is already being abstracted from watercourses, any remedial measures which may be required are to be taken.
- When buildings or installations are being planned, constructed or operated, disruptions to the flow regime or sediment transport are to be mitigated so as to promote the achievement of the development goals.
- Natural flow regimes and sediment transport rates are to be preserved as far as possible; if it is not possible for them to be preserved, they should be kept as near-natural as possible in terms of quality, quantity and seasonality in order to safeguard all the functions of the watercourse.


1

Example of good practice

Adequate water flows in the Kleine Emme river

Good solutions can be achieved by means of simple restoration measures (removal of hard bank reinforcements) and interconnection with tributaries via ramps and fish ladders. A model for half a dozen tributaries is the only remaining natural point where the Fontanne flows into the Kleine Emme [1], or natural riverbeds such as that at Witzigen [4].

On the lower reaches of the river, the benefits for the redesigned stretch of water below the Torenberg weir – with a discharge of 1,7 m^3 per second – are immediately apparent [3], compared with the former state [2].


2


3


4

With the aid of watershed planning for the Kleine Emme river, which stretches for 35 km, the canton of Lucerne is playing a pioneering role in watercourse protection. In this planning, modern principles of water pollution control and flood protection are taken into account. Planning for the drainage basin is based on an assessment of water use, hydrology, water quality, biology and eco-morphology, including barriers to fish migration. On the basis of this survey, the need for action has been determined. Possible measures include restoration work and the construction of fish ladders and bypasses to safeguard the ecological functioning of the watercourse.

One of the measures to be taken on the lower reaches of the Kleine Emme involves a new regime for the diversion of water from a series of three weirs for hydropower generation (Wolhusen, Torenberg and Emmenweid). The Torenberg weir (Switzerland’s first hydropower station) diverts 7 m^3 water per second, and to date the 2,9 km downstream stretch has carried no water for 132 days each year. At the Emmenweid weir, “drying-up” has occurred for 210 days a year. Watershed planning now provides for additional residual flows. An example is being set by the owner of the Torenberg weir (EWLE Lucerne): here, a supply of at least 1 m^3 per second is being discharged on a voluntary basis. In the future, when residual flows are guaranteed by means of fishways, the river will once again be barrier free. These limitations are also in the interests of the hydropower stations: the power generated can be attractively marketed with an ecolabel.
For more information on tourist-related aspects of the Kleine Emme river, see www.soerenberg.ch

Development goal: “Adequate water quality”

The third development goal is primarily concerned with reducing the levels of pollutants and nutrients entering our watercourses. The measures envisaged are designed to tackle the problem at source, thereby lowering the high costs associated with water pollution control.

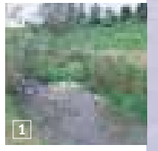
What does adequate water quality involve?

- Water temperature is at near-natural levels.
- Water, suspended matter and sediments either contain no persistent pollutants, or such substances are only present in harmless concentrations.
- Other substances that may enter water as a result of human activities do not adversely affect biological communities or the use of watercourses.

Measures for the achievement of adequate water quality

The prevention of water pollution or reduction of pollutant and nutrient inputs from domestic, industrial and commercial sources, as well as diffuse sources (agricultural run-off, air), is to be achieved primarily by measures taken “at source”. This means:

- At the community level, measures are to be taken to control the use of substances and treat wastewater using the best available techniques in order to prevent the release of pollutants and nutrients, or to ensure that inputs into water bodies are reduced to harmless levels.
- Production processes are to be designed and wastewater is to be treated using the best available techniques in such a way as to prevent the release of synthetic organic substances or heavy metals from trade and industry, or to ensure that inputs into water bodies are reduced to harmless levels.
- Levels of pollutants and nutrients from diffuse sources are to be reduced so as to prevent adverse impacts on watercourses. Specific measures in the agricultural sector include the following: establishment of extensively managed buffer strips, optimization of fertilizer balance on farms where livestock is kept, no-till management, extensification of grassland, reduced use of artificial fertilizers and pesticides, reduction of erosion and soil run-off through appropriate soil management (e.g. no-till and/or mulch-till systems).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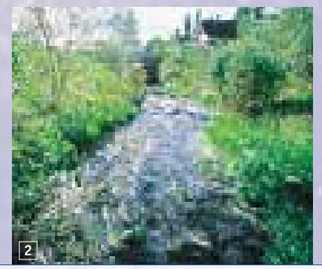
Example of good practice

Buffer zones reduce water pollution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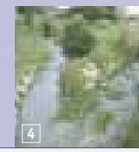
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As part of a programme of rehabilitation measures, buffer zones were established along the Lyssbach in the canton of Bern. Farmers are required to manage these zones extensively and receive financial compensation in return. Nitrate and phosphate inputs are thus reduced, enhancing both habitat and water quality.
Photos 1–4: Lyssbach, Canton of Bern

The new regulations concerning the area required for watercourses complement both the Ordinance on Environmentally Hazardous Substances and the Law on Water Pollution Control: the Ordinance provides for a buffer zone with a width of 3 m along watercourses, where the use of fertilizers and pesticides is prohibited. When the area required for a watercourse is determined, this zone may be widened if necessary.

Throughout Switzerland, dozens of examples can now be found of buffer zones along rehabilitated watercourses. Through partnerships between farmers, local and cantonal authorities, and environmental agencies, it is possible to achieve workable solutions adapted to local conditions.

Farmers receive payments for meeting required standards of ecological performance – which serves as an incentive. Under Article 62a of the Law on Water Pollution Control (concerning measures to prevent run-off and leaching of substances in agriculture), sufficient financial resources are available each year to resolve problems of water pollution control at the regional level.

For individual farming families, these subsidies offer major economic advantages. However, this system also benefits the national economy, as cantonal and federal expenditures on water pollution control are thus reduced by millions of francs each year. The principle of tackling the problem of nitrate and phosphate water pollution at source, i.e. by preventing inputs, pays off in the long term.

All pulling in the same direction

In the area of watercourse use, preservation and development, Switzerland possesses considerable know-how. With effective interdisciplinary cooperation between experts representing the concerns of river engineering, biology, ecology, agriculture, spatial planning and the economy, appropriate solutions can be achieved. This will not only benefit watercourses but serve the interests of society as a whole.

The "Guiding Principles for Swiss watercourses" seek to promote an integrated approach to watercourse management, indicating how problems can be successfully tackled. However, if they are to be effective and the development goals are to be achieved, these principles need to be put into practice by means of interdisciplinary cooperation between specialists in the fields of river engineering, ecology, spatial and landscape planning, and agriculture. Although these various experts will each have their own perspective, they should collectively have the ability to take a global view and to implement solutions that give due consideration to all the relevant interests. A key factor in this process will be collaboration between the federal, cantonal and communal agencies. Government agencies, which can draw on considerable know-how, are also responsible for ensuring that legal regulations are implemented, e.g. under the Law on Water Pollution Control, the Ordinance on Water Pollution Control (specification of water quality requirements), the Ordinance on Hydraulic Engineering (Article 21: cantonal obligation to determine the area required for watercourses) or the Ordinance on Environmentally Hazardous Substances (prohibitions and restrictions on the use of substances in the vicinity of watercourses). While these regulations set the general framework for the management of watercourses, they also leave some room for intelligent and innovative solutions. This leeway should be more effectively exploited. But actors in the private sector have an equally important role to play – industrial and environmental associations, and not least the parties directly concerned. All these players rightly wish to have a say; they should all not only participate in projects, but also take the initiative themselves. Likewise, they should all share in the satisfaction of seeing a solution successfully implemented.

In recent years, much valuable work has been done in watercourse projects throughout Switzerland: consideration has been given in many cases both to flood protection and environmental concerns, numerous restoration and rehabilitation projects have been carried out, and new flood protection concepts have been developed. Thanks to the efforts and commitment of a large number of experts from a wide range of disciplines, our watercourses have a living future ahead of them.

"At last, an integrated approach"

An agricultural perspective

"By adopting near-natural management practices, our farmers contribute to the good quality of watercourses. They are the expert partners for the appropriate use and management of riparian areas. Compensation – in the form of a fair level of subsidies – needs to be provided for these efforts made in the public interest."

René Weber,
Federal Office for Agriculture

A local authority perspective

"In our community, thanks to cooperation between the authorities, land owners and farmers, and conservationists, we have also helped to give the River Thur a future. Flood protection measures are in place wherever necessary, the river has regained its natural dynamics, and the landscape has been significantly enhanced for humans, plants and wildlife."

Benjamin Gentsch, mayor,
Neunforn (Canton of Thurgau)

A river engineering perspective

"Flood protection and ecology now go hand in hand, on the principle 'as soft as possible, as hard as necessary'. Increasingly, the current river engineering philosophy attaches equal importance to the needs of the public and of nature. As far as possible, the space required by watercourses is to be made available once again. This reduces the risk of flooding and at the same time gives nature a free rein."

Albert Hurni,
Civil Engineering Office,
Canton of Bern

A cantonal perspective

"Watercourse rehabilitation is not a luxury but a duty! Climate change and floods or long periods of low water levels remind us how important it is to preserve the natural dynamics of watercourses and adequate space for them. The Canton of Geneva has enshrined watercourse rehabilitation in the Cantonal Law on Water Bodies and resolved to make funds available for an action programme. We are proud to be contributing to the International Year of Freshwater."

Robert Cramer, State
Councillor, Canton of Geneva

An environmental perspective

"At last, an integrated approach is being adopted. We now have the opportunity to restore our most important watercourses to a near-natural state. This will benefit not only nature but also all of us, whether as consumers or as relaxation seekers."

Silva Semadeni, President of
Pro Natura Switzerland

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Bibliography (German)

- Synthesebericht Raumbedarf von Fliessgewässern, BWG, 2002
- Der Stickstoffhaushalt in der Schweiz, Konsequenzen für Gewässerschutz und Umweltentwicklung, Schriftenreihe Umwelt, Nr. 209, BUWAL, 1993
- Methoden zur Untersuchung und Beurteilung der Fliessgewässer: Ökomorphologie, Stufe F, Vollzug Umwelt, Mitteilungen zum Gewässerschutz, Nr. 27, BUWAL, 1998
- Mehr Raum für unsere Fliessgewässer, Pro Natura, 1999
- Strategie zur Reduktion von Stickstoffemissionen, Schriftenreihe Umwelt Nr. 273, BUWAL, 1996
- Wegleitung für den ökologischen Ausgleich auf dem Landwirtschaftsbetrieb, Landwirtschaftliche Beratungszentrale CH-8315 Lindau, 1999
- Evaluation der Ökomassnahmen und Tierhaltungsprogramme, Dritter Zwischenbericht, BLW, August 2000
- Restwassermengen in Fliessgewässern, Wasserentnahmen, die insbesondere der Bewässerung dienen (Kt. Bern), Vollzug Umwelt, Mitteilungen zum Gewässerschutz, Nr. 24, BUWAL 1997
- Raum den Fliessgewässern!, BWG/BUWAL/ARE, 2000 (leaflet)
- Mehr Raum und Dynamik für vernetzte Fliessgewässer, Fachbeitrag (in: Ingenieurbiologie, Nr. 3, 2000)
- Die Thur, Ein Fluss mit Zukunft für Mensch, Natur und Landschaft, Kantone Appenzell I.Rh., Appenzell A. Rh.,
- St. Gallen, Thurgau und Zürich, Bundesamt für Wasser und Geologie (2001)
- Instrumente zur Aufwertung von Fliessgewässern, PUSCH, Thema Umwelt 3/2002

Key legislation

- Water Pollution Control Law, Art. 1 (integrated perspective)
- Water Pollution Control Law, Art. 6–13 (wastewater treatment and sewerage)
- Water Pollution Control Law, Art. 14, 27 (farmyard manure and soil management)
- Water Pollution Control Law, Art. 29–36 (residual flows)
- Water Pollution Control Law, Art. 37, 38 (reinforcement and culverting)
- Water Pollution Control Law, Art. 62a (compensation for non-use)
- Hydraulic Engineering Law, especially Art. 3, 4, 7 (flood protection and river engineering requirements)
- Hydraulic Engineering Ordinance, Art. 21 (cantonal obligation to determine area required)
- Federal Law on the Protection of Nature and Cultural Heritage (requirements for specific nature and landscape protection, protection of landscapes and water bodies listed in inventories, e.g. alluvial zones, mire landscapes, mires)
- Environmental Protection Law (especially the associated Ordinance on Environmentally Hazardous Substances)
- Fisheries Law, especially Art. 7–10 (specification of requirements for habitat protection)
- Spatial Planning Law, especially Art. 3, 17 (general planning principles, designation of protected areas in land-use planning)
- Agriculture Law, Art. 70–77 (associated ordinances on direct payments and ecological subsidies)
- Water Pollution Control Ordinance, Appendix 1 (ecological goals for water bodies)
- Water Pollution Control Ordinance, Appendix 2 (requirements for water quality)

Photographs

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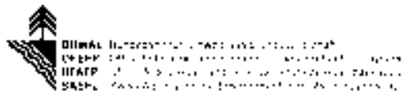

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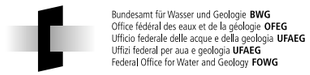

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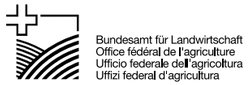

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