

# **Implementation of the Protocol on Water and Health in Switzerland**

**Status report 2010 - 2012**

**in accordance with article 7 of the Protocol**

## **Preamble**

The Protocol on Water and Health is an international instrument aimed at improving water management to reduce and prevent the spread of water-related diseases. Good management of the entire water cycle is vital to ensure that water intended for human consumption is of good quality and does not endanger consumers' health. The implementation of this instrument, which has been ratified by Parliament, is primarily the responsibility of the Federal Office of Public Health (FOPH) and the Federal Office for the Environment (FOEN). These two bodies work closely together in this field to achieve the objectives of the Protocol, on which progress reports are produced every three years.

This report provides useful information on the work done in Switzerland by the federal and cantonal authorities. It also gives an overview of water and sanitation projects that have been carried out under the terms set out in article 6 of the Protocol.

We hope that readers of this report will learn more about the multiple facets of water management which can, in various ways, affect human health. This holistic approach also shows that many groups are involved in ensuring that the guarantees required by the Protocol are fulfilled. Only concerted action among these groups will allow solutions to be found to the current issues related to drinking water.

This report also looks to the future. It contains a list of objectives showing the intentions of groups responsible for drinking water regulation in the years to come.

Let us hope that the subjects discussed will give readers an idea of all the work being done to ensure sustainable water and sanitation management in Switzerland.

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<b>Table of contents</b>	<b>Page</b>
1. General aspect	4
1.1. Publication of national targets	4
1.2. Coordination among the competent authorities	4
1.3. Strategic planning of the federal authorities in relation to water	4
1.4. Legislation on the provision of drinking water and sanitation	5
1.4.1. Federal constitution	5
1.4.2. Provisions at national level	5
1.4.3. Cantonal and communal provisions	6
1.5. Relevant international agreements	6
1.6. Cost-benefit analyses of projects undertaken	6
1.6.1. Wastewater treatment	6
1.6.2. Water supply	6
1.7. Public participation	7
1.8. Production of the status report	7
1.9. Decentralised water management	7
1.10. Emerging challenges in water management	7
1.10.1. National Research Programme on “Sustainable water management” (NRP 61)	7
1.10.2. Climate change and water	8
1.10.2.1. Water Supply 2025	8
1.10.2.2. Switzerland’s climate adaptation strategy - water sub-strategy	8
1.10.2.3. Research project: climate change and hydrology in Switzerland (CCHydro)	9
1.10.2.4. Summer drought	9
1.10.3. Micropollutants in waters	9
1.10.4. Micropollutants in drinking water	10
2. Common indicators	11
2.1. Quality of the drinking water supplied	11
2.1.1. Microbiological parameters	11
2.1.2. Chemical parameters of drinking water	12
2.1.3. Additional chemical indicators	15
2.2. Outbreaks of infectious diseases and incidents of water-related diseases	15
2.3. Access to drinking water	16
2.4. Connection to sanitation system	16
2.5. General condition of waters and water use	17
2.5.1. Water quality	17
2.5.1.1. Surface waters	17
2.5.1.2. Groundwater	19
2.5.2. Water use	21
3. Targets and target achievement: Review of the current situation	22
3.1. Drinking water quality [Art. 6, Paragraph 2 (a)]	22

3.2.	Reduction of the number and scale of outbreaks and incidents of water-related disease [Art. 6, Paragraph 2 (b)]	23
3.3.	Access to drinking water [Art. 6, Paragraph 2 (c)]	23
3.4.	Access to sanitation [Art. 6, Paragraph 2 (d)]	24
3.5.	Levels of performance in water supply [Art. 6, Paragraph 2 (e)] (FOEN)	24
3.6.	Levels of performance of collective systems and other systems for sanitation [Art. 6, Paragraph 2 (e)]	26
3.7.	Application of recognised good practice to the management of the water supply [Art. 6, Paragraph 2 (f)]	29
3.8.	Application of recognised good practice to the management of sanitation [Art. 6, Paragraph 2 (f)]	31
3.9.	Discharges of untreated wastewater [Art. 6, Paragraph 2 (g) (i)]	32
3.10.	Untreated storm water [Art. 6, Paragraph 2 (g) (ii)]	32
3.10.1.	Discharges of untreated storm water overflows	33
3.10.2.	Road run-off	33
3.11.	Quality of discharges from wastewater treatment installations [Art. 6, Paragraph 2 (h)]	33
3.12.	Disposal or reuse of sewage sludge [Art. 6, Paragraph 2 (i), first part]	34
3.13.	Quality of wastewater used for irrigation purposes [Art. 6, Paragraph 2 (i), second part]	34
3.14.	Quality of waters used as sources for drinking water [Art. 6, Paragraph 2 (j), first part]	34
3.14.1.	Groundwater	34
3.14.2.	Surface waters	37
3.15.	Quality of waters used for bathing (rivers and lakes) [Art. 6, Paragraph 2 (j), second part]	38
3.16.	Quality of waters used for aquacultures [Art. 6, Paragraph 2 (j), third part]	38
3.17.	Quality of waters used for swimming baths [Art. 6, Paragraph 2 (k)]	38
3.18.	Identification and remediation of particularly contaminated sites [Art. 6, Paragraph 2 (l)]	39
3.19.	Effectiveness of systems for the management, development, protection and use of water resources [Art. 6, Paragraph 2 (m)]	39
3.20.	Inspection of water supply companies on the basis of a risk analysis	42
4.	Overall evaluation	43
4.1.	Switzerland, a water tower for Europe	43
4.2.	Implementation of the Protocol on Water and Health in Switzerland	43
4.3.	Data on water quality	43
4.4.	Raising public awareness	44
4.5.	Research and education	44
4.6.	National cooperation	45
4.7.	International cooperation	46
4.7.1.	International Year of Water Cooperation: Guide to water cooperation for communes	46
4.7.2.	Protocol on Water and Health and sustainability indicators	46
4.7.3.	International commissions	47
5.	Information on the persons preparing the report	48
6.	References	49

# **1. General aspect**

## **1.1. Publication of national targets**

Switzerland ratified the Protocol on Water and Health in 2006. This Protocol is supported by the Regional Office for Europe of the World Health Organisation (WHO/EURO) and the United Nations Economic Commission for Europe (UNECE).

An initial preliminary report was prepared and published by the Federal Office for the Environment FOEN and the Federal Office of Public Health FOPH in April 2010. This document, which is available on the Internet<sup>1</sup>, examined the various current issues related to water management in relation to health in Switzerland. This holistic approach allowed the work being done in this area by the federal and cantonal authorities to be highlighted.

The targets set at this time were not officially published outside this preliminary report. However, it is interesting to review what has happened over the past three years in respect of the topics which had been presented and for which targets had been set. Sections 2 and 3 of this report do this by examining the activities described under article 6 of the Protocol (section a to section m).

## **1.2. Coordination among the competent authorities**

The Swiss authorities have not set up an additional coordination group dedicated to activities related to the Protocol, as this comes within the remit of the Federal Office of Public Health FOPH. The federal and cantonal authorities regularly attend meetings of the working groups described in section 4 to discuss current water-related issues.

The purpose of the work done by these various working groups is to ensure excellent drinking water quality and optimum wastewater management for the long term. The work done will be described in detail in section 3. Strategic planning of the federal authorities in relation to water

## **1.3. Strategic planning of the federal authorities in relation to water**

Most of the water-related objectives for the coming years in the strategic plans of the FOPH, the FOEN, the FOAG, the SDC and the SECO have been set independently of the Protocol.

The FOPH strategy for drinking water<sup>2</sup> describes targets for drinking water based on the Protocol and other more extensive targets independently of the Protocol. This strategy is designed to improve information about drinking water in Switzerland and provide a better flow of information on matters such as drinking water quality. Another aim is to increase cooperation with stakeholders in Switzerland and other countries.

In the areas of water protection and sanitation, which come under the responsibility of the FOEN, various projects and strategies concerned with issues of water and health and launched independently of the Protocol are on-going. Specific projects initiated in this area by the FOEN are "Water Supply 2025"<sup>3</sup> (see chap. 3.5) and "Sanitation 2025"<sup>4</sup> (see section 3.6), which analyse the challenges and options for action in respect of these two issues over the coming decades.

In respect of micropollutants in waters, the FOEN is monitoring both local and diffuse contamination. Information from the "Micropoll Strategy" (see Switzerland's 2010 report) has been published in a report<sup>5</sup>.

Environmental targets for agriculture have been specified jointly by the FOEN and FOAG<sup>6</sup> with the aim of maintaining good water quality in the long term.

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<sup>1</sup> Protocol on Water and health: <http://www.bag.admin.ch/themen/lebensmittel/04858/04864/04905/index.html?lang=en>

<sup>2</sup> FOPH 2009

<sup>3</sup> FOEN 2013

<sup>4</sup> Maurer et al. 2012

<sup>5</sup> Gälli et al. 2009

A national research programme on "Sustainable water management" is also under way. This programme addresses the future challenges for Swiss water management, particularly in connection with climate change<sup>7</sup> (see section 1.10).

Finally, the activities of the SDC in connection with water, through various forms of international cooperation, should be mentioned at this point (see section 4.7).

#### **1.4. Legislation on the provision of drinking water and sanitation**

At federal level, water use and management and associated issues are primarily regulated in the Federal Constitution of the Swiss Confederation of 18 April 1999 (FC; SR 101), the Federal Act of 24 January 1991 on the Protection of Waters (GSchG; SR 814.20) and the Water Protection Ordinance of 28 October 1998 (GSchV; SR 814.201), the Federal Act of 9 October 1992 on Foodstuffs and Utility Articles (Foodstuffs Act, LMG; SR 817.0), the corresponding implementing ordinances and in the Ordinance of 20 November 1991 on Drinking Water Supply in Emergencies (VTN; SR 531.32)<sup>8</sup>.

Accordingly, in Switzerland, many of the legal bases required for meeting the obligations arising from the ratification of the Protocol are already in place. Like all legal amendments in Switzerland, these legal bases are subject to optional referendum and have been confirmed accordingly.

##### **1.4.1. Federal constitution**

According to Article 76 of the FC, the Confederation shall, within the scope of its powers, ensure the economic use and the protection of water resources and lay down principles on the conservation and exploitation of water resources. It shall legislate on water protection (Art. 76 para. 1-3 FC). The cantons shall manage their water resources and may levy charges for the use of water subject to the limits imposed by federal legislation (Art. 76 para. 4 FC)<sup>9</sup>. According to Article 97 of the FC, the Confederation shall take measures to protect consumers, and according to Article 118, it shall legislate on the use of foodstuffs.

##### **1.4.2. Provisions at national level**

The Water Protection Act (GSchG) and the Water Protection Ordinance (GSchV) constitute the **water protection legislation** of Switzerland at national level.

The Water Protection Act contains provisions on comprehensive and use-related measures for protecting waters. In addition to a general prohibition on the pollution of waters (Art. 6 GSchG) and other regulations for maintaining the quality of waters, the Water Protection Act also regulates the spatial planning related to groundwater protection. The law envisages the designation of water protection areas, groundwater protection zones and groundwater protection areas in which measures are taken to protect water catchment installations in both quantitative and qualitative respects<sup>10</sup>.

The Ordinance on the Safeguarding of the Drinking Water Supply in Emergencies (VTN) regulates the supply of drinking water in times of crisis and states that the cantons and water supply companies should maintain the regular drinking water supplies for as long as possible, rapidly resolve possible shortcomings and ensure that sufficient drinking water is available for survival at all times.

Since drinking water is considered a foodstuff in Switzerland it is covered by the legislation on foodstuffs. This includes the Foodstuffs Act<sup>11</sup> and the corresponding ordinances. Drinking water is also covered by the Ordinance on Foodstuffs and Utility Articles<sup>12</sup>, the Hygiene Ordinance<sup>13</sup>, the Ordinance on Contaminants and Constituents in Foodstuffs<sup>14</sup> and the Ordinance on Drinking, Spring and Mineral

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<sup>6</sup> FOEN et FOAG 2008

<sup>7</sup> <http://www.nfp61.ch/F>

<sup>8</sup> Eawag 2009

<sup>9</sup> Eawag 2009

<sup>10</sup> Eawag 2009

<sup>11</sup> Foodstuffs Acts from Octobre 9, 1992, RS 817.0

<sup>12</sup> Ordinance on Foodstuffs and Utility Articles from Novembre 23, 2005, RS 817.02

<sup>13</sup> Ordinance on Hygien from Novembre 23, 2005, RS 817.024.1

<sup>14</sup> Ordinance on Contaminants and Constituents in Foodstuffs, rom June 26, 1995, RS 817.021.23

Water<sup>15</sup>. The quality requirements for drinking water are laid down in the Ordinance on Drinking, Spring and Mineral Water (general requirements), the Hygiene Ordinance (bacteriological requirements) and the Ordinance on Contaminants and Constituents in Foodstuffs (chemical requirements). Additionally, a key element of the Foodstuffs Act, namely self-monitoring, also applies to water supplies. According to Art. 49 of the Foodstuffs and Utility Articles Ordinance, the following are important instruments of self-monitoring: (a) the assurance of good practices (Good Hygiene Practice, Good Manufacturing Practice), (b) the application of procedures based on principles of the HACCP concept, (c) traceability and (d) the sampling and analysis of foodstuffs and utility articles.

Finally, the Federal Act on Spatial Planning (RPG, SR 700) regulates issues such as the protection of natural resources (air, soil, water, forest, landscape) and guarantees an adequate infrastructural provision throughout the country (Art. 1). According to Art. 93 of the Federal Act on Agriculture (LwG, SR 910.1) water supply and sanitation infrastructure in rural regions (in particular in mountain regions) can be financially supported by federal contributions or investment credits.

### **1.4.3. Cantonal and communal provisions**

Cantonal and communal provisions can supplement and specify the federal legislation. The existing cantonal legislation on water provision varies considerably. Some cantons have laws and ordinances which are concerned only with water use or water supply, while in other cantons, the water supply is regulated differently, for example in the cantonal Fire Protection Ordinance. Details concerning the water supply are also often legislated at communal level<sup>16</sup>.

Sanitation at cantonal level is regulated in enforcement provisions to the national Water Protection Act, which implement the national water protection legislation at cantonal level. These provisions are usually specified in the form of an introductory act to the national Water Protection Act. Here too, the provisions vary widely from canton to canton.

### **1.5. Relevant international agreements**

At international level, Switzerland has entered into legally binding commitments within the framework of its membership of international water protection commissions. In addition to its efforts for maintaining the quality of its own waters, Switzerland fulfils its responsibilities by actively participating in international commissions, specifically: the International Commission for the Protection of the Rhine<sup>17</sup> (ICPR), the International Commission for the Protection of Lake Constance<sup>18</sup> (IGKB), the International Commission for the Protection of the Waters of Lake Geneva<sup>19</sup> (CIPEL), the International Commission for the Protection of Italian-Swiss Waters<sup>20</sup> (CIP AIS) and the Commission for the Protection of the Marine Environment of the North-East Atlantic<sup>21</sup> (OSPAR) (see section 4.7.3).

### **1.6. Cost-benefit analyses of projects undertaken**

#### **1.6.1. Wastewater treatment**

A survey conducted in 2010 into the costs and quality of service of public wastewater management in Switzerland<sup>22</sup> showed that the quality of wastewater treatment had improved again in the past few years with no increase in overall costs.

#### **1.6.2. Water supply**

A water supply benchmarking study<sup>23</sup> showed that the relevant factor affecting the cost of drinking water in CHF/m<sup>3</sup> is the specific network output in m<sup>3</sup>/km x year<sup>24</sup>. This is why large water supply companies

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<sup>15</sup> Ordinance on Drinking, Spring and Mineral Water from 2005, RS 817.022.102

<sup>16</sup> Eawag 2009

<sup>17</sup> [www.iksr.org](http://www.iksr.org)

<sup>18</sup> [www.igkb.org](http://www.igkb.org)

<sup>19</sup> [www.cipel.org](http://www.cipel.org)

<sup>20</sup> [www.cipais.org](http://www.cipais.org)

<sup>21</sup> [www.ospar.org](http://www.ospar.org)

<sup>22</sup> VSA 2011

<sup>23</sup> Kappeler 2010

with a dense connection structure tend to offer their customers lower fees and charges than smaller ones, even though they incur higher water acquisition and treatment costs. The fee structure of Swiss water supplies is highly variable. Charges paid at regular intervals usually comprise a fixed standing charge and a price based on volume. The SGWA has issued recommendations (W1006) on the funding of water supplies, laying down principles for cost calculation and for the calculation of fees and charges based on usage. As water supply companies have high fixed costs, the recommendations are that 50 % to 80 % of the costs should be covered by standing charges and 20 % to 50 % by prices based on volume. Water supply companies are generally supposed to be not-for-profit bodies. This means that the fees they charge must cover all their costs, but they must not actually make a profit.

### **1.7. Public participation**

The political system in Switzerland is characterised by direct democracy and federalism. The peoples' right of codetermination includes voting, initiative, referendum and petition rights<sup>25</sup>. Accordingly, the Swiss population is actively involved in framing legislation. This is achieved at national and cantonal level via compulsory and optional referendums and by people's initiatives. Likewise at cantonal and communal level, the population frequently decides on specific projects, e.g. budgets, project loans etc. It should be emphasised that in Switzerland drinking water management is essentially a public service undertaking.

### **1.8. Production of the status report**

The FOPH is responsible for management of the Protocol on Water and Health. This federal office, which is in particular responsible for drinking water legislation, is in charge of coordinating the implementation of the Protocol in Switzerland. The FOEN was called on to make a significant contribution to the production of this report, as it is responsible for all issues relating to water management and sanitation. Other cantonal bodies, primarily the cantonal laboratories, were also involved in providing the information needed to produce this report, since under the Swiss federal system water belongs to the cantons. The names of the authors most closely involved in drafting the report are given in section 5.

### **1.9. Decentralised water management**

It is important to stress that under our federal system water belongs to the cantons, which can delegate their powers to the communes which normally act as water distributors. The communes are required to comply with statutory federal requirements and are overseen by the cantonal authorities (consumer department or environmental department) responsible for ascertaining whether the self-monitoring system set up by each water distributor is acceptable.

### **1.10. Emerging challenges in water management**

#### **1.10.1. National Research Programme on "Sustainable water management" (NRP 61)**

The national research programme on "Sustainable water management" (NRP 61<sup>26</sup>) is elaborating scientific principles and methods for the sustainable management of water resources, for which demand is growing all the time. NRP 61 is determining the effects of climate change and social change on this resource, and identifying the risks and future conflicts associated with its use. It is developing strategies to ensure the sustainable and integrated use of water resources in the future.

The aims of NRP 61 are:

- to devise scientifically proven principles, methods and strategies capable of finding solutions to future challenges with regard to the use of water resources;
- to study the effects of climate change and social change on water resources;
- to examine the management of risks and conflicts related to use from a global perspective;
- to develop effective and sustainable water resource management systems.

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<sup>24</sup> if losses are very high for equivalent amounts of water entering the network, then the cost per cubic metre rises accordingly

<sup>25</sup> More informations available under « The Swiss Confederation - A brief guide» (Federal Chancellery 2013)  
<http://www.bk.admin.ch/dokumentation/02070/index.html?lang=en>

<sup>26</sup> <http://www.nfp61.ch/D/portrait/Seiten/default.aspx>

The programme was launched in 2010 with CHF 12 million in funding to cover four years of research. A summary of the projects will be published in summer 2014 once they have been completed.

### **1.10.2. Climate change and water**

#### **1.10.2.1. Water Supply 2025**

In order to ascertain whether Swiss public water supplies are equipped to deal with the challenges of climate change, the Federal Office for the Environment has commissioned a survey of water supplies in Switzerland as a preliminary study to the project Water Supply 2025. The key topics addressed in this study were infrastructure, organisation, financial aspects, quantity and quality of water resources, and drinking water treatment technologies<sup>27</sup>.

Concrete targets and measures were attended with the main water supply project 2025. The project shows that in particular the implementation of the following propositions lead to a sustainable water supply<sup>28</sup>:

Proposition 1: The canton knows its water resources, their quantitative and qualitative state, the existing uses and the hazards of resources.

Proposition 2: The canton cares the realisation of regional water supply planning. It takes into account the environmental aspects of the water supply, the threat to the resources in terms of quality and quantity, the current and future water demand due to the expected development of the population and the economy. It coordinates its planning with neighboring cantons.

Proposition 3: Each water supply covers its requirements from at least two independent water resources, taking into account the predominant hazards<sup>29</sup>.

Proposition 4: Every water supply knows their specific risks (e.i. rockfall, flooding, accidents involving substances hazardous to water) and aimed for risk reduction.

Proposition 5: The water supplier has a control of the maintenance of its infrastructures, guaranteeing their proper functioning. It also performs a systematic accounting system in order to cover the necessary investments.

Proposition 6: The Confederation promotes the modernization and professionalization of the water supplies.

Proposition 7: The federal government sets a minimum standard for the collection and management of data on water use and for a harmonized data and information exchange.

The implementation these propositions will be elicited in a next phase

#### **1.10.2.2. Switzerland's climate adaptation strategy - water sub-strategy**

Climate change is affecting the environment, the economy and society in Switzerland as in other countries. Action to deal with these effects is already needed now, and will be even more important in the future. To this end the Federal Council adopted the first part of its adaptation strategy in March 2012. Within it, aims and principles for adaptation are set out, and the major multi-sectoral challenges related to adaptation at national level are described<sup>30</sup>.

The FOEN's contribution to the water aspect of the climate adaptation strategy takes the form of a sub-strategy in which areas for action, options and objectives for the water sector are identified. Climate-

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<sup>27</sup> EAWAG (Hrsg.) 2009. Wasserversorgung 2025 – Vorprojekt Standortbestimmung im Auftrag des FOEN.  
[http://library.eawag.ch/EAWAG-Publications/openaccess/Eawag\\_05587.pdf](http://library.eawag.ch/EAWAG-Publications/openaccess/Eawag_05587.pdf)

<sup>28</sup> FOEN 2013

<sup>29</sup> Water suppliers in remote areas that have no exploitable and economically viable alternative catchings, can only undertake a few actions to strengthen their supply security within the meaning of the proposition 3

<sup>30</sup> <http://www.bafu.admin.ch/publikationen/publikation/01673/index.html?lang=de>



related changes to the water cycle affect all parts of the water sector. Action is needed as a result of possible changes such as lower discharge at certain times of the year, more frequent drought and low water levels in summer, higher water temperatures and more frequent flooding. The change in water availability may lead to conflicts over use. The next step is to devise a plan of action in which measures to adapt to climate change are set at national level<sup>31</sup>.

The Swiss Gas and Water Industry Association, SGWA, has published a set of practical guidelines for water supply companies on strategic planning for climate adaptation, under the title "Klimaänderung und Wasserversorgungen - Informationen und Anpassungsstrategien" [Climate Change and Water Supplies - Information and Adaptation Strategies].

#### **1.10.2.3. Research project: climate change and hydrology in Switzerland (CCHydro)**

The FOEN has commissioned an investigation into the effects of climate change on Switzerland's water supplies up till the year 2100 as part of a research project on climate change and hydrology in Switzerland (CCHydro). The results show that Switzerland's discharge regime will change and that the pattern of discharge over the year will eventually alter. Flooding is likely to be more common, and low water levels are extremely likely. The investigation will allow Switzerland to prepare for change before it occurs<sup>32</sup>.

#### **1.10.2.4. Summer drought**

Increasingly frequent summer droughts present a significant challenge. Switzerland has enough water now, and will continue to do so in the future. However, long periods of dry weather in summer are increasingly likely to occur in the future, which means that there may be temporary local or regional shortages. In response to a political initiative, efforts are now being made to find solutions and options for the management of water resources to help the Swiss water sector prepare for these developments and deal with local shortages in the short and long term<sup>33</sup>.

The measures that are relevant in the context of this report are summarised in the sections dealing with the targets in question in the form of a declaration of intent (proposed target). Comments on how far the targets have been achieved will be made in the next triennial report.

#### **1.10.3. Micropollutants in waters**

Action taken by some communal wastewater treatment plants (WWTP) should reduce the discharge of micropollutants (pharmaceuticals and chemicals) into waters in order to protect drinking water resources and aquatic flora and fauna<sup>34</sup>. At the same time the FOEN is preparing an examination of the issue at a national level in respect of diffuse sources<sup>35</sup>. This will form the basis for a comprehensive micropollutant survey and assessment plan, specific proposals to reduce micropollutant levels, and provide scientific data to help increase understanding of the system.

#### **Micropollutants from municipal drainage**

Various work carried out over the past few years has shown that treated communal wastewater in the densely populated parts of Switzerland makes a significant contribution to water contamination by micropollutants. This discharge can be further reduced by expanding existing wastewater treatment plants. Sophisticated pilot trials carried out as part of the "Micropoll Strategy" project showed that more

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<sup>31</sup> Internet: <http://www.bafu.admin.ch/klimaanpassung/11529/11624/11782/index.html?lang=de>; siehe dort Link auf den Bericht: [http://www.bafu.admin.ch/klimaanpassung/11529/11624/11782/index.html?lang=de&download=NHZLpZeg7t,Inp6l0NTU042l2Z6ln1acy4Zn4Z2qZpnO2YUq2Z6gpJCGe4J,fWym162epYbg2c\\_JjKbNoKSn6A--](http://www.bafu.admin.ch/klimaanpassung/11529/11624/11782/index.html?lang=de&download=NHZLpZeg7t,Inp6l0NTU042l2Z6ln1acy4Zn4Z2qZpnO2YUq2Z6gpJCGe4J,fWym162epYbg2c_JjKbNoKSn6A--)

<sup>32</sup> FOEN website: <http://www.bafu.admin.ch/wasser/01444/01991/10443/index.html?lang=de>; Synthesebericht (auch auf englisch verfügbar): <http://www.bafu.admin.ch/publikationen/publikation/01670/index.html?lang=en>

<sup>33</sup> <http://www.bafu.admin.ch/wasser/01444/01991/12442/index.html?lang=de>.

Internet: <http://www.bafu.admin.ch/klimaanpassung/11529/11550/11611/index.html?lang=de>

<sup>34</sup> <http://www.bafu.admin.ch/gewaesserschutz/03716/11218/11223/index.html?lang=de>

<sup>35</sup> <http://www.bafu.admin.ch/gewhptp://www.bafu.admin.ch/gewaesserschutz/03716/11217/index.html?lang=de>

advanced techniques such as powdered activated carbon adsorption or ozonation can significantly improve water quality<sup>36</sup>.

Around a hundred Swiss wastewater treatment plants (WWTP) need to be upgraded so that they can apply these processes and thereby halve the levels of micropollutants entering waters via treated wastewater. The Federal Council has proposed special funding to cover 75 per cent of the start-up costs: all Swiss WWTPs will pay a levy based on the number of customers they have. The necessary legal basis will be created by an amendment to the Water Protection Act (GSchG). The consultation process on this proposed amendment to the law finished at the end of August 2012 (see also section 3.6). The Federal Council and Parliament are not likely to vote on the proposal before summer 2013.

### **Micropollutants in waters from diffuse sources**

The FOEN is currently engaged in a long-term project aimed at reducing and preventing the discharge of micropollutants into waters from diffuse sources. It is investigating the following issues:

- **Situational analysis:** production of a survey of diffuse sources and substance groups entering surface waters from these sources, and an initial assessment of the relevance of various combinations of sources and substance groups.
- **Survey and assessment method:** establishing the principles to be used to survey and assess micropollutants in surface waters from diffuse sources.
- **Scientific principles:** research projects are to be carried out to plug gaps in knowledge that are relevant to the project.

#### **1.10.4. Micropollutants in drinking water**

The detection of micropollutants in drinking water has led the federal authorities to publish a guide for use in assessing these unregulated foreign substances. This assessment of substances that have recently been identified and whose toxicity is not known is based on the TTC concept. This concept takes account of the precautionary principle and sets a maximum threshold for potentially genotoxic substances (around 0.1 µg/litre) and another threshold for all other substances (100 µg/litre).

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<sup>36</sup> <http://www.bafu.admin.ch/publikationen/publikation/01661/index.html?lang=de>

## 2. Common indicators

These indicators are closely related to the areas under Article 6, paragraph 2 of the Protocol, for which targets should be set. Data for Switzerland regarding these indicators are presented below in the sequence specified in the format for summary reports under the Protocol on Water and Health.

### 2.1. Quality of the drinking water supplied

Drinking water distribution infrastructure started to be built at the end of the nineteenth century. Wastewater treatment also began in the second half of the twentieth century, starting with the major towns. At present, practically the entire Swiss population has access to high-quality drinking water. The same applies to wastewater, which is properly treated before being released back into the environment (see section 3.6).

Unless otherwise mentioned, all figures refer to the sum of rural and municipal water supplies.

Since the indicator parameters for drinking water are not monitored across Switzerland as a whole, we must rely on data from official controls undertaken by the cantons. The nationwide statistics on food controls (including drinking water) are based on these data and are managed by the FOPH<sup>37</sup>. These controls do not amount to monitoring, but are to some extent risk-based controls, which can lead to an unrepresentatively high proportion of samples that exceed the tolerance or limit values. Moreover, the FOPH statistics do not allow quality data to be obtained on the individual parameters, but merely provide a brief overview of the number of samples that have been the subject of complaints because of their microbiological status or chemical components or contaminants.

Further details of the results of the analyses conducted in connection with official controls can be found in the annual reports of the cantonal laboratories. However, since the reporting differs from canton to canton, it is difficult, or even impossible, to produce a nationwide compilation of the data.

Remark on tolerance and limit values: According to Art. 10, paragraph 2 of the Foodstuffs Act (LMG), limit value refers to the maximum concentration for foreign substances and components or the maximum quantities of micro-organisms or additives specified on the basis of a toxicological and epidemiological assessment. By contrast, tolerance value refers, according to Art. 10, paragraph 3 of the LMG, to specified maximum concentrations or amounts which are lower than absolutely necessary for the protection of health.

#### 2.1.1. Microbiological parameters

The following data are derived from the national statistics on the basis of the official cantonal controls. It cannot be determined, on the basis of the statistical data, how many of the existing water supplies across the whole of Switzerland were checked in the respective years or what percentage of the population is covered by these supplies.

In samples that were faulted because of their microbiological status, the tolerance value specified in the Hygiene Ordinance for Drinking Water was exceeded for at least one of the following three parameters: *E. coli*, Enterococci and aerobic mesophilic bacteria (AMB). The following tolerance values apply:

<i>E. coli</i>	not detectable/100 ml
Enterococci	not detectable/100 ml
AMB at the catchment installation, untreated	< 100 CFU/ml
AMB at the catchment installation, treated	< 20 CFU/ml
AMB in the distribution network	< 300 CFU/ml

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<sup>37</sup> <http://www.bag.admin.ch/themen/lebensmittel/04865/06680/index.html?lang=fr>

Sum parameter	Tolerance value <sup>38</sup>	Value in 2005 <sup>39</sup>	Value in 2008 <sup>40</sup>	Current value (2011) <sup>41</sup>
Number of samples complained about due to microbiological status <sup>42</sup> / total number of investigated samples (in %)	see text	3234 / 45,223 (7.2 %)	2068 / 40,807 (5.1 %)	1993 / 36,699 (5.4 %)

**Conclusion:** In terms of microbiological parameters, the drinking water quality can be rated as good. However, currently, no detailed national overview is available for each microbiological parameter tested, in particular to differentiate between the total number of microbes and *E. coli*.

### 2.1.2. Chemical parameters of drinking water

#### Total samples complained about on the basis of chemical parameters

The FOPH statistics allow statements to be made about the total samples queried on the basis of chemical parameters<sup>43</sup>. As regards the quality of the data, it must be said that it is highly likely that different parameters, or not all parameters, were measured across the total number of samples counted, i.e. 45,223, 40,807 and 36,699 respectively, certainly resulting in percentages on the low side. Again, the percentage of the population covered by these statistics is not documented here.

Sum parameter	Value in 2005	Value in 2008	Current value (2011)
Number of samples faulted due to constituents and contaminants / total number of investigated samples (in %)	356 / 45,223 (0.8 %)	223 / 40,807 (0.5 %)	198 / 36,699 (0.5 %)

**Conclusion:** In terms of chemical parameters, the drinking water quality can be rated as very good. However, currently no detailed nationwide overview is available for each parameter investigated.

#### Figures for the individual chemical indicators

Data on the individual chemical indicators can only be obtained with difficulty in some cases since these are managed by the cantons or water suppliers and have not yet been imported into a nationwide database for Switzerland.

Data obtained as part of the National Groundwater Monitoring NAQUA<sup>44</sup> (see section 2.5.1.2) provide an overview of the situation in Switzerland. However, these findings relate to groundwater, not drinking water, and it should also be borne in mind that not all the catchment installations examined are used to provide drinking water. But as 80 % of drinking water in Switzerland comes from groundwater<sup>45</sup>, some preliminary conclusions as to the quality of drinking water can be drawn from these data. It is clear that, depending on how water is treated or how water from different sources is mixed, concentrations in drinking water can differ from those present in untreated water.

<sup>38</sup> Tolerance value from the ordinance on hygien; RS 817.024.1

<sup>39</sup> Statistics from FOPH : <http://www.bag.admin.ch/themen/lebensmittel/04865/06680/index.html?lang=fr>

<sup>40</sup> <http://www.bag.admin.ch/themen/lebensmittel/04865/06680/index.html?lang=fr>

<sup>41</sup> <http://www.bag.admin.ch/themen/lebensmittel/04865/06680/index.html?lang=fr>

<sup>42</sup> *E. coli*, enterococci, aerobic mesophilic bacteria(AMB)

<sup>43</sup> Datas from reports of cantonal laboratories:

<http://www.bag.admin.ch/themen/lebensmittel/04865/06680/index.html?lang=fr>

<sup>44</sup> FOEN/Federal office of geology 2004 et FOEN 2009

<sup>45</sup> SWGA 2009

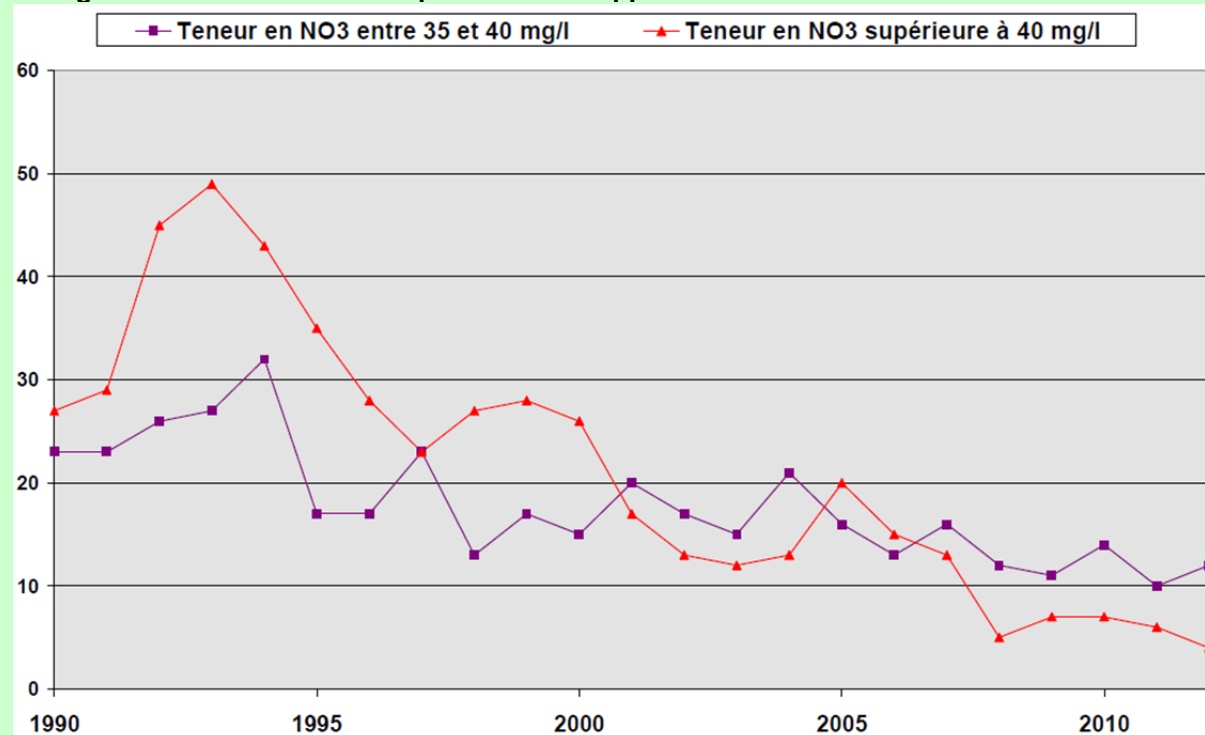
## Nitrate and nitrite

Statistics on the presence of nitrate in drinking water are only available for a small number of cantons. As an illustration, here is a summary of the analyses conducted by the cantons of Berne and Vaud<sup>46</sup>. These two cantons together cover a good fifth of the Swiss population (1.8 million inhabitants out of a total of 8.1 million). These cantons are also representative of Switzerland in respect of the town-country ratio.

Substance	Tolerance value <sup>47</sup>	Value in 2005	Value in 2008	Current value (2012)
<b>Nitrate: proportion of installations in which the tolerance value was exceeded</b>	40 mg/l	3 %	1 %	1 %

A number of drinking water catchments were abandoned due to excessive nitrate values. Regarding nitrite, the tolerance value is set at 0.1 mg / l for drinking water<sup>48</sup>.

**Change in the nitrate content of public water supplies in the canton of Vaud from 1990 to 2012**



The canton of Vaud had 740,000 inhabitants and 439 water distribution networks in 2012. The steady improvement seen since 1995 is linked to the introduction of integrated agricultural production, considerable work by the authorities to upgrade wastewater treatment facilities, and the closure of some resources. At present, almost 15,000 inhabitants of the canton may be exposed to nitrate levels of 30 mg/l or above.

Source: 2012 report of activities by the Consumer and Veterinary Affairs Department<sup>49</sup>

<sup>46</sup> Canton of Vaud 2010 ;Cantonal lab of Bern 2009 and 2006

<sup>47</sup> Tolerance value of the ordinance on Hygien ; RS 817.024.1

<sup>48</sup> Tolerance value according to the Ordinance on foreign substances and components,RS 817.021.23

<sup>49</sup>[http://www.vd.ch/fileadmin/user\\_upload/organisation/dse/scav/inspection/Rapport\\_d\\_activit%C3%A9s\\_2011\\_-\\_Inspection\\_des\\_eaux.pdf](http://www.vd.ch/fileadmin/user_upload/organisation/dse/scav/inspection/Rapport_d_activit%C3%A9s_2011_-_Inspection_des_eaux.pdf)

## Lead and trace elements

As regards various trace elements in drinking water, data are available for the canton of Berne for the year 2005. 167 drinking water samples were tested for 56 different trace elements. The following were of particular interest: aluminium, arsenic, lead, cadmium, chromium, copper, mercury, selenium and zinc. Maximum values are specified for these elements in the Ordinance on Contaminants and Constituents in Foodstuffs (FIV). The contents measured were all well below these maximum values<sup>50</sup>.

Elevated levels of heavy metals occur in drinking water as a result of domestic installations and fittings, mainly in new buildings. Cantonal chemists have found lead in the drinking water in new domestic installations<sup>51</sup>. Only a small amount of data is available on this subject however<sup>52</sup>. As far as lead is concerned, it should be mentioned that, according to Art. 4 of the Ordinance on Consumer Goods<sup>53</sup>, lead piping and lead-containing fittings are not permitted in Switzerland.

### The example of the canton of Aargau

In 2008, risk-based measurements of lead and antimony were carried out in drinking water installations downstream of shooting ranges in the canton of Aargau. They support the above statements on groundwater contamination<sup>54</sup>.

## Arsenic

Very limited amounts of arsenic occur locally in Switzerland, primarily in crystalline rocks in the Lower Valais, Sottoceneri, the Engadine and Poschiavo, and in isolated cases in iron-rich limestone in the Jura and the edge of the Alps. However, drinking water analyses in the cantons concerned, i.e. Ticino, Valais and Graubünden, produced arsenic levels above the Swiss limit value of 50 µg/l only in rare cases<sup>55</sup>. In these cases the drinking water catchment installations were closed or the drinking water was diluted<sup>56</sup>. Whereas the limit value in the EU and the USA is 10 µg/l, and the WHO also recommends this value, the current limit in Switzerland is 50 µg/l. A reduction in this limit value will be sought in the medium term<sup>57</sup>. A change in the limit value from 50 µg/l to 10 µg/l will cause problems for various communes in Valais, Ticino and Graubünden, where arsenic concentrations between 10 and 50 µg/l are found. In Valais some 14,000 people would be affected<sup>58</sup>, and 5,000 in Ticino<sup>59</sup>. The number of people affected in the canton of Graubünden is not known<sup>60</sup>. Overall, therefore, less than 0.5 per cent of the Swiss population is affected.

## Fluoride

No national overview of fluoride concentrations in drinking water is available.

### Examples in Aargau and Vaud

<sup>61</sup> Throughout the canton, concentrations of fluoride above the limit of detection of 0.1 mg/l have been found in just 8 drinking water installations. The maximum concentration recorded in these 8 installations during the measuring period 2005 to 2010 was 1.1 mg/l, the median concentration 0.3 mg/l.

The population of the canton of Aargau (598,920 inhabitants) is supplied with drinking water from 273 water supplies.

<sup>50</sup> Cantonal laboratory of Bern 2006

<sup>51</sup> Walker 2006

<sup>52</sup> Eawag 2009

<sup>53</sup> Ordinance on Foodstuffs and Utility Articles, 2005, RS 817.023.21

<sup>54</sup> Jahresberichte des Amtes für Verbraucherschutz:

<https://www.ag.ch/de/dgs/verbraucherschutz/jahresberichtepublikationen/jahresberichtepublikationen.jspf>

<sup>55</sup> Pfeifer et consorts 2000, FOPH 2005

<sup>56</sup> Pfeifer & Zobrist 2002

<sup>57</sup> Personal communication from Urs von Gunten (Eawag) in Eawag 2009

<sup>58</sup> Schultz 2003

<sup>59</sup> Pfeifer & Zobrist 2002

<sup>60</sup> Pfeifer & Zobrist 2002

<sup>61</sup> Personal communication from Irina Nüesch (canton of Aargau)

Tests performed on 439 distribution networks in the canton of Vaud (721,561 inhabitants at the end of 2011) in 2012 found the highest level to be 0.37 mg/l. Thirty networks were found to be supplying water with a fluoride content between 0.10 and 0.16 mg/l. The fluoride content of the water supplied by the other 408 networks was below 0.10 mg/l. Consequently, the water supplied in this canton is practically free of fluoride.

It should be noted in this connection that, according to Art. 5 of the Ordinance on the addition of essential or physiologically beneficial substances to foods<sup>62</sup>, fluoride may be added to the drinking water, provided that the fluoride concentration (calculated as fluorine) in the drinking water after supplementation is  $\leq 1$  mg/l. The drinking water for the city of Basel was fluoridated until 2003, but other water supplies that were supplemented with fluoride are not known<sup>63</sup>.

## Iron

It is also difficult to find data on iron for Switzerland as a whole. Iron is of interest as a test parameter primarily as a way of describing a water resource and for process technology reasons. Evidence of iron in water samples indicates that the hydrogeological situation is worsening, and iron levels are also important to water supply companies because iron can cause unwanted failures in the distribution network and may mean that the water needs to be aerated at the catchment installation

In the canton of **Aargau**, none of the 59 drinking water samples analysed in 2008 in official controls exceeded the tolerance value for iron (0.3 mg/l). 3 % of the samples of drinking water taken from catchment installations that underwent chemical analysis produced results above 0.01 mg/l (limit of detection).

### 2.1.3. Additional chemical indicators

The Guidelines for Review and Assessment of Progress under the Protocol envisage the identification and submission by each country of data on five additional chemical indicators, in addition to the five aforementioned chemical indicators (see section 2.1.2.2).

No other chemical parameters have been identified to date that would need to be analysed in the context of drinking water monitoring in Switzerland for the purposes of the report to the WHO.

## 2.2. Outbreaks of infectious diseases and incidents of water-related diseases

According to the aforementioned guidelines, the total number of actual cases (regardless of cause) and the number of water-related outbreaks should be listed for five infectious diseases (cholera, bacillary dysentery, EHEC, hepatitis A, typhoid fever).

Cholera and typhoid fever are not included in the FOPH statistics retrievable via the Internet<sup>64</sup>. Both diseases are rare in Switzerland and are principally imported from warm countries with low hygiene standards. Thus, an average of 50 cases of typhoid/paratyphoid fever and 1 case of cholera are reported to the FOPH each year.

<b>Pathogen / disease</b>	<b>Total number of reported cases<sup>65</sup></b>		
	<b>Value in 2005</b>	<b>Value in 2008</b>	<b>Current values (2012)</b>
<b>Cholera</b>	<b>see text</b>	<b>see text</b>	<b>see text</b>
<b>Bacillary dysentery (shigellosis)</b>	<b>346</b>	<b>302</b>	<b>159</b>
<b>EHEC</b>	<b>62</b>	<b>70</b>	<b>74</b>

<sup>62</sup> Ordinance on the addition of essential or physiologically beneficial substances to foods, 2005, RS 817.022.32

<sup>63</sup> Cantonal Laboratory of Basel-Stadt 2003

<sup>64</sup> <http://www.bag.admin.ch/themen/lebensmittel/04921/index.html?lang=fr>

<sup>65</sup> [http://www.bag.admin.ch/k\\_m\\_meldesystem/00733/00804/index.html?lang=fr](http://www.bag.admin.ch/k_m_meldesystem/00733/00804/index.html?lang=fr)



<i>Pathogen / disease</i>	<i>Total number of reported cases<sup>65</sup></i>		
	<i>Value in 2005</i>	<i>Value in 2008</i>	<i>Current values (2012)</i>
<b>Hepatitis A</b>	<b>147</b>	<b>149</b>	<b>87</b>
<b>Typhoid fever</b>	<b>see text</b>	<b>see text</b>	<b>see text</b>

There is no nationwide overview in Switzerland on the number of water-borne outbreaks. Disease outbreaks resulting from hygiene problems with the drinking water have only occurred to date in isolated cases as a result of failure to comply with the legally prescribed precautionary measures. The greatest threat arises from small drinking water supplies in rural areas<sup>66</sup> and from karst sources.

However, there is one documented report of a drinking water-related incident in 2008 in the canton of Zurich, in which the drinking water was contaminated by treated wastewater. Various cases of gastroenteritis occurred and were caused by pathogens such as Campylobacter, noroviruses and enterotoxigenic E. coli<sup>67</sup>. Another example of a disease outbreak due to contaminated drinking water is the incident in La Neuveville in 1998, where once more Campylobacter, but also Shigella and noroviruses, were detected in the drinking water. More than 1,600 people were affected<sup>68</sup>.

**Conclusion:** According to the national statistics on infectious diseases, water-related infectious diseases rarely occur in Switzerland.

### 2.3. Access to drinking water

<i>Percentage of individuals with access to clean drinking water<sup>69</sup></i>	<i>Value in 2005</i>	<i>Value in 2008</i>	<i>Current value (2012)</i>
<b>Overall</b>	100 %	100 %	100 %
<b>In urban areas</b>	100 %	100 %	100 %
<b>In rural areas</b>	100 %	100 %	100 %

**Conclusion:** The total urban and rural population of Switzerland has access to clean drinking water.

### 2.4. Connection to sanitation system

<i>Proportion of individuals connected to a collective sanitation system<sup>70</sup></i>	<i>Value in 2005</i>	<i>Value in 2008</i>	<i>Current value (2012)</i>
<b>Overall</b>	99 %	99 %	99 %
<b>In urban areas</b>	100 %	100 %	100 %
<b>In rural areas</b>	97 % (collective systems)	97 % (collective systems)	97 % (collective systems)
	2 % (decentralised systems)	2 % (decentralised systems)	2 % (decentralised systems)

<sup>66</sup> Füchslin et consorts 2005

<sup>67</sup> Cantonal laboratory of Zurich, 2009

<sup>68</sup> Maurer et Stürchler 2000

<sup>69</sup> Assessment of SWGA

<sup>70</sup> <http://www.bafu.admin.ch/gewaesserschutz/01295/01296/01297/index.html?lang=fr>



**Conclusion:** 99 % or more of the sewage is treated. All potential households are connected to a central sewage treatment plant or a decentralised treatment system.

## 2.5. General condition of waters and water use

### 2.5.1. Water quality

#### 2.5.1.1. Surface waters

Over the decades the water quality of lakes and rivers has improved considerably in relation to nutrients.

The Hydrological Atlas of Switzerland (map sheet 7.6.)<sup>71</sup> provides a nationwide overview of the development of the three nutrient parameters ammonium, nitrate and orthophosphate in **watercourses** over the period 1976-2000, classified according to provisional status classes of the harmonised "Methods for assessing the ecological status of rivers in Switzerland"<sup>72</sup>. This overview allows an assessment to be made in this report on the nutrient contamination of watercourses in Switzerland for 1976-1980 and 1996-2000. Only those measuring sites for which continuous data are available were taken into account. It should be noted, however, that not all regions of Switzerland are covered representatively, which limits the significance of the findings for the country as a whole. This assessment does not take account of the organic trace elements (see section 3.6), nor the hydrobiology or the aspects of water flow rate and water structure (ecomorphology) of watercourses.

The new National Surface Water Monitoring (NAWA, see section 3.14.2) provides data for 109 measuring sites throughout Switzerland for 2011<sup>73</sup>. The table aggregates the monthly measurements (total of 12 measurements) to produce an annual figure for 2011. When comparing the findings with figures for earlier periods (1976-1980 and 1996-2000) it is important to bear in mind that the annual figures for 2011 are not directly comparable with the periodic values, as the latter cover several years. Outliers have a more pronounced influence on figures for a particular year, and so can tend to produce poorer results. This could be one of the reasons for the fall in the number of measuring sites classified as "very good" for ammonium, for example. Nevertheless, the total proportion of measuring sites classified as "very good" or "good" (i.e. the sites meeting the quality requirements of the GSchV) has risen from 89 to 92 %. So it could be concluded that the quality of watercourses is improving.

The following table shows the classification based on ammonium-nitrogen. Ammonium is problematic because the fish toxin ammonia is formed at higher temperatures and pH levels. Ammonium occurs more frequently downstream of wastewater discharge sites<sup>74</sup>. According to Annex 2 of the Water Protection Ordinance, the following requirements apply in watercourses:

for the total of  $\text{NH}_4^+$  - N and  $\text{NH}_3$  - N:

At temperatures:

– above 10 °C: 0.2 mg/l N

– below 10 °C: 0.4 mg/l N

Classification based on $\text{NH}_4$ -nitrogen	Value for 1976 – 1980 117 measuring sites	Reference value (1996-2000) 117 measuring sites	Current value (2011) 109 measuring sites
Very good	19 % of measuring sites	52 % of measuring sites	42 %

<sup>71</sup> Jakob et al. 2001

<sup>72</sup> According to the Modular Stepwise Procedure: [http://www.modul-stufen-konzept.ch/download/ChemieD\\_Juni2010.pdf](http://www.modul-stufen-konzept.ch/download/ChemieD_Juni2010.pdf)

<sup>73</sup> FOEN (2013b).

<sup>74</sup> Jakob et al. 2001

Classification based on NH <sub>4</sub> -nitrogen	Value for 1976 – 1980 117 measuring sites	Reference value (1996-2000) 117 measuring sites	Current value (2011) 109 measuring sites
Good	47 % of measuring sites	37 % of measuring sites	50 %
Fair	13 % of measuring sites	7 % of measuring sites	4 %
Unsatisfactory	0 % of measuring sites	0 % of measuring sites	1 %
Poor	21 % of measuring sites	4 % of measuring sites	3 %

Based on the available data, a declining trend in the pollution of watercourses by ammonium can be detected (i.e. there is a positive trend for compliance with the requirements of the GSchV), although it must be borne in mind that the figures are not directly comparable, as stated above.

The following table shows the classification based on nitrate-nitrogen, as an indicator of agricultural and residential pollution<sup>75</sup>. The requirement of 5.6 mg/l N specified in Annex 2 of the GSchV (corresponds to 25 mg/l nitrate) applies to nitrate (NO<sub>3</sub>-N) in watercourses used for drinking water.

Classification based on NO <sub>3</sub> -nitrogen <sup>76</sup>	Value for 1976 – 1980 107 measuring sites	Reference value (1996-2000) 107 measuring sites	Current value (2011) 109 measuring sites
Very good (<1.5 mg/l N)	43 % of measuring sites	43 % of measuring sites	41%
Good (1.5 – 5.6 mg/l N)	48 % of measuring sites	45 % of measuring sites	47%
Fair (5.6 – 8.4 mg/l N)	8 % of measuring sites	11 % of measuring sites	8%
Unsatisfactory (8.4 – 11.2 mg/l N)	1 % of measuring sites	0 % of measuring sites	2%
Poor (≥ 11.2 mg/l N)	0 % of measuring sites	1 % of measuring sites	2%

Based on the available data it can be concluded that there has been no clear change regarding the impairment of watercourses by nitrate.

And finally the classification based on orthophosphate, which plays an important role particularly in the eutrophication of lakes (see below)<sup>77</sup>. The maximum levels for phosphate in lakes are regulated indirectly by the Water Protection Ordinance, Annex 2, paragraph 13.2 The table shows orthophosphate values for **watercourses**.

<sup>75</sup> Jakob et al. 2001

<sup>76</sup> According to the Modular Stepwise Procedure: [http://www.modul-stufen-konzept.ch/download/chemie\\_klassen\\_07112006.pdf](http://www.modul-stufen-konzept.ch/download/chemie_klassen_07112006.pdf)

<sup>77</sup> Jakob et al. 2001

Classification based on ortho-P <sup>78</sup>	Reference value (1976 - 1980) 275 measuring sites	Reference value (1996-2000) 108 measuring sites	Current value (2011) 109 measuring sites
Very good (<0.02 mg/l)	5 % of measuring sites	33 % of measuring sites	42
Good (0.02 – 0.04 mg/l)	3 % of measuring sites	22 % of measuring sites	23
Fair (0.04 – 0.06 mg/l)	7 % of measuring sites	12 % of measuring sites	12
Unsatisfactory (0.06 – 0.08 mg/l)	1 % of measuring sites	3 % of measuring sites	5
Poor (≥ 0.08 mg/l)	84 % of measuring sites	30 % of measuring sites	18

Based on the available data a clear improvement in respect of orthophosphate in Swiss watercourses is apparent.

The phosphorus concentrations in Swiss **lakes** have steadily declined since the 1980s. The state of Swiss lakes can, for the most part, currently be described as good. Since currently the soil is still being enriched with phosphorus in catchment areas with a high livestock density, a further improvement cannot be guaranteed for all lakes<sup>79</sup> (see also section 3.14.2).

Thanks to the National Surface Water Monitoring (NAWA), it has since 2011 been possible to assess water quality by means of nationally coordinated monitoring according to the harmonised “Methods for assessing the ecological status of rivers in Switzerland”<sup>80</sup>.

### 2.5.1.2. Groundwater

In Switzerland, roughly 80 % of the total drinking water and industrial water supply is obtained from groundwater<sup>81</sup>. Compared to many other countries, groundwater in Switzerland is available almost anywhere, in sufficient quantity and generally in excellent quality. The National Groundwater Monitoring NAQUA<sup>82</sup> collects groundwater quality data representative of the country as a whole. The National Groundwater Monitoring comprises over 600 measuring sites and has been run in close cooperation by the FOEN and specialist cantonal agencies since 2002. The quality of groundwater is evaluated on the basis of nitrate, pesticides residues and volatile organic compounds VOC in the context of the WHO Protocol.

In 2011 nitrate concentrations were above the 25 mg/l threshold set in Annex 2 of the Water Protection Ordinance at 16 % of the NAQUA measuring sites and thus on the same level as three years earlier. The tolerance value<sup>83</sup> of 40 mg/l, which is relevant to health, was also exceeded at 3 % of the measuring sites.

<sup>78</sup> According to the Modular Stepwise Procedure:: [http://www.modul-stufen-konzept.ch/download/chemie\\_klassen\\_07112006.pdf](http://www.modul-stufen-konzept.ch/download/chemie_klassen_07112006.pdf)

<sup>79</sup> <http://www.bafu.admin.ch/umwelt/indikatoren/08605/08608/>

<sup>80</sup> <http://www.modul-stufen-konzept.ch/>

<sup>81</sup> SGWA 2011

<sup>82</sup> FOEN 2009

<sup>83</sup> Annexe of the Ordinance on Contaminants and Constituents in Foodstuffs (FIV)

<i>Proportion of groundwater measuring sites with a nitrate concentration of</i>	<i>Value in 2005<sup>84</sup> (526 measuring sites)</i>	<i>Value in 2008<sup>85</sup> (526 measuring sites)</i>	<i>Current value 2011<sup>86</sup> (531 measuring sites)</i>
<b>&gt; 25 mg/l</b>	19 % of measuring sites	16 % of measuring sites	16 % of measuring sites
<b>&gt;40 mg/l</b>	4 % of measuring sites	4 % of measuring sites	3 % of measuring sites

Pesticide residues were found in groundwater at 55 % of measuring sites. The threshold of 0.1 µg/l for the active substances, laid down in the Water Protection Ordinance, was exceeded at 2 % of the NAQUA measuring sites. Decomposition products of agricultural pesticides were found at concentrations over 0.1 µg/l in 20 % of measuring sites. As the spectrum of substances analyzed in groundwater has greatly expanded in recent years, the data of this period are not directly comparable. Only the long-term development can give a clear assessment of the specific substances.

<i>Proportion of groundwater measuring sites with an AP concentration of</i>	<i>Value in 2005<sup>87</sup> (505 measuring sites)</i>	<i>Value in 2008<sup>88</sup> (503 measuring sites)</i>	<i>Current value 2011<sup>89</sup> (531 measuring sites)</i>
<b>LD (limit of determination)</b>	50 % of measuring sites	48 % of measuring sites	55 % of measuring sites
<b>&gt; 0.1 µg/l</b>	11 % of measuring sites	8 % of measuring sites	21 % of measuring sites

In 2011, volatile organic compounds (VOC) exceeded in 5% of the NAQUA measurement points the requested value of 1 g / l, which is set in the Water Protection Regulation for aliphatic hydrocarbons, monocyclic aromatic hydrocarbons and volatile halogenated hydrocarbons. VOCs were detected in 31% of the measurement points. Although the spectrum of analytes was regularly extended in recent years, the number of measurement points where VOC were detected at elevated concentrations did not increase significantly

<i>Proportion of groundwater measuring sites with a VOC concentration of</i>	<i>Value in 2005<sup>90</sup> (505 measuring sites)</i>	<i>Value in 2008<sup>91</sup> (503 measuring sites)</i>	<i>Current value 2011<sup>92</sup> (531 measuring sites)</i>
<b>LD (limit of determination)</b>	35 % of measuring sites	37 % of measuring sites	31 % of measuring sites
<b>&gt; 1 µg/l</b>	6 % of measuring sites	5 % of measuring sites	5 % of measuring sites

**Conclusion:** In general, the requirements of the Water Protection Ordinance are fulfilled. Residues of fertilizers, pesticides and other synthetic organic substances occurs mainly in intensively farmed and densely populated areas on the groundwater.

<sup>84</sup> National Groundwater Monitoring NAQUA

<sup>85</sup> National Groundwater Monitoring NAQUA

<sup>86</sup> National Groundwater Monitoring NAQUA: <http://www.bafu.admin.ch/grundwasser/07500/07563/07577/index.html?lang=de>

<sup>87</sup> National Groundwater Monitoring NAQUA

<sup>88</sup> National Groundwater Monitoring NAQUA

<sup>89</sup> National Groundwater Monitoring NAQUA: <http://www.bafu.admin.ch/grundwasser/07500/07563/07581/index.html?lang=de>

<sup>90</sup> National Groundwater Monitoring NAQUA

<sup>91</sup> National Groundwater Monitoring NAQUA

<sup>92</sup> National Groundwater Monitoring NAQUA: <http://www.bafu.admin.ch/grundwasser/07500/07563/07581/index.html?lang=de>

## 2.5.2. Water use

When asked about the water consumption in Switzerland usually the water-annual statistics of SGWA is contrived, which first appeared in the operating year in 1900. In addition to public water supplies that have promoted 2011 954 million m<sup>3</sup> of, commercial, industrial and agricultural win even considerable amounts of water, as in 1975 for the first time emerged from a study of the SGWA<sup>93</sup>.

From the FOEN supported, new collection of SGWA 2007/2008 shows that the water requirements of the Swiss economy will be covered in half from its own production and the self-promotion of the industry in the same order of magnitude as before as three decades ago, but with a strong shift between the sectors<sup>94</sup>.

An overview of the estimated annual water demand quantities for the various forms of use in Switzerland are Table 1<sup>95</sup>. The hydropower use is not listed, nor is the use of cooling water of nuclear power plants. A quantification of these terms is not useful due to their complexity (transitions between basins, multiple use by Pump-/Speicher- and run power stations, question whether use or consumption).

**Table 1: Water requirements for different uses in Switzerland (km<sup>3</sup>/a)<sup>96</sup>**

Use	Description	Total
Households	Housholds and small factories	0.5
Commercials and Industry	Commercials and industry	1.1
Agriculture	Total <sup>97</sup>	0.41
Public purposes	Incl. fontains	0.08
Losses		0.1
<b>Total</b>		<b>2.2</b>

Table 2 shows the percentage comparison of the requirements in relation to the mean precipitation and total runoff, averaged over the year and the whole of Switzerland, as an indicator of water availability.

**Table 2: Comparison of water demand and water balance as an indicator of water availability**

Water balance	km <sup>3</sup> /a	% of total demand
Precipitation	60	4
Outflow	40.5	6

**Conclusion:** The magnitude of the juxtaposition (Table 2) clearly shows that the term "water castle" is justified in general for Switzerland. This will remain valid in the future, even if it may change both on the supply and on the demand side (FOEN 2012b). Despite this conclusion on the overall level of Switzerland, there are at local / regional level vulnerable areas which are temporarily affected by problems of scarcity (Pfaundler 2010; FOEN 2012), see also Section 1.9

<sup>93</sup> SGWA (2011)

<sup>94</sup> Freiburghaus (2009)

<sup>95</sup> The tables and the related text will soon be on the FOEN website launched (Pfaundler Schaffner, 2013)

<sup>96</sup> Freiburghaus 2009

<sup>97</sup> ohne Regenwassernutzung

### 3. Targets and target achievement: Review of the current situation

The following subsections are presented in the sequence specified in the Preliminary Guidelines for Review and Assessment of Progress under the Protocol<sup>98</sup>, which are based on Art. 6 Paragraph 2 of the Protocol<sup>99</sup>. The targets described in the following subsections are classified as follows:

**Target:** Target discussed by the Federal offices and definitively established on a legal basis.

**Proposed target:** Target decided by the authorities but which will require an amendment of the law. However, not all the steps associated with the amendment of the corresponding act or ordinance (consultation process, referendum, poss. vote) have yet been completed.

**Possible target:** Target proposed by an authority but which has not yet been discussed with all the stakeholders concerned.

#### 3.1. Drinking water quality [Art. 6, Paragraph 2 (a)]

**Target:** Development of a national drinking water database.

**Background:** No nationwide overview on the quality of drinking water currently exists in Switzerland. This shortcoming is to be rectified by the creation of a national drinking water database. This database should initially contain data recorded by individual cantons during their official controls. The next step in the plan is to also incorporate data from water suppliers recorded in connection with the legally stipulated self-monitoring. This will counteract any distorted picture arising from the fact that official controls are partly based on risk assessment alone (see section 3.20).

The aim of the drinking water database is to obtain an overview of the parameters measured in Switzerland in drinking water and untreated water, the proportion of samples that exceed the tolerance and limit values and also the progress over time of these parameters. Evaluations based on the drinking water database should help assess the quality of drinking water in Switzerland and identify and plan for any necessary improvements.

Article 5 of the Ordinance on Drinking, Spring and Mineral Water states that any party supplying drinking water to consumers via a water supply installation must provide consumers with comprehensive information about the quality of the drinking water at least once a year. The SVGW offers interested parties the opportunity to publish their quality data at [www.wasserqualitaet.ch](http://www.wasserqualitaet.ch).

**Target achievement:** A firm of consulting engineers has been commissioned to develop a national drinking water database in collaboration with the FOPH. The structure of this database, together with an interface for transferring data from the cantons, has been devised. The aims of this project still have to be presented to and accepted by the cantonal laboratories before data input can start.

**Target:** Ensure the value conservation of the infrastructures (water supply system, water catchment installations, reservoirs, laboratories).

**Background:** Infrastructure management recommendations have been prepared by the competent authorities. Achievement of this target is above all a question of funding, human resources and the availability of suitable planning instruments.

**Target achievement:** A Water Agenda 21 working group<sup>100</sup> is examining the shortcomings of communal infrastructures, pinpointing areas where action is needed, and developing a plan of action to maintain

<sup>98</sup> UNECE 2009: Preliminary Guidelines for Review and Assessment of Progress under the Protocol  
<http://www.unece.org/env/documents/2007/wat/wh/ece.mp.wh.2007.4.e.pdf>

<sup>99</sup> Protokoll über Wasser und Gesundheit zu dem Übereinkommen von 1992 zum Schutz und zur Nutzung grenzüberschreitender Wasserläufe und internationaler Seen vom 17. Juni 1999



and upgrade existing infrastructures, taking the water sector as an example. The working group's objectives are:

- Situational analysis; identification of significant deficits and areas where action is required in the management of communal network infrastructures.
- Development of a plan of action to maintain and upgrade existing infrastructures, taking the water sector as an example.

In specific areas where action is required, development of principles and tools, such as the "Communal Infrastructure Management Manual"<sup>101</sup>.

The costs of upgrading water infrastructures have been assessed in a study, which concluded that the public drinking water supply system is broadly self-financing, i.e. its funding is secure in the long term as required by law. Value conservation is generally covered by charges. Substance conservation should ideally be planned as part of overall water supply planning<sup>102</sup>.

**Proposed target:** Support for comprehensive infrastructure management.

**Background:** Guidelines should ensure that infrastructure operates efficiently and that its value is conserved, by means of asset accounting, a long-term tariff policy and other measures. This proposed target was devised in the context of the report of the Federal Council on dealing with local water shortages in Switzerland<sup>103</sup>.

### 3.2. Reduction of the number and scale of outbreaks and incidents of water-related disease [Art. 6, Paragraph 2 (b)]

While no target has yet been formulated for this parameter, the existing nationwide statistics in Switzerland on diseases caused by drinking water are not satisfactory (see section 2.1). The development of a reporting system for incidents and outbreaks of disease caused by water therefore constitutes one possible target. This could be modelled on the Swedish system for example.

**Possible target:** Development of a reporting system for incidents and outbreaks of disease caused by water.

**Background:** Since water-related diseases are extremely rare in Switzerland, this target has not thus far been considered a priority.

### 3.3. Access to drinking water [Art. 6, Paragraph 2 (c)]

Since the whole population of Switzerland has access to drinking water (see section 2.3), the definition of targets in this area is not a priority. Proposed targets relate to improving the security of drinking water supplies and creating emergency infrastructure.

**Proposed target:** To improve the security of drinking water supply, water supply companies ensure that they are able to draw upon water from two different sources.

**Background:** Severe weather conditions in recent years have also affected water supplies at various locations over a prolonged period. These incidents demonstrate the increasing need for communes and water supply companies to address the drinking water supply in emergencies and to develop corresponding explicit strategies. This is also stipulated by the federal government in the Ordinance on the Safeguarding of the Drinking Water Supply in Emergencies (VTN). To support this work, the Swiss

<sup>100</sup> <http://www.wa21.ch/index.php?page=320>

<sup>101</sup> <http://www.wa21.ch/index.php?page=535>

<sup>102</sup> FOEN 2009b.

<sup>103</sup> FOEN 2012: Umgang mit lokaler Wasserknappheit in der Schweiz. Bericht des Bundesrates zum Postulat „Wasser und Landwirtschaft. Zukünftige Herausforderungen“. <http://www.bafu.admin.ch/wasser/01444/01991/12442/index.html?lang=de>.

Gas and Water Association (SVGW) has produced a guideline for the planning and implementation of the drinking water supply in emergencies<sup>104</sup>.

**Target achievement:** In some cantons experts have observed a consistent trend towards the interconnecting/cross-linking of water supplies and thus toward improved reliability of supply. However, this does not apply across the whole of Switzerland. Some cities (e.g. Geneva, Zurich) have already implemented the strategy. Other cantons, such as Zurich, Berne and Aargau, are actively pursuing this strategy.

In 2008 the federal government conducted a survey of the cantons in order to determine the status of the execution of the Ordinance on the Safeguarding of the Drinking Water Supply in Emergencies. A further survey was conducted in conjunction with the project Water Supply 2025 to ascertain how much data were available on water resources in the cantons. In the light of the findings from the project Water Supply 2025, principles have been agreed with the SVGW to ensure a sustainable and reliable water supply<sup>105</sup>.

The Confederation is encouraging the introduction of a "second source" of water supply via information campaigns and the creation of planning/practical tools if the cantons and technical associations consider that these would be useful<sup>106</sup>.

**Proposed target:** Creation of emergency infrastructure to improve water supply in exceptional situations.

**Background:** This proposed target was devised in the context of the report of the Federal Council on dealing with local water shortages in Switzerland<sup>95</sup>.

#### 3.4. Access to sanitation [Art. 6, Paragraph 2 (d)]

97 % of the Swiss population is connected to a central WWTP (see section 2.4). The target has therefore been achieved, and there is no longer any reason to define further targets.

#### 3.5. Levels of performance in water supply [Art. 6, Paragraph 2 (e)] (FOEN)

**Target:** Project **Water Supply 2025:** The federal government is analysing the possible future challenges and options for action with regard to water supply, and is drawing up measures on the basis of this analysis, with a view to achieving and maintaining an optimum level of performance in water supply.

**Background:** Although Switzerland has abundant water resources, water supply companies will be faced with new challenges as a result of climate change, demographic trends, including the declining per capita consumption of water, and industrial and commercial production. It should therefore be assumed that competition will intensify, for example as a result of increased crop irrigation, the use of water for cooling or between projects of revitalization of surface water and drinking water protection (see also section 3:20). The aim of the project Water Supply 2025 is to close existing gaps in knowledge and consider various future scenarios, and to work out specific targets and action plans on the basis of the findings.

**Target achievement:** An initial analysis has been made and shortcomings identified in the preliminary project Water Supply 2025<sup>107</sup>. Following on from this, specific targets and action plans were defined as part of the main project Water Supply 2025 (see section 1.9). The study has been completed and a

<sup>104</sup> SGWA 2007: "Wegleitung zur Planung und Realisierung der Trinkwasserversorgungen in Notlagen", publiziert: W/VN300d.

<sup>106</sup> FOEN 2012: Management of local water shortages in Switzerland. Report of the Federal Council to the postulate on "Water and agriculture: future challenges. <http://www.bafu.admin.ch/wasser/01444/01991/12442/index.html?lang=de>

<sup>107</sup> Eawag 2009



summary will be published shortly<sup>108</sup>. A final decision on exactly how the measures will be implemented has yet to be taken.

Possible areas for which further targets might be formulated include the levels of performance of small-scale water suppliers, mergers of water suppliers to improve the performance level, preservation of the infrastructure and staff training.

An example from the canton of Schaffhausen pointing the way for future developments and strategies is given in the box below.

**Example of actions regarding drinking water supply taken in the canton of Schaffhausen: future development analysis<sup>109</sup>**

Recent years have shown that certain small communes often find it difficult to maintain their drinking water installations in a condition that satisfies current food hygiene law and firefighting requirements. Furthermore, financial resources have not always been efficiently used in the past – a situation encouraged by an outmoded subsidies policy. For example, two adjacent small communes each built their own new reservoir or drilled for ground water without first seriously discussing the possibility of working together with their neighbour.

To avoid such occurrences in future and in view of the increasing complexity of the demands facing drinking water suppliers (groundwater protection zones, installation maintenance, self-monitoring, specialist staff, product liability, financial outlay, etc.), the canton started up a project to record the current situation in detail and develop regional approaches to resolving problems in 2002. The simultaneous aim is to demonstrate the associated cost advantages of doing so. A survey of the current situation revealed severe shortcomings in some areas, particularly in smaller water supply systems. These included maintenance, financial management systems, safeguarding drinking water supplies to emergency installations and staff training.

This detailed analysis of the current situation was followed by a discussion of the ways in which the planning and organisation of water supplies could be developed in a financially viable way in the period up to 2020. This was done by dividing the canton into four regions and developing a concept for each region. Combining drinking water suppliers guarantees higher reliability of supply (each commune has two independent sources of water) and reduces costs. Based on the outcome of the analysis the communes work out their general water supply projects (GWP).

**Target:** To conserve the value of infrastructures (water supply network, catchment installations, reservoirs, laboratories).

**Background:** Infrastructure management recommendations have been prepared by the competent authorities. Achievement of this target is above all a question of funding, human resources and the availability of suitable planning instruments.

**Target achievement:** A Water Agenda 21 working group<sup>110</sup> is examining the shortcomings of communal infrastructures, pinpointing areas where action is needed, and developing a plan of action to maintain and upgrade existing infrastructure, taking the water sector as an example. The working group's objectives are:

Situational analysis; identification of significant deficits and areas where action is required in the management of communal network infrastructures.

Development of a plan of action to maintain and upgrade existing infrastructures, taking the water sector as an example.

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<sup>108</sup> FOEN 2013

<sup>109</sup> <http://www.kantlab.ch/index.php?id=191&L=4>

<sup>110</sup> <http://www.wa21.ch/index.php?page=320>

In specific areas where action is required, development of principles and tools, such as the “Communal Infrastructure Management Manual”<sup>111</sup>.

The costs of upgrading water infrastructures have been assessed in a study, which concluded that the public drinking water supply system is broadly self-financing, i.e. its funding is secure in the long term as required by law. Value conservation is generally covered by charges. Substance conservation should ideally be planned as part of overall water supply planning<sup>112</sup>.

**Proposed target:** Support for comprehensive infrastructure management.

**Background:** Guidelines should ensure that infrastructure operates efficiently and that its value is conserved, by means of asset accounting, a long-term tariff policy and other measures. This proposed target was devised in the context of the report of the Federal Council on dealing with local water shortages in Switzerland<sup>113</sup>.

### 3.6. Levels of performance of collective systems and other systems for sanitation [Art. 6, Paragraph 2 (e)]

**Target:** The targets and requirements of the Water Protection Ordinance (Annex 3) are observed.

**Background:** The Water Protection Ordinance (GSchV) stipulates the number of treatment stages required on the basis of the discharge targets to be achieved.

**Target achievement:** Target achieved. The number of treatment stages fulfills the requirements of the Water Protection Ordinance (GSchV) nationwide.<sup>114</sup> Currently in Switzerland, 20% of the wastewater is treated in two stages, 77% in three stages and 2% in decentralised plants<sup>115</sup>. See also Figure 1 on the geographical distribution of wastewater treatment plants in Switzerland according to treatment type.

**Background:** Wastewater treatment in Switzerland is currently of a high standard. The development of infrastructure for wastewater treatment has created the conditions for the recovery of the country's waterbodies. The overall costs for installing this infrastructure (sewerage systems, sewage treatment plants, stormwater tanks, etc.) are of the order of CHF 40 – 50 billion, while the replacement cost would be approx. CHF 80 – 100 billion. Current challenges include the establishment of sustainable wastewater management and on-going optimisation of the treatment system.<sup>116</sup> The intention in the future is to safeguard the performance capability of the sewerage systems and sewage treatment plants and to optimise municipal drainage through targeted organisational, operational and technical modifications. Modern measurement and control technology and remote monitoring nowadays enable more sophisticated processes to be used. This in turn allows sewerage systems and treatment plants to be managed as a single unit and better use to be made of reserve capacity, for example.

The competent authorities will develop recommendations for managing infrastructure in each sector. Achievement of this target is above all a question of funding, human resources and the availability of suitable planning instruments.

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<sup>111</sup> <http://www.wa21.ch/index.php?page=535>

<sup>112</sup> FOEN 2009b.

<sup>113</sup> FOEN 2012: Management of local water shortages in Switzerland. Report of the Federal Council to the postulate on “Water and agriculture: future challenges. <http://www.bafu.admin.ch/wasser/01444/01991/12442/index.html?lang=de>.

<sup>114</sup> The cantons monitor the situation and possess corresponding data.

<sup>115</sup> <http://www.bafu.admin.ch/gewaesserschutz/01295/01296/01298/>

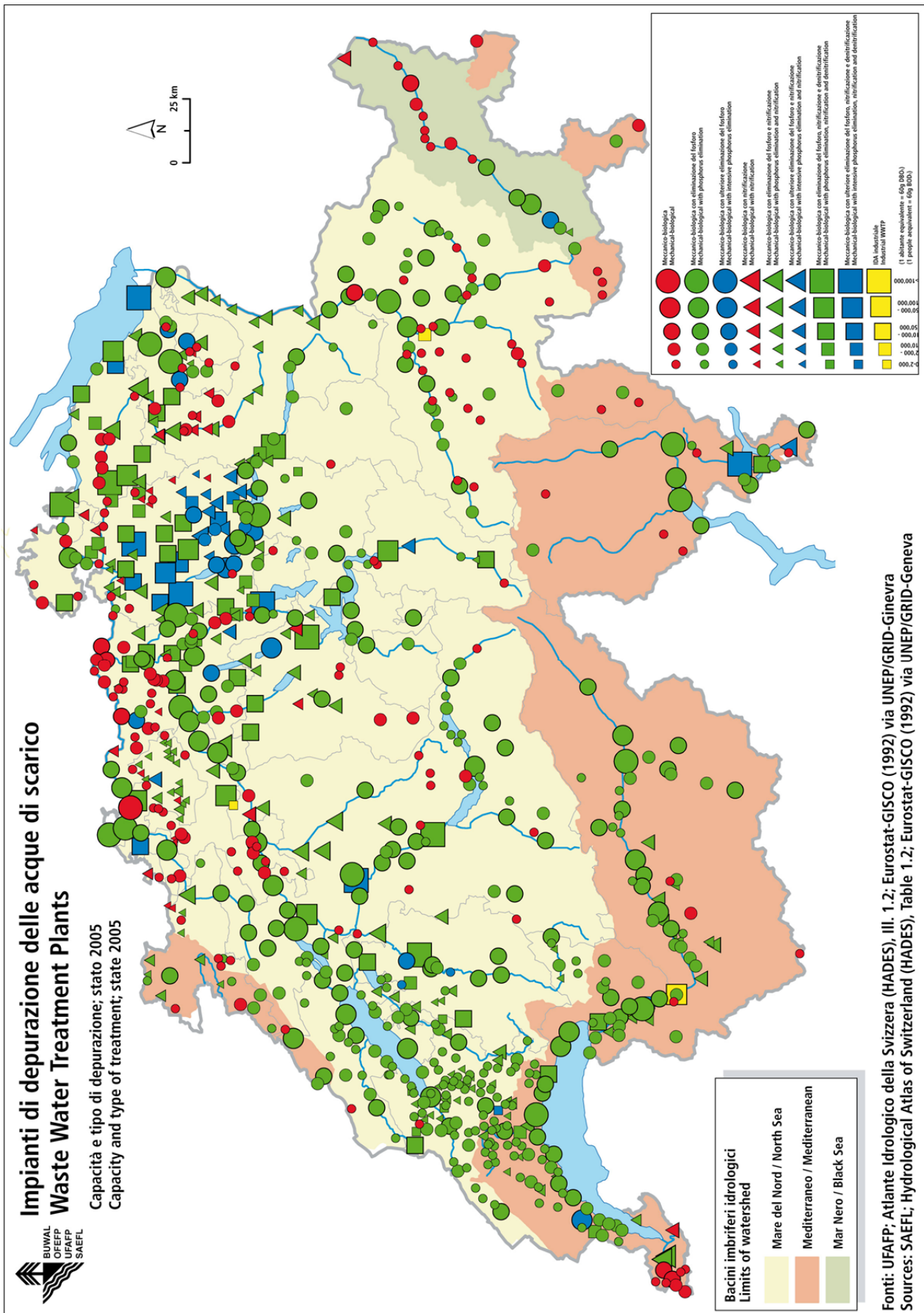


Figure 1: Capacity and type of wastewater treatment plants in Switzerland in 2005

**Proposed target:** The Water Protection Ordinance is amended to include micropollutants. The treatment capacity of wastewater treatment plants for micropollutants is to be more than doubled.

**Background:** Wastewater treatment plants (WWTP) that were originally constructed to eliminate nutrients in wastewater only partially remove, or do not remove at all, organic trace elements such as chemical products in daily use, pharmaceuticals or biocides. These micropollutants enter watercourses and lakes along with the treated wastewater, where they can harm the aquatic flora and fauna and impair the quality of the drinking water reserves<sup>117</sup>. In order to obtain a national overview of the pollution in Swiss surface waters, a situational analysis of micropollutants in waters was carried out in connection with the FOEN "Micropoll Strategy - Micropollutants in Waters", focusing on organic trace elements from municipal drainage<sup>118</sup>. The analysis showed that, as a result of inadequate dilution of the treated wastewater, especially in small or medium-sized watercourses in intensively used areas in Central Switzerland, concentrations that may lead to adverse effects on plants and animals can be expected. Such substances can enter the groundwater via bank infiltration and represent a growing challenge for the treatment of drinking water. As a result of the situational analysis, options for reducing this contamination were drawn up, focusing particularly on the technical optimisation (upgrade) of wastewater treatment in the region of Central Switzerland.<sup>119</sup> The following three criteria were used to identify the WWTP which need to be upgraded: the size of the WWTP, the proportion of wastewater in the receiving water and its significance for the drinking water supply.

**Target achievement:** Specifically, the WWTPs should remove 50% of the micropollutants which reach watercourses in treated wastewater. This would substantially reduce the burden on the affected watercourses. This target can be achieved by upgrading the 12 biggest and approx. 100 of the medium-sized plants of the total of 700 WWTPs in Switzerland over the next few years. This will require a revision of the Water Protection Ordinance. More than 80 per cent of the comments submitted during the consultation/hearing procedure for the draft version of the revision supported the selective, solution-oriented upgrade concept. The main point of criticism, on the other hand, was that this upgrade would be funded by the affected plants and the households connected to them, and that this did not respect the polluter-pays principle since the entire population of Switzerland contributes to the contamination of the waterways with organic trace elements. A parliamentary proposal was therefore put forward, calling for the development of a concept for usage-based funding of the elimination of trace elements from wastewater. The necessary legal basis for this was to be created by amending the Water Protection Act (GSchG). The resulting proposal for the amended Ordinance will be debated in parliament from late summer 2013.

**Target:** Project **Water Sanitation 2025:** The federal government analyses potential impending challenges (e.g. climate change, infrastructure management) and options for managing wastewater and derives measures from this analysis with a view to achieving and sustaining optimal performance in the wastewater management system.

**Target achievement:** The findings of Project Water Sanitation 2025 were published in 2012<sup>120</sup>. The report comprises seven themed modules and a "Recommendations" section. It identifies areas where knowledge of the situation and the future of wastewater management in Switzerland is incomplete, documents current knowledge comprehensively and points to areas of wastewater management in Switzerland where action will be required in the future, with special emphasis on climate change and its direct and indirect impact on wastewater management.

**Possible target:** Ensure the value conservation of infrastructures (sewerage system, sewage treatment plants).

**Target achievement:** The "Project Water Sanitation 2025" report makes many proposals for better infrastructure management<sup>121</sup>. They focus primarily on the private-sector and public sewerage system and contain a number of high-priority **recommendations**. Discussions are currently taking place to

<sup>117</sup> <http://www.bafu.admin.ch/dokumentation/medieninformation/00962/>

<sup>118</sup> Gälli et al. 2009

<sup>119</sup> Abegglen et al. 2012

<sup>120</sup> Eawag 2012.

<sup>121</sup> Eawag 2012

define measures and ways of implementing them in the practical setting. One of the aspects that requires clarification is which stakeholders need to be involved in implementation. The most important measures concern:

- organisational measures at communal level;
- development and publication of key performance indicators for the operation of wastewater infrastructures;
- creation of incentives to promote infrastructure management at cantonal and national level (including expansion of continuing training opportunities and greater communication; development of guidelines, performance standards and tools for monitoring success);
- and definition of requirements for the condition of sewer networks and property drainage systems.

A study estimated the **cost** of replacing water-related infrastructures. Public wastewater management is financed by usage-based wastewater charges. The degree of cost recovery varies between regions, although it is increasing all the time; some cantons have already achieved 100 %. The condition of the sewerage networks and preservation of their substance is recorded and planned in the General Drainage Plan (GDP).

**Possible target:** Promote the regionalisation of municipal drainage.

This target is currently being discussed and prepared by the federal offices concerned. At cantonal level, in certain areas regionalisation measures are already being implemented (see example in the box).

**Background:** The organisation of wastewater management in Switzerland is characterised by federalism, direct democracy and municipal autonomy. Small-scale organisational structures (usually communes), a "militia" political system with inadequately qualified personnel and a lack of continuity contrast with the growing complexity of the regulations and additional challenges such as cost control, infrastructure maintenance and the management of micropollutants<sup>122</sup>.

**Target achievement:** The Swiss Water Association (VSA) immediately included the topic in its guidelines for GEPs, explicitly recommending regionalisation<sup>123</sup>. The periodic revision of GEPs is now being carried out in line with these guidelines, which also recommend regionalisation (see section 3.8). The Project Water Sanitation 2025 also addresses the topics of regionalisation and institutional aspects (see target 3.5).

An example of successful regionalisation is shown in the box below.

#### **Practical example of regionalisation**

A central element of the **reorganisation of municipal wastewater management in the canton of Uri** is that, in the future, wastewater management will no longer be carried out by the communes, but rather by a single wastewater management company for the whole canton. The communes will hand over their wastewater treatment plants to this company. This measure should enable more efficient water protection and reduced costs. The greatest savings are expected to be made by joining small WWTP catchment areas and shutting down the smallest WWTPs. Finally, this solution also ensures better funding of long-term infrastructure maintenance<sup>124</sup>.

### **3.7. Application of recognised good practice to the management of the water supply [Art. 6, Paragraph 2 (f)]**

**Target:** Produce good practice guidelines in accordance with Art. 52 of the Ordinance on Foodstuffs and Utility Articles (LGV).

**Background:** Article 52 of the LGV envisages the drawing up by the food industry of guidelines for good practice which will then need to be approved by the FOPH. Such guidelines could replace individual self-supervision strategies, and a guideline for drinking water should help water suppliers

<sup>122</sup> BG Consulting Engineers 2008

<sup>123</sup> <http://www.vsa.ch/publikationen/gep-mph-dokumente/>

<sup>124</sup> GSA 2007



(particularly small and medium-sized suppliers) to observe the basic rules of hygiene and apply the HACCP principles specified for the catchment, preparation and distribution of water.

**Target achievement:** The Swiss Gas and Water Industry Association (SVGW) will draft "Guidelines for good practice in simple drinking water supplies". The implementation offices are monitoring the drafting process and the FOPH will approve the final guidelines.

**Possible target:** Drinking water is prepared and distributed in line with the detailed guidelines issued by the SGWA trade association, the FOPH and the FOEN.

**Background:** FOPH documents describing recognised treatment processes for drinking water and a management system for drinking water safety already exist. The regulations of the SGWA association include guidelines for monitoring quality in the drinking water supply<sup>125</sup>, quality assurance in groundwater protection zones<sup>126</sup> and recommendations for a quality assurance system<sup>127</sup>. The FOEN has also issued various implementation guidelines explaining in concrete terms the legal bases and thus serving as a practical aid for water suppliers. However, there are certain areas in which additional documents need to be made available, for example guidelines or recommendations relating to water treatment. Furthermore, the corresponding specialist groups must be informed about the existing documents so that these are also put into practice.

**Target achievement:** The target for large water suppliers is largely achieved. No statements can currently be made at national level about small and medium-sized water suppliers.

**Target:** In accordance with the Water Protection Act, overextraction of groundwater resources occurs for only limited periods.

**Background:** In order to preserve groundwater resources in the long term, the Water Protection Act only allows short-term periods of overextraction.

**Target achievement:** The cantons monitor the situation and record the corresponding data. The degree of implementation varies between the cantons.

**Target:** Strategic planning of the water supply.

**Background:** To date Switzerland has no agreed requirements for planning the water supply. The SGWA association has therefore developed a useful working instrument in the form of a "Recommendation for strategic planning of the water supply" (published in 2009: W1005d). This recommendation takes into account all the aspects relevant in planning a water supply, including groundwater protection zones and their regulation. In addition to technical aspects, it also covers economic, organisational and structural issues.

**Target achievement:** The guideline has been published. The publication is intended primarily for political and financial decision-makers, the respective managers at water supply companies, representatives of engineering offices and teachers.

**Target:** In order to protect the quality and quantity of the groundwater, water protection areas and groundwater protection zones as defined in the water protection legislation and the FOEN implementation aids are designated and restrictions on use within the ground water protection zones and areas (protection zone regulation) are enforced systematically (enforcement of groundwater protection planning).

**Background:** Groundwater protection planning has been anchored in law since 1991.

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<sup>125</sup> SGWA 2005a

<sup>126</sup> SGWA 2005b

<sup>127</sup> SGWA 2003

**Target achievement:** The cantons enforce these regulations. The degree of implementation varies between the cantons. There are no specific projects in this area; the legal requirement is implemented on an on-going basis.

**Target:** Safeguard groundwater reserves for future water requirements. The cantons designate appropriate groundwater protection areas (future reserves) to safeguard the water supply for future generations.

**Background:** There has been a statutory requirement to safeguard groundwater reserves since 1991.

**Target:** Sustainable agricultural production; conservation of natural resources.

**Background:** The federal constitution states that agriculture should pursue sustainable and market-oriented production in order to make a substantial contribution to reliably supplying the population and conserving natural resources. The federal government provides support in this context. One important instrument in agricultural policy with a bearing on water quality is proof of ecological performance (PEP), which is required in order to receive direct payments. The aspects it covers include the balanced use of nutrients, crop rotation and selection and specific application of plant-treatment products. Ecological direct payments provide farmers with an incentive to provide specific ecological services. Switzerland's agricultural policy for the period 2014-2017 refines the existing system of direct payments and places a more systematic emphasis on non-market-oriented services in agriculture. The following elements play an important role in the context of water.

Specific measures in the proof of ecological performance to encourage improvements in locations at risk of erosion and crops, and better administration of the supply of fertilisers to farms.

Introduction of production-system payments to promote particularly natural production forms which are environmentally and animal-friendly.

Introduction of resource-efficiency payments to promote rapid adoption of target-oriented, resource-sparing techniques, e.g. in crop protection or soil processing.

**Target achievement:** The legal basis for the agricultural policy 2014-2017 will come into force on 1.1.2014. Agricultural environmental monitoring tracks environmentally relevant developments in agriculture on an on-going basis and draws attention to them in annual agricultural reports.

### **3.8. Application of recognised good practice to the management of sanitation [Art. 6, Paragraph 2 (f)]**

**Target:** Recognised practice for communal sanitation is defined in, and ensured by, the FOEN recommendations and Swiss Water Association (VSA) guidelines. For industrial wastewaters, the state of the art according to the Water Protection Ordinance and the decisions and recommendations of international water protection commissions applies.

**Background:** The FOEN issues guidelines and enforcement aids for various aspects of sanitation including, for example, the groundwater protection guidelines<sup>128</sup>, practical guidance on the state of the art in water protection<sup>129</sup>, the guidelines on traffic route drainage<sup>130</sup> and practical guidance on industrial wastewater treatment<sup>131</sup>.

The VSA also publishes guidelines on a wide variety of aspects of sanitation including, for example, a standard on property drainage<sup>132</sup>, guidelines on the optimal discharge of storm water<sup>133</sup>, on wastewater

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<sup>128</sup> FOEN 2004

<sup>129</sup> FOEN 2001b

<sup>130</sup> Ernst Basler + Partner 2002

<sup>131</sup> FOEN 2001a

<sup>132</sup> VSA und SSIV 2002

<sup>133</sup> VSA 2002

discharge into water bodies during rainy weather<sup>134</sup>, guidelines on wastewater in rural areas<sup>135</sup>, guidelines on the maintenance of sewers<sup>136</sup> and guidelines on the financing of wastewater management<sup>137</sup>. The content of these documents has been agreed with the FOEN.

Finally, various guidelines have also been issued in connection with international agreements such as the OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic or the International Commission for the Protection of the Rhine (ICPR)<sup>138</sup>.

**Target achievement:** The cantons monitor the situation and have the corresponding data. The VSA carried out a comprehensive survey in 2011 in order to obtain an overview of the key data relating to sanitation at the national level. The report "Costs and services relating to sanitation" summarises the results<sup>139</sup>. The intention is to carry out surveys of this type periodically in the future.

**Target:** The total sealed surface area in housing areas is drained according to GDPs.

**Background:** The General Drainage Plan (GDP) is the central planning instrument for municipal drainage and forms the basis for the extension, adaptation, maintenance and remediation (preservation) of the public sewage network. It should guarantee adequate water protection in municipalities and effective drainage of housing areas. By law (Article 7 Water Protection Act and Article 5 Water Protection Ordinance), every commune is required to produce a GDP. The elaboration of the GDP is subsidised by the federal government and the cantons and the subsidies are usually linked to compliance with binding deadlines.

**Target achievement:** Comprehensive GDPs are not yet available in many cantons, and progress is variable. The degree of target achievement at national level has not been recorded to date, and this is not at present the subject of a project. Target achievement is estimated at about 70 %. Elaboration of the GDPs should be completed by about 2016.

### 3.9. Discharges of untreated wastewater [Art. 6, Paragraph 2 (g) (i)]

**Target:** In Switzerland, contaminated wastewater may not be discharged untreated or allowed to seep into waterbodies.<sup>140</sup>

**Background:** According to Article 5 of the Water Protection Ordinance (GSchV) the cantons are responsible for drawing up General Drainage Plans which guarantee adequate water protection in municipalities and effective drainage of housing areas (see 3.8).

**Target achievement:** GDPs identify and rectify inappropriate sewer connections. The GDPs therefore aid implementation of this ban. Little progress has been made on implementing these measures to date since comprehensive GDPs have not yet been elaborated in all cantons (see section 3.8).

### 3.10. Untreated storm water [Art. 6, Paragraph 2 (g) (ii)]

**Target:** Appropriate measures are in place to prevent direct infiltration of agricultural pesticides and nutrients in run-off from agricultural roads and drainage systems.

**Background:** Enforcement of measures stipulated in the water protection legislation is regulated federalistically in Switzerland, i.e. differently in each of the 26 cantons. The federal government issues implementation guidelines with the aim of standardising and reinforcing implementation. Implementation guidelines on the use of agricultural pesticides (AP) and on the use of nutrients and fertilisers are intended to explain the legal bases for water protection and clean air in the context of soil inputs used in agriculture.

<sup>134</sup> VSA 2007

<sup>135</sup> VSA 2005

<sup>136</sup> Various guidelines: <http://www.vsa.ch/publikationen/>

<sup>137</sup> VSA / FES 1994

<sup>138</sup> see <http://www.bafu.admin.ch/chemikalien/01405/01408/> und <http://www.iksr.org/>

<sup>139</sup> VSA 2011

<sup>140</sup> Art. 7 Water Protection Act, Art. 8 Water Protection Ordinance



**Target achievement:** The implementation guidelines "Nutrients and the use of fertilisers in agriculture" were published in 2012. The implementation guidelines "Use of AP in agriculture" are still being developed.

### 3.10.1. Discharges of untreated storm water overflows

**Possible target:** Carry out a data survey of untreated storm water overflows.

**Background:** Detailed guidelines for the management of storm water in Switzerland have been issued by the VSA<sup>141</sup>. As a general rule, non-polluted storm water must be allowed to infiltrate into the ground if permitted by local conditions. This practice will be introduced in stages in the course of drafting and updating the General Drainage Plans (GDP). In the long term this will reduce the quantity of storm water in mixed water sewers and thus the frequency of discharges of untreated storm water overflows into waters. However, no nation-wide data are currently available on the frequency, quantities and pollution levels of discharges of untreated storm water overflows.

**Target achievement:** New guidelines "Discharges of untreated storm water overflows into water bodies" have been produced, in which the design and dimensions of storm water relief systems and storm water tanks have been revised in line with a new, emissions-oriented approach. The guidelines will be used for new infrastructures and, in particular, infrastructures requiring remediation. As yet there is no national data-survey project.

### 3.10.2. Road run-off

**Target:** All road drainage fulfils the requirements of the water protection legislation.

**Background:** In the late 1990s it became increasingly apparent that the prevailing practice for the drainage of roads can lead to the contamination of waters. The Water Protection Ordinance of 28.10.1998 and the SAEFL guide to "Water protection in the drainage of traffic routes" in 2002 created the basis for a new approach to road drainage. Since there is a major need for action in respect of the national roads, the FOEN is working closely with the Federal Roads Office (FEDRO) with the aim of implementing a new drainage strategy in the near future. The study "Methods for managing road run-off. State of the art" was published in the second quarter of 2010.

**Target achievement:** The implementation of the new drainage strategy is progressing well, but is still in its initial stages. This is partly because the technical methods for treating road run-off in situations in which technical measures are required are not yet established. Therefore, at the present stage, an assessment of target achievement does not make much sense.

In the coming years, the FEDRO will develop a plan which will illustrate progress with national roads. The results of this planning work can provide a basis for producing a corresponding overview of the situation at cantonal and communal level.

### 3.11. Quality of discharges from wastewater treatment installations [Art. 6, Paragraph 2 (h)]

**Target:** 100 % of wastewater treatment plants fulfil the requirements for discharges of communal wastewater specified in the Water Protection Ordinance. Industrial wastewaters are treated according to the state of the art.

**Target achievement:** The cantons monitor the situation and have the corresponding data. The degree of target achievement at national level has not been established to date.

**Proposed target:** Optimise central data capture with respect to wastewater treatment at federal level.

**Background:** In Switzerland more than 700 central wastewater treatment plants (WWTPs) treat the country's wastewater to a high technical standard. For this reason the emphasis today is on preserving the value and the performance of these installations and on optimising operational and organisational processes. It may be necessary to expand the capacity of the WWTPs and to incorporate further treatment stages in order to equip the existing installations for the future (see section 3.6). An

<sup>141</sup> VSA 2002

implementation guideline defines the reporting of operational data from WWTPs against this background.

**Target achievement:** Since the 1980s, the required data have been recorded by the WWTP operators and industry and forwarded to a central WWTP database at the FOEN. However, this is not managed in a fully comprehensive and standardised manner, and this makes it difficult to allow nation-wide statements to be made for Switzerland. The Federal Law on Geoinformation (GeolG) entered into force on 1 July 2008. Its purpose is to establish binding federal legal standards for the recording, modelling and exchange of federal government geodata at national level. The law also contains new legal bases for management of wastewater data at cantonal and communal level and it improves access for federal offices, the business community and the population to these data, which are recorded and managed at great expense.

### 3.12. Disposal or reuse of sewage sludge [Art. 6, Paragraph 2 (i), first part]

The agricultural use of sewage sludge has been banned in Switzerland since 2008<sup>142</sup>. Sewage sludge is incinerated. The disposal of sewage sludge is being regulated as part of the current revision of the Technical Waste Ordinance (TVA).

**Possible target:** Determine the most sustainable method in the long term for utilising sewage sludge with minimal pollution of the environment and waters.

**Background and target achievement:** A study commissioned by the FOEN investigated the impact of the disposal of sewage sludge and of recovering nitrogen and phosphorus from sewage sludge. The aim was to establish the most sustainable way in the long term of utilising the sewage sludge. A multiple-criteria study tested eight different ways of disposing of sewage sludge. The evaluation incorporated ecological criteria (lifecycle analysis) and economic and social aspects - including the use of nutrients and phosphorus in particular<sup>143</sup>.

The study reached the following conclusions:

- Separate incineration is a suitable and future-oriented way of disposing of sewage sludge.
- Utilisation in the cement industry is an equally good alternative.
- The ash from incinerating sewage sludge should be stored in dedicated landfill sites to ensure that P can be recycled subsequently.
- Investment in sludge gasification or wet oxidation cannot be recommended from today's perspective.

### 3.13. Quality of wastewater used for irrigation purposes [Art. 6, Paragraph 2 (i), second part]

According to Art. 7 of the Water Protection Act (GSchG) and Art. 8 of the Water Protection Ordinance (GSchV), in Switzerland, contaminated wastewater may not be used for irrigation purposes. Therefore no targets are set in this regard.

### 3.14. Quality of waters used as sources for drinking water [Art. 6, Paragraph 2 (j), first part]

#### 3.14.1. Groundwater

**Target:** The quality of groundwater used or envisaged for use as drinking water meets the requirements of the Water Protection Ordinance, Annex 2.

<sup>142</sup> Annex to the Ordinance on risk reduction related to the use of certain particularly dangerous substances, preparations and articles (Chemical Risk Reduction Ordinance, ChemRRV) of 18. Mai 2005, SR 814.81

<sup>143</sup> Holinger, econcept, esu-services 2011. Comparison of different ways of disposal of sludge from the Lucerne region using multi-criteria analysis and life cycle assessment: <http://www.bafu.admin.ch/gewaesserschutz/01308/01325/index.html?lang=de>

**Background:** The quality of waters is constantly being improved by a wide variety of measures, including for example the plans for water protection and nitrate or agricultural pesticide projects (see next target).

**Target achievement:** The quality of groundwater used or envisaged for use as drinking water is generally very good<sup>144</sup>. Only approx. 50 % of the groundwater that is used as drinking water needs to be treated, usually requiring only a simple (mainly preventive) disinfection process. The National Groundwater Monitoring NAQUA allows the compliance of groundwater quality according to the requirements of the Water Protection Ordinance (GSchV) to be monitored. At some measuring sites, certain substances, e.g. pesticides, chlorinated hydrocarbons and, in particular, nitrate, are found in concentrations exceeding the requirements of the Water Protection Ordinance, although these are not harmful to health<sup>145</sup>. See also section 2.5.1.2.

The implementation guideline Environmental Protection in Agriculture brings together the legal provisions affecting the environment and explains unclear legal terms. These include the provisions for protecting groundwater. The aim of the implementation guideline is to reinforce implementation and achieve a more uniform standard throughout Switzerland. The implementation guideline contains various modules including construction-related environmental protection, nutrients and the use of fertilisers and pesticides.

This target is pursued by establishing the cause of contamination of groundwater reserves which do not meet the quality requirements and implementing remediation measures (using the polluter-pays principle), some of which receive funding from federal sources (Art. 62a GSchG, Contaminated sites, see following targets).

**Target:** Reduction of the nitrate levels in groundwater (projects according to Article 62a GSchG)<sup>146</sup>

**Background:** Based on Article 62a of the Water Protection Act, the nitrate strategy aims to reduce nitrate levels in groundwater in clearly defined, contaminated areas of contribution to values below 25 mg/l by agricultural measures, with the specific aim of achieving compliance with the requirements of Annex 2 GSchV. If nitrate concentrations in excess of 25 mg/l (the figure stipulated in Annex 2 GSchV) are detected in a groundwater body used or envisaged for use as drinking water, the cantons are required to draw up and implement remediation measures in accordance with the water protection legislation. In order to actively promote this reduction in nitrate levels in contaminated groundwater bodies, targeted cantonal remediation projects are financially supported by the federal government (Article 62a GSchG). Farmers who implement contractually agreed measures to reduce nitrate leaching into groundwater as part of a remediation project of this type receive compensation for the costs, primarily from the federal government but also, to a lesser extent, from the cantons, communes or water suppliers.

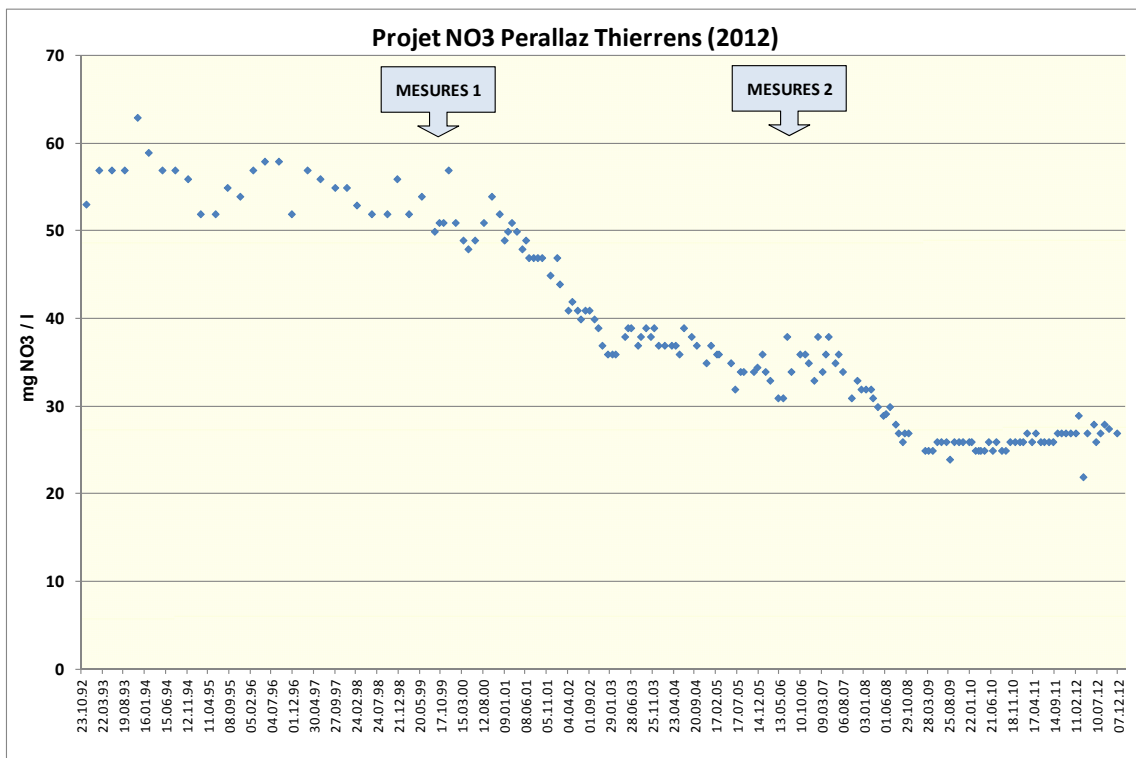
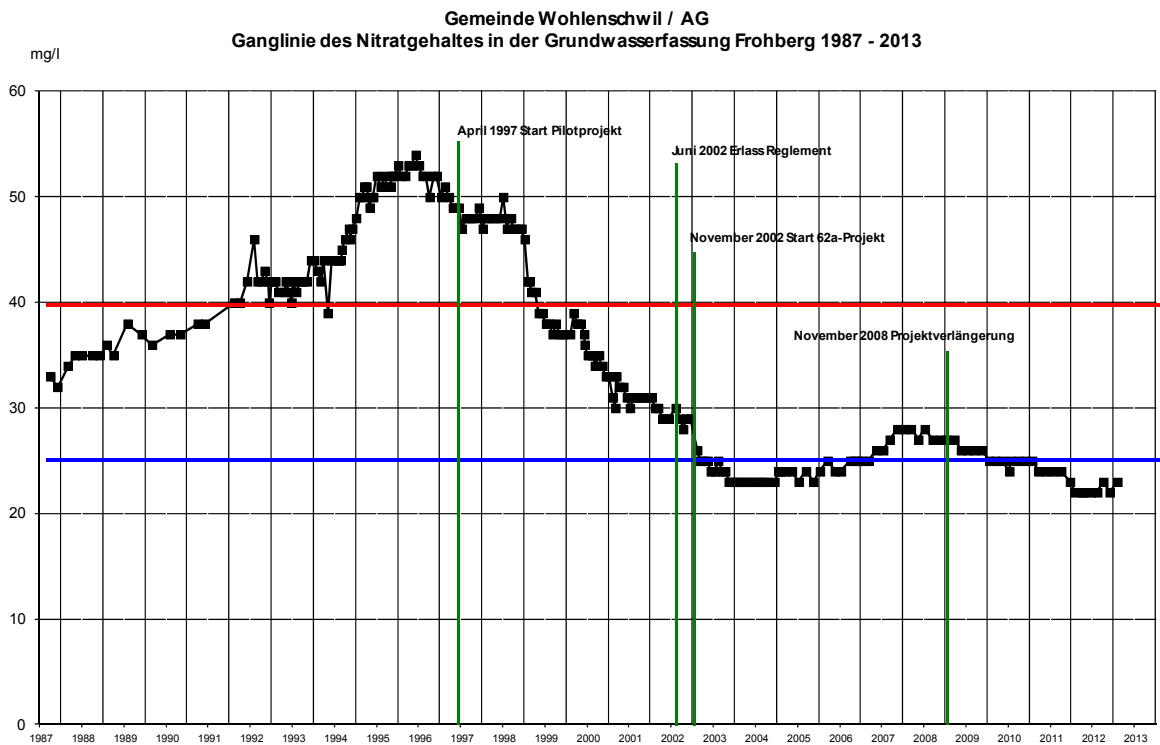
**Target achievement:** When implemented consistently, projects in accordance with Article 62a GSchG prove successful, as shown by the examples of catchment installations in Wohlenschwil (canton of Aargau) or Thierrens (canton of Vaud) (Figure 2), although groundwater remediation of this kind can take several decades if the residence time of the groundwater is long. In view of the current nitrate situation in groundwater, however, in many cases the cantons are still reluctant to undertake these targeted remediation projects, and the problem is often "solved" by abandoning the contaminated drinking water catchment installation or combining polluted water with uncontaminated water from other sources.

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<sup>144</sup> OECD 2007

<sup>145</sup> FOEN 2009

<sup>146</sup> <http://www.bafu.admin.ch/gewaesserschutz/01308/01313/01316/>



**Figure 2: Nitrate projects according to Article 62a GSchG: Nitrate profiles for catchment installations in Wohlenschwil, canton of Aargau (top) and Thierrens, canton of Vaud (bottom).**

### Examples of nitrate projects in practice

An illustrative example of a targeted nitrate remediation project is Wohlenschwil (canton of Aargau), where intensive efforts have been made since 1996 to reduce nitrate leaching. In addition to measures such as maintaining a green cover in winter or introducing no-till systems, around 22 hectares of arable

land have been converted to pasture, with the result that about 45 of the 62 hectares of agricultural land in the catchment area are now used as grassland.<sup>147</sup>

Another successful example is the project in Thierrens (canton of Vaud) where the decrease in nitrate concentrations in groundwater clearly reflects the measures implemented. The most efficient measure is the conversion of open cropland to grassland.

**Proposed target:** Improve the implementation of water protection: reinforce information and oversight.

**Background:** In some areas there is a backlog in the designation and management of groundwater management zones. This proposed target was developed as part of the Federal Council's report on the management of local water shortages in Switzerland<sup>148</sup>.

### 3.14.2. Surface waters

**Target:** The quality requirements of the Water Protection Ordinance, Annex 2, are fulfilled.

**Background:** Monitoring of the quality of surface waters is carried out by the cantons and coordinated at national level.

**Target achievement:** In terms of contamination with nutrients, the quality of Switzerland's waterbodies is good to very good, with the exception of small watercourses in the densely populated parts of Central Switzerland.<sup>149</sup> However, the discharge of organic trace elements resulting from agriculture, municipal drainage and other sources (e.g. road run-off, sealed surfaces) remains a challenge for water protection. Especially in small or medium-sized watercourses in intensively used regions of Central Switzerland, concentrations that can lead to adverse effects on plants and animals in waters have been measured.

The state of Swiss lakes is considered largely good today<sup>150</sup>. Improvements in the quality of rivers and streams, along with more sophisticated wastewater treatment, have produced positive effects on lake water quality and thus also benefits for water supply companies drawing from lake water.<sup>151</sup> The drinking water supply from lake water is monitored and safeguarded thanks to effective treatment plants.

**Target:** Surface water quality is recorded comprehensively in Switzerland by means of the harmonised "Methods for assessing the ecological status of rivers" and by corresponding methods for the lakes.

**Background:** The harmonised "Methods for assessing the ecological status of rivers"<sup>152</sup> provide standardised methods for investigating and assessing the state of rivers in Switzerland. A concept for assessing the state of the lakes will be published in the near future<sup>153</sup>. In levels of different processing intensity (stages), the methods record the structural and hydrological, biological, chemical and ecotoxicological aspects of water quality. The developed methods serve as implementation aids for the cantonal authorities.

**Target achievement:** The methods for rivers that have already been prepared will be applied by the cantons as part of the cantonal monitoring of waters. Since 2011, the methods have also been applied at national level at more than 111 representative locations in Switzerland as part of the "Coordinated Monitoring of Surface Waters" (NAWA). This project is intended to form the basis for documenting and evaluating the condition and development of Swiss surface waters at national level (initially only in watercourses, and subsequently in lakes as well) (see also section 2.5.1.1).

<sup>147</sup> FOEN/FOWG 2004

<sup>148</sup> FOEN 2012: Management of local water shortages in Switzerland. Report of the Federal Council to the postulate on "Water and agriculture: future challenges. <http://www.bafu.admin.ch/wasser/01444/01991/12442/index.html?lang=de>

<sup>149</sup> OECD 2007

<sup>150</sup> Spreafico & Weingartner 2005

<sup>151</sup> Eawag 2009

<sup>152</sup> <http://www.modul-stufen-konzept.ch/>

<sup>153</sup> Schlosser et al. 2013

In monitoring the quality of water resources it is also important to ensure that laboratories capable of carrying out the water analyses are available in the long term. Both the chemical (nutrient analysis, organic trace analysis) and the ecotoxicological measurements and evaluations are standardised in order to produce comparable findings. In the field of ecotoxicology, internationally certified biotests are currently being developed in cooperation with academia and industry.

**Target:** The Swiss Environmental Monitoring Network (NUS) provides a system for coordinating environmental monitoring throughout Switzerland.

**Background:** Environmental data can currently be obtained for numerous different data sources in the FOEN, institutes and cantonal departments. The "Swiss Environmental Monitoring Network NUS" should improve national coordination of environmental data capture, exchange and management so that all users have easier and faster access to the data. NUS covers all the processes, agreements and technical infrastructures involved in establishing, operating and periodically updating a coherent, needs-oriented database to provide environmental information for the whole of Switzerland.

**Target achievement:** In October 2008 the "Swiss Environmental Monitoring Network NUS" was declared a priority project by various representatives of cantons, cities and the federal government. By mid-2008 almost all cantons and the Principality of Liechtenstein had joined the network. The NAWA project described above provides the data for surface water quality defined by the NUS. The implementation of the GeolG (section 3.11) will provide further support for the environmental monitoring targets.

### 3.15. Quality of waters used for bathing (rivers and lakes) [Art. 6, Paragraph 2 (j), second part]

**Proposed target:** Revision of the existing recommendation on recording and assessing the quality of the water in lake and river baths, in line with EU Directive 2006/7/EC.

**Background:** Since the 1960s, efforts have been made in Switzerland to protect the health of bathers by the hygiene assessment of lake and river baths. At European level, the authorities have, for the first time, set uniform standards for the investigation and evaluation of bathing waters in the "Directive on Bathing Water Quality". This European Directive was published in 1976 and revised in 2006.<sup>154</sup>

In Switzerland, the quality of bathing water is monitored by the cantonal laboratories. To this day, a recommendation for the hygiene assessment of lake and river baths<sup>155</sup> issued in 1991 serves as the methodological basis of this monitoring. In view of the experience acquired over the past few years in the practical implementation of hygiene assessments of lake and river baths, and in view of developments in microbiological methods, it was decided to revise the recommendation of 1991 on the basis of EU Directive 2006/7/EC.

**Target achievement:** A working group, consisting of representatives of the FOPH, FOEN and the cantonal laboratories, has revised the recommendation of 1991 on the basis of EU Directive 2006/7/EC and in consultation with the cantonal laboratories. The new recommendation is expected to be published in May 2013 and to form the basis for recording and evaluating the quality of water used for bathing for the first time in the 2013 bathing season.

### 3.16. Quality of waters used for aquacultures [Art. 6, Paragraph 2 (j), third part]

Since no significant aquacultures exist in Switzerland, no targets are set for this parameter.

### 3.17. Quality of waters used for swimming baths [Art. 6, Paragraph 2 (k)]

**Possible target:** Produce a Bathing Water Ordinance for Switzerland.

**Background:** No ordinance governing the water quality of swimming baths currently exists nation-wide for Switzerland, although there is a standard 385/1 (version: 2010), issued by the Swiss Society of Engineers and Architects (SIA), on the requirements relating to water and water treatment plants in

<sup>154</sup> <http://www.bag.admin.ch/themen/lebensmittel/04858/04864/04904/04937/>

<sup>155</sup> FOPH et al. 1991



baths open to the public<sup>156</sup>. Bathing water regulations also already exist in individual cantons, for example in the cantons of Aargau<sup>157</sup> and Fribourg<sup>158</sup>.

**Target achievement:** The Foodstuffs Act (LMG) is currently being revised. The revised version of the LMG stipulates the establishment of legal bases for bathing water and is scheduled to be passed by Parliament in 2013. If the new LMG stipulates that water is a utility article, the FOPH will prepare a draft version of a Bathing Water Ordinance.

### 3.18. Identification and remediation of particularly contaminated sites [Art. 6, Paragraph 2 (l)]

**Target:** Recording, investigation and remediation of contaminated sites. The cantons fulfil their obligations in accordance with the Ordinance on Contaminated Sites concerning local pollutants that could jeopardise waters.

**Background:** According to the Ordinance on Contaminated Sites (AltIV)<sup>159</sup> and the Water Protection Ordinance (GSchV), if the cantons detect any pollutants originating from contaminated sites (landfills, industrial sites or sites of accidents) which could jeopardise waters, they must determine their causes and define and implement corresponding measures.

**Target achievement:** The cantons monitor the situation and possess corresponding data. A land register managed by the relevant cantonal departments provides an overview of all contaminated sites and thus forms the basis for future action (e.g. investigation and monitoring of the need for remediation, sustainable remediation of contaminated sites depending on urgency)<sup>160</sup>. Most of the cantons have already produced their land registers. The other cantons were due to have finished producing their land registers in 2011.

In 2012 the FOEN compiled the data on contaminated sites contained in the land registers compiled by the cantonal and federal offices and evaluated this information. This is the first time that an overview of the contaminated sites has been produced for Switzerland as a whole. The data show that there are some 38,000 contaminated sites in Switzerland, fewer than previously assumed. The authorities are dedicating substantial resources to dealing with contaminated sites<sup>161</sup>.

### 3.19. Effectiveness of systems for the management, development, protection and use of water resources [Art. 6, Paragraph 2 (m)]

**Target:** The federal government promotes integrated river basin management.

**Background:** Although Switzerland has not adopted the Water Framework Directive (Directive 2000/60/EC), the federal government sees great potential benefit in the integrated management of water resources. As a member of various international transboundary river basin commissions (see section 4.7), Switzerland is working with its neighbouring countries and thus indirectly applies certain principles of the Water Framework Directive.<sup>162</sup> The aim in the long term is to produce a wide-ranging strategy for the management of water resources, waters and water infrastructures. The efforts to promote integrated river basin management are based on partnerships between the various users which take into account all the interests of water resource management. Certain river basins are already being managed according to these principles. See box below.

This approach particularly highlights conflicting targets, e.g. the use of water to generate hydroelectric power versus the need to protect waters/landscapes, and the space needed for the renaturing of waters (see next target) versus the protection of groundwater as a resource for drinking water. In this context

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<sup>156</sup> SIA 2010

<sup>157</sup> Ordinance on Public Baths (Baths Ordinance, BÄV) of 21 March 2001

<sup>158</sup> Ordinance on hygiene in Public Swimming Baths and Lidos of 29 June 2004

<sup>159</sup> Ordinance on Remediation of Contaminated sites (Contaminated Sites Ordinance, AltIV) of 26 August 1998, SR 814.680

<sup>160</sup> <http://www.bafu.admin.ch/altlasten/01608/>

<sup>161</sup> <http://www.news.admin.ch/message/index.html?lang=de&msg-id=46545>

<sup>162</sup> SOER 2010

the principles of integrated river basin management, which takes a wide-ranging, long-term and cross-sectoral approach, can provide greater freedom in the search for solutions.

**Target achievement:** A national "Integrated River Basin Management" working group<sup>163</sup> was established at the end of 2008 with the aim of coordinating activities in order to elaborate basic principles for integrated river basin management. As a first step, the working group prepared a set of **guiding principles** designed to introduce the principles of river basin management and thus to create a common framework for the stakeholders in the water sector in the cantons, regions and communes<sup>164</sup>. The document explains, in comprehensible language, why Switzerland promotes the integrated river basin management approach and the implications, benefits and long-term implementation objectives that are being pursued.

In the second step, a **practical guide** to integrated river basin management in Switzerland was developed<sup>165</sup>. This guide gives concrete form to the guiding principles and provides assistance with the methodological approach. The practical guide does not offer standard solutions; it explains implementation options and describes practical examples. It refers to existing methods, tools and implementation models which have been tested in practice, where these are available.

The principles of integrated river basin management have also been integrated as effectively as possible in the implementation of the **revised water protection legislation** (see next target). The revised water protection legislation explicitly states the need to coordinate water management projects and expressly calls on the stakeholders in the river basin to consult with each other. Implementation guidelines for these statutory requirements, with an annex listing examples of possible forms of coordination, will be published shortly<sup>166</sup>.

An interdisciplinary research project on "**Integrated Water Governance with Adaptive Capacity in Switzerland**" (IWAGO), which forms part of the NRP 61 (see section 1.10.1), is working on institutional aspects of an integrated water sector and integrated water management. IWAGO has developed and applied aids, known as practical tools, for analysing and structuring water management issues. The target group intended to use these practical tools comprises the stakeholders involved in the water sector in Switzerland, particularly the cantonal and communal offices, administration bodies, planning groups and commissioned planners. The practical tools represent possible approaches to analysing and structuring questions relating to water management and are explained using examples of cases encountered during the IWAGO project. A project database enables practical examples to be located<sup>167</sup>.

The "Guide to water cooperation for communes"<sup>168</sup> was produced to tie in with the International Year of Water Cooperation 2013; its aim was to encourage cooperation across communal boundaries (see also section 4.7.1). The Federal Office of the Environment FOEN encouraged water management experts to pool their knowledge and experience, and this information was published in the Guide to water cooperation for communes. The Guide to water cooperation for communes suggests situations in which cooperation is worthwhile and provides ideas for going about it. The guide details seven steps, from idea to cooperation in water management, and explains all the aspects that have to be clarified, right up to the decision on whether or not to pursue cooperation in practice.

Further examples of how integrated river basin management can be promoted:

Pilot river basin management projects receive support from the federal government (financial, expertise, follow-up) (see box).

River basin management is being included in the climate adaptation strategy (water sub-strategy) as an overriding strategic target and integrated into the definition of measures (see section 1.10.2).

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<sup>163</sup> <http://www.wa21.ch/index.php?page=212> ; <http://www.bafu.admin.ch/wasser/01444/08981/index.html?lang=de>

<sup>164</sup> <http://www.bafu.admin.ch/publikationen/publikation/01576/index.html?lang=de>

<sup>165</sup> <http://www.bafu.admin.ch/publikationen/publikation/01652/index.html?lang=de>.

<sup>166</sup> <http://www.bafu.admin.ch/umsetzungshilfe-renaturierung/11360/index.html?lang=de>

<sup>167</sup> <http://www.wa21.ch/index.php?page=469>

<sup>168</sup> [www.wasser2013.ch/wasserkompass](http://www.wasser2013.ch/wasserkompass)



## Practical examples of integrated river basin management

**Birs**<sup>169</sup>: Major rivers such as the Rhine, Rhône, Aar, Reuss, Linth, Thur and Birs traverse several cantons on their way from source to mouth, or until they leave Switzerland. Various forms of intercantonal cooperation have arisen around these rivers, some of which – the correction of the Jura waters, for example – date from the beginnings of the Swiss Confederation. One example is the intercantonal planning of the Birs river basin.

The river basin of the 75-kilometre river encompasses the cantons of Berne, Jura, Solothurn and both Basel cantons. Around 170,000 people live in this region in 90 towns and villages. The planning for this project showed that, in addition to drinking water quality and flood protection, major concerns included the revitalisation of the Birs. The intention was to create natural water and water meadow landscapes, thus providing a habitat in which species native to the region could again settle. At the same time, municipal drainage and waste water treatment were to be improved (contamination with heavy metals and organic substances, leaching of nutrients). Since 2010, the intercantonal "Birs commission for integrated river basin management IEM" has ensured that all measures are implemented in a coordinated manner and that joint answers and solutions are found to problems concerning water protection, flood protection and water use.

**Val-de-Ruz**<sup>170</sup>: Communes can achieve a great deal by working together to resolve water management issues, as shown by the example of Val-de-Ruz. The people living in the valley between Neuchatel and La-Chaux-de-Fonds suffered from poor water quality and low water levels. A regional drainage plan uncovered a number of reasons for these problems: inadequate infrastructure, overuse of groundwater, intensive agriculture and an unnatural watercourse morphology. In addition, responsibility for water management was shared among 16 cantons and 6 intercommunal organising bodies. Against this background, the communes in Val-de-Ruz decided that it was time to act. They involved all the stakeholders in the task of finding a solution and handed responsibility for the entire water cycle to a single body. This newly created organisation, the regional communal association MultiRuz, took over all the functions and infrastructures relating to water management at the start of 2011: drinking water, waste water, agricultural drainage, waterbody maintenance.

The **water strategy of the canton of Berne**<sup>171</sup> illustrates how the cantonal government intends to manage the resource water within the existing legal framework. The strategy is binding on the cantonal administration. It deals with the management of the resource water from a number of different viewpoints, taking into account both the need to use the canton's water and the need to protect it. The focus is on water usage, water supply and municipal drainage (protection of waterbodies). Top priority is accorded to the long-term protection of the drinking and utility water supply and the promotion of hydroelectric energy generation. The water strategy pays special attention to the handling of conflicting uses of water. This involved the development of new instruments such as the hydrographic map showing hydroelectric energy usage categories. The water strategy shows what needs to be done to maintain the high standard of water supply and municipal drainage that has been achieved in the long term despite diminishing financial resources. Here it emphasises the optimisation of management and infrastructure. The **municipal drainage plan (VOKOS)** within the water strategy gives a prominent role to the **regionalisation** of municipal drainage. The implementation of municipal drainage measures is largely the responsibility of the communes. This task requires expert knowledge which is frequently not available, particularly in smaller communes. The main thrust of the municipal drainage plan is the regionalisation and professionalisation of municipal drainage. From a cantonal point of view, organisations covering entire WWTP catchment areas would be a good approach. These organisations would own all public municipal drainage facilities and would have recognised experts to carry out the associated tasks.

**Target:** Within a few generations, some of the heavily engineered waters are transformed into as natural a condition as possible, and for all waters an adequate area is defined which may only be managed extensively as an ecological compensation area (biodiversity promotion area from 2014). In addition, within 20 years the negative effects on waters of hydroelectric power generation (hydropeaking, bed-load balance, accessibility for fish) have been eliminated as far as possible.

<sup>169</sup> <http://www.wasser2013.ch/schweiz/kantone/>; <http://www.labirse.ch/>

<sup>170</sup> <http://www.multiruz.ch/>

<sup>171</sup> <http://www.bve.be.ch/bve/de/index/direktion/ueber-die-direktion/dossiers/wasserstrategie.html>

**Background:** The revitalisation of waters should restore their natural functions and strengthen their social benefit, while at the same time eliminating the major negative environmental effects arising from hydroelectric power generation (hydropeaking, inadequate connectivity and disrupted bed-load balance). These aims were formulated in a parliamentary counter-proposal to an initiative of the Swiss Fisheries Association.

**Target achievement:** The revised Water Protection Act came into force on 1.1.2011, the corresponding changes to the Water Protection Ordinance took effect on 1.6.2011. In order to support the implementation of the new requirements, they were explained in detail in modular implementation guidelines (for the aspects revitalisation, fish migration, hydropeaking and bed-load balance) and in circulars, leaflets and data sheets (aquatic environment)<sup>172</sup>.

The revised Water Protection Act is one of the most important stages in Switzerland's water protection efforts. Currently about 40 per cent of the watercourses in Central Switzerland, and more than 80 per cent in urban areas, are engineered. Energy is produced from more than 90 per cent of all usable waters. Water bodies should once again be given more space so that they can perform their natural functions. The changes to the Water Protection Act are an important step towards ensuring that watercourses and lake shores in Switzerland can become more natural again and can contribute to maintaining biodiversity by becoming species-rich habitats. Moreover, this will increase the benefit they provide to the population in the form of recreation areas and tourist attractions.

### **3.20. Inspection of water supply companies on the basis of a risk analysis**

The supervisory authorities, acting through the Association of Swiss Cantonal Chemists, have published a "concept for risk evaluation of drinking water distribution"<sup>173</sup>. This document describes the existing procedure for evaluating the risk associated with the distribution of drinking water. It is applicable to all forms of drinking water distribution, irrespective of whether an HACCP (Hazard Analysis and Critical Control Points) process or the GMP (Good Manufacturing Practice) guidelines are used.

The document also complies with the Federal Food Chain Unit (FFCU) regulations, which determine the frequency with which monitoring should be performed as a function of the potential risks, based on a national monitoring plan covering several years<sup>174</sup>.

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<sup>172</sup> <http://www.bafu.admin.ch/umsetzungshilfe-renaturierung/index.html?lang=de>

<sup>173</sup> <http://www.bag.admin.ch/themen/lebensmittel/04865/04892/index.html?lang=fr>

<sup>174</sup> <http://www.bvet.admin.ch/blk/02557/index.html?lang=fr>

## **4. Overall evaluation**

### **4.1. Switzerland, a water tower for Europe**

Switzerland, a water tower for Europe, is in the fortunate position of being provided with adequate natural water resources. The drinking water needs for the whole of Switzerland can be covered by just 2 % of its annual precipitation. With its 1500 lakes, countless streams and rivers and its glaciers, Switzerland not only benefits from abundant valuable freshwater resources, but their quality can also be considered as good from the microbiological and chemical point of view. This is largely attributable to comprehensive water protection efforts. Drinking water supplies are ensured by around 3000 water supply companies. Thanks to the high quality of the raw water resources, sophisticated water treatment processes are rarely required. Disease outbreaks resulting from impurities in the drinking water have only occurred to date in isolated cases as a result of failure to comply with the legally prescribed protective measures. Around 750 large-scale and 3500 small-scale sewage treatment plants and 90,000 km of sewage pipes ensure almost complete coverage for the removal and comprehensive treatment of wastewater.

With the high quality of water resources and drinking water achieved in Switzerland, coupled with the high performance level of the existing infrastructures, Switzerland meets the key requirements of the Protocol on Water and Health.

### **4.2. Implementation of the Protocol on Water and Health in Switzerland**

For decades Switzerland has made great efforts to improve and preserve the water quality of its groundwater and surface waters. In 1953 the Swiss people approved the inclusion of a water protection article in the Federal Constitution. The first Water Protection Act came into effect in 1957 on the basis of this article. This was followed, in 1992, by a new, more comprehensive Water Protection Act, which was designed to protect waters from all kinds of adverse influences. As a foodstuff, drinking water is subject to the comprehensive food legislation.

Irrespective of the Protocol on Water and Health, the two federal authorities responsible for water protection and for drinking water, the FOEN and the FOPH, have always developed strategies and formulated objectives designed to implement the legal requirements and thus preserve and improve water quality. This is one reason why little attention has been paid to date in Switzerland to the Protocol on Water and Health. The targets in this report have thus far been specified largely independently of the Protocol.

After the Protocol was ratified (2006), the stakeholders concerned with the Protocol (FOPH, FOEN, FOAG, SDC, Eawag) attended an initial meeting in 2007 primarily to share information and opinions on the Protocol on Water and Health. Closer collaboration between the FOPH and the FOEN began in 2009 in order, on the one hand, to prepare the first report and, on the other, to launch the target-setting process. The future implementation of the Protocol was discussed at the start of April 2010 at a bilateral meeting of the Heads of the FOPH and the FOEN. The review of the current situation in this report forms the basis for the future course of action. The exchange of views between the FOPH and the FOEN is to be continued in the second half of 2013 with the aim of defining a list of possible targets. This list will then form the basis for discussions with other stakeholders (FOAG, SDC, Eawag in addition to FOPH and FOEN) so that, ultimately, priorities can be set and the selected targets elaborated. The next step will be to involve other affected parties in the process, e.g. the cantons or associations (SGWA, VSA, etc.), in order to formulate the definitive targets with corresponding indicators, timeframes, etc.

Setting targets in relation to water is not new for Switzerland – targets and requirements are embedded in the legislation (for example in the Water Protection Act). What is new about the strategy of the Protocol for Switzerland, however, is the nature of the programme, i.e. that the achievement of targets is linked to a specific timeframe. The Protocol also promotes cooperation between the relevant departments and other stakeholders concerned with water. Finally, the Protocol provides the option of forcing the setting of targets or of lending greater weight to certain targets.

### **4.3. Data on water quality**

Water quality in Switzerland can essentially be generally rated as good from the chemical and microbiological point of view. However, micropollutants represent a major challenge and a potentially significant problem for water quality, particularly in small watercourses. For some issues it is difficult to prove these assertions for the whole of Switzerland or to make corresponding data available to the public (see also section 2.1). For example, there is no central overview of the quality of drinking water in Switzerland, and the corresponding data can only be obtained from each cantons and water suppliers. The development of a national drinking water database (see section 3.1) should prove helpful in this respect.

The observation programs conducted by the FOEN, in collaboration with the cantonal authorities, - the National Groundwater Monitoring NAQUA, the National Long-term investigation of surface watercourses NADUF and the National Monitoring of surface water quality NAWA - deliver representative data at the national level on the quality of groundwater, resp. of watercourses. The data from these three monitoring programs are managed centrally by the FOEN since 2013 in a single database.

The Protocol on Water and Health provides the opportunity to develop or extend national databases in order to produce a central overview of the water quality of the water resources and drinking water. Such an overview, in turn, will form the basis for future decisions and strategies designed to achieve further improvements in water quality.

#### **4.4. Raising public awareness**

The public has hitherto been informed about the Protocol mainly via the FOPH "Water and Health" website<sup>175</sup> and corresponding media releases. Further information on drinking and bathing water can be found on this site. Furthermore, according to the Food Ordinance, all drinking water suppliers are obliged to provide information about the quality of the supplied drinking water at least once a year. Many suppliers use the "Drinking Water Quality in Switzerland" Internet platform<sup>176</sup>, which has been set up and provided free of charge by the SGWA. Important information on drinking and bathing water is also made available to the public by the cantonal laboratories, e.g. in the form of their annual reports or via the Internet. In the future, it is also planned to publish a national overview of the quality of bathing waters for those which are relevant from a European perspective.

The public can obtain comprehensive information on water protection (surface and groundwater) from the FOEN website<sup>177</sup>. Information on the state and development of the environment, including on water quality, is presented on the FOEN "Environmental state" web page<sup>178</sup>. This information is published in greater detail every two years in the FOEN Environmental Report. At cantonal level, information is provided by the environmental protection departments via corresponding media sources. Overall, therefore, the public has numerous information channels at its disposal for obtaining an overview of the wide variety of issues connected with water.

#### **4.5. Research and education**

The research landscape in Switzerland in respect of water is highly varied, and a wide range of educational opportunities exists at basic and advanced levels.

Eawag<sup>179</sup> is a world-leading water research institute. The combination of natural and social scientists and engineers permits a wide range of water research, across the continuum from relatively unperturbed aquatic ecosystems to fully engineered wastewater management systems. To ensure that new findings and concepts from research are put into practice as quickly as possible, Eawag also fosters close contacts with experts from industry, the administration and professional associations.

The Swiss National Science Foundation (SNSF), the most important Swiss institution for promoting scientific research, has launched a National Research Programme on "Sustainable water management"

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<sup>175</sup> <http://www.bag.admin.ch/themen/lebensmittel/04858/04864/>

<sup>176</sup> <http://www.wasserqualitaet.ch/>

<sup>177</sup> <http://www.bafu.admin.ch/grundwasser/index.html?lang=de>:

<sup>178</sup> <http://www.bafu.admin.ch/umwelt/>

<sup>179</sup> <http://www.eawag.ch/>

(NRP 61<sup>180</sup>) (see also section 1.10.1). One aim of this programme is to elaborate scientific principles and methods for the sustainable management of water resources in Switzerland. The 16 projects were initiated in January 2010 and are scheduled for completion in mid-2014. Like all other NRPs, NRP 61 attaches great importance to implementation and communication. The public are kept regularly updated on the status of the research. The researchers present their results to decision-makers and the interested public, thereby promoting awareness of the programme in political and public discussions.

Various universities in Switzerland offer study courses on the basics of water management and municipal water management.

The core element in the high level attained by water supply and disposal facilities in Switzerland is the thorough training given to operatives (Switzerland's dual vocational training system). The industry associations SGWA and VSA offer a wide range of vocational training encompassing plant management, pipe construction, installation supervision, quality assurance and occupational safety. Vocational training is rounded out by technical meetings to discuss current topics in the water sector.

The technical journal Aqua&Gas, which is also the publication medium of the SGWA and the VSA, is widely considered to be the leading journal in the field of municipal water management.

#### 4.6. National cooperation

The table below provides an overview of the various working groups in which the national and cantonal authorities in Switzerland and the water suppliers are involved:

Organisations, working groups:	Coordination:	Purpose:	Average number of meetings per year:
Federal Group on Water in Switzerland	FOEN, ARE <sup>181</sup> , FOAG, FOPH, SECO <sup>182</sup> , SFOE	Exchange between the federal departments on the subject of water; identification of "emerging issues"	2 meetings
UNO Year of Water Cooperation <sup>183</sup>	FOEN, SDC, <sup>184</sup> SECO, FOAG, cantonal departments ...	Cooperation on matters concerning water; focus on the communal level (see below)	
Swiss observation group SBG-CH	FOEN, ARE, FOAG, FOPH, SECO, SFOE	Strategic and technical support for the National Groundwater Monitoring (NAQUA)	1 meeting
Strategic Advisory Group on Surface Waters / Quality SBO	FOEN, EAWAG, cantonal departments	Strategic and technical support for groundwater monitoring as a basis for implementation, planning measures and environmental observation (focus: chemistry, biology, morphology)	1 meeting
Federal Nitrate Working Group	FOAG, FOEN, FOPH, cantonal departments	Development of projects designed to reduce the impact of pesticides in groundwater envisaged for use as drinking water	4 meetings
Working group on drinking water and	VKCS, FOPH	Uniform application of legislation on drinking water and bathing water	3 meetings

<sup>180</sup> <http://www.nfp61.ch/>

<sup>181</sup> ARE: Federal Office for Spatial Development

<sup>182</sup> SECO: State Secretariat for Economic Affairs

<sup>183</sup> [www.wasser2013.ch](http://www.wasser2013.ch)

<sup>184</sup> SDC: Swiss Development and Cooperation Agency

<b>Organisations, working groups:</b>	<b>Coordination:</b>	<b>Purpose:</b>	<b>Average number of meetings per year:</b>
bathing water of the VKCS <sup>185</sup>		Discussion forum for problems relating to the implementation of federal law	
Principal commission of the SGWA (Swiss Gas and Water Industry Association)	SGWA, FOEN, FOPH, VKCS	Management of drinking water, decisions concerning water distribution	2 meetings
IDANE Wasser, interdepartmental group on water and sanitation	SDC, FOAG, FOEN, FOPH, SECO	Coordination of international activities, joint statements	3 meetings
Division responsible for water supply in emergencies	FONES, FOEN, FOPH, VKCS	Coordination of measures in situations where there are problems with the national supply	2 meetings

#### **4.7. International cooperation**

##### **4.7.1. International Year of Water Cooperation: Guide to water cooperation for communes**

The International Year of Water Cooperation has encouraged the FOEN to think about cooperation in the protection and management of water, with particular emphasis on the communal level. The Guide to water cooperation for communes<sup>186</sup> suggests situations in which water cooperation is worthwhile and ways of tackling it. In this way the communes can achieve greater freedom to identify solutions for water management which will meet the needs of future generations.

The Guide to water cooperation is designed to support cooperation with other communes and organisations. Coordination between different parts of the infrastructure and different projects within the same commune naturally also presents opportunities for improving the delivery of services and reducing costs.

##### **4.7.2. Protocol on Water and Health and sustainability indicators**

As part of its activities connected with the Protocol on Water and Health, Switzerland is responsible for managing the "Task force on Indicators and Reporting", which was set up at the initial meeting of the Protocol signatories. Important products issued by this Task Force include guidelines on the setting of targets, on evaluation of the process and on reporting, as well as guidelines and a template for the first report.

Under the auspices of the SDC, Switzerland supports the implementation of the Protocol on Water and Health in the Republic of Moldova, which ratified the Protocol in 2005. In this connection the SDC is initially involved in the process of target setting and reporting. One of the first challenges was to organise a meeting of the stakeholders concerned in order to announce the Protocol in Moldova and to outline the current situation. Further similar meetings are planned in order to identify and set national targets. Since one of the key aspects of the Swiss development aid programme for Moldova is concerned with the rural drinking water supply and sanitation<sup>187</sup>, the SDC is very interested in the national targets in this area. The Protocol provides a suitable framework for this process.

The SDC is also involved in certain aspects of the Protocol in connection with the "Water 2015" strategy. On the basis of Millennium target 7, the SDC is committed to halving the number of people

<sup>185</sup> ACCS: Swiss Cantonal Chemist Association

<sup>186</sup> <http://www.wasser2013.ch/wasserkompass>; <http://www.watercooperation2013.org/>

<sup>187</sup> [http://www.deza.admin.ch/de/Home/Laender/Gemeinschaft\\_Unabhaengiger\\_Staaten\\_GUS/Moldau\\_Republik](http://www.deza.admin.ch/de/Home/Laender/Gemeinschaft_Unabhaengiger_Staaten_GUS/Moldau_Republik)



who have no access to clean drinking water by 2015. The strategy also includes targets relating to food safety (water for nutrition).<sup>188</sup>

#### 4.7.3. International commissions

In the area of water protection Switzerland has entered into various obligations at international level, specifically in connection with the following five international water protection commissions: the International Commission for the Protection of the Rhine<sup>189</sup> (ICPR), the International Commission for the Protection of Lake Constance<sup>190</sup> (IGKB), the Commission for the Protection of the Waters of Lake Geneva<sup>191</sup> (CIPEL), the International Commission for the Protection of Italian-Swiss Waters<sup>192</sup> (CIPAIS) and the Commission for the Protection of the Marine Environment of the North-East Atlantic<sup>193</sup> (OSPAR).<sup>194</sup> Under the leadership of the FOEN, Switzerland is actively involved in the protection of these transboundary water bodies. As a result, e.g. thanks to the great efforts in Swiss water protection over the past few decades, pollution of the Rhine with nutrients and other pollutants has been substantially reduced. For example, the discharge of toxic heavy metals such as mercury, cadmium and lead has declined by over 95 per cent in the last 20 years. All of the targets set by the ICPR for the water quality in Basel are currently met. Nevertheless, the water quality will continue to be monitored in order to ensure, for example, that in the event of an incident in which chemicals could potentially enter the Rhine, the downstream areas are informed quickly and comprehensively.

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<sup>188</sup> SDC 2005

<sup>189</sup> [www.iksr.org](http://www.iksr.org)

<sup>190</sup> [www.igkb.org](http://www.igkb.org)

<sup>191</sup> [www.cipel.org](http://www.cipel.org)

<sup>192</sup> [www.cipais.org](http://www.cipais.org)

<sup>193</sup> [www.ospar.org](http://www.ospar.org)

<sup>194</sup> OECD 2007

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Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the community action in the field of water policy (EU Water Framework Directive, WFD)  
[http://ec.europa.eu/environment/water/water-framework/index\\_en.html](http://ec.europa.eu/environment/water/water-framework/index_en.html)

Directive 2006/7/EC of the European Parliament and of the Council concerning the management of the bathing water quality and repealing Directive 76/160/EEC. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:064:0037:0051:EN:PDF>

#### **Mentioned legislative texts at national level:**

Legislative texts at national level can be found in German, French and Italian at:  
<http://www.admin.ch/ch/e/rs/rs.html>

Bundesgesetz über das bäuerliche Bodenrecht (BGBB) vom 4. Oktober 1991 (Stand am 1. September 2008) SR 211.412.11

Bundesgesetz über den Schutz der Gewässer (Gewässerschutzgesetz, GSchG) vom 24. Januar 1991 (Stand am 1. August 2008) SR 814.20

Bundesgesetz über den Wasserbau vom 21. Juni 1991 (Stand am 1. August 2008) SR 721.100

Bundesgesetz über Lebensmittel und Gebrauchsgegenstände (Lebensmittelgesetz, LMG) vom 9. Oktober 1992 (Stand am 1. April 2008) SR 817.0

Bundesgesetz über die Landwirtschaft (Landwirtschaftsgesetz, LwG) vom 29. April 1998 (version: 1. Januar 2010) SR 910.1

Bundesgesetz über die Raumplanung (Raumplanungsgesetz, RPG) vom 22. Juni 1979 (version: 1. August 2008) SR 700

Federal Act on Foodstuffs and Utility Articles (Foodstuffs Act, LMG) of 9 October 1992 (version: 1 April 2008) SR 817.0

Federal Constitution of the Swiss Confederation of 18 April 1999 (version: 27. September 2009) SR 101

Energiegesetz (EnG) vom 26. Juni 1998 (Stand am 1. Januar 2009) SR 730.0

Bundesgesetz über Geoinformation (Geoinformationsgesetz, GeoIG) vom 5. Oktober 2007 (Stand am 1. Oktober 2009) SR 510.62

Gewässerschutzverordnung (GSchV) vom 28. Oktober 1998 (Stand am 1. Juli 2008) SR 814.201

Hygieneverordnung des EDI (HyV) vom 23. November 2005 (Stand am 25. Mai 2009) SR 817.024.1

Lebensmittel- und Gebrauchsgegenständeverordnung (LGV) vom 23. November 2005 (Stand am 1. Mai 2009) SR 817.02

Verordnung des EDI über Bedarfsgegenstände vom 23. November 2005 (Stand am 1. Januar 2009) SR 817.023.21

Verordnung des EDI über den Zusatz essenzieller oder physiologisch nützlicher Stoffe zu Lebensmitteln vom 23. November 2005 (Stand am 25. Mai 2009) SR 817.022.32

Ordinance on Contaminants and Constituents in Foodstuffs from June 26, 1995, RS 817.021.23

Verordnung des EDI über Trink-, Quell- und Mineralwasser vom 23. November 2005 (Stand am 27. Dezember 2005) SR 817.022.102

Verordnung über die Sanierung von belasteten Standorten (Altlasten-Verordnung, AltIV) vom 26. August 1998 (Stand am 1. Januar 2009) SR 814.680

Verordnung über die Sicherstellung der Trinkwasserversorgung in Notlagen (VTN) vom 20. November 1991. SR 531.32

Ordinance on Risk Reduction related to the use of certain particularly dangerous Substances, Preparations and Articles (Ordinance on Chemical Risk Reduction, ORRChem) of 18 Mai 2005 (version: 1 March 2010) SR 814.81

#### **Mentioned cantonal legislative texts:**

Kanton Aargau: Verordnung über die öffentlichen Bäder (Bäderverordnung, Bäv) vom 21. März 2001. SR 325.211

Kanton Freiburg: Verordnung über die Hygiene in öffentlichen Schwimm- und Strandbädern vom 29. Juni 2004. SR 821.41.24.



## Glossary and list of abbreviations

AltIV	Altlasten-Verordnung [Contaminated Sites Ordinance]
AMB	Aerobic Mesophilic Bacteria
AP	Agricultural Pesticides
AOX	Adsorbable organic halogens
ARE	Federal Office for Spatial Development
BGBB	Bundesgesetz über das bäuerliche Bodenrecht [Federal Act on Agricultural Land Rights]
CFU	Colony Forming Units
ChemRRV	Chemikalien-Risikoreduktions-Verordnung [Chemical Risk Reduction Ordinance]
CIP AIS	International Commission for the Protection of Italian-Swiss Waters
CIPEL	Commission for the Protection of the Waters of Lake Geneva
DHA	Department of Home Affairs
Discharge conditions	Requirements that may be imposed by cantons on companies and WWTPs before they are allowed to discharge wastewater into water bodies.
Eawag	Swiss Federal Institute of Aquatic Science and Technology
EnG	Energiegesetz [Energy Act]
FEDRO	Federal Roads Office
FFCU	Federal Food Chain Unit
FIV	Fremd- und Inhaltsstoffverordnung [Ordinance on Contaminants and Constituents in Foodstuffs]
FOAG	Federal Office for Agriculture
FOEN	Federal Office for the Environment (formed in 2006 from the merger of SAEFL and FOWG)
FONES	Federal Office for National Economic Supply
FOPH	Federal Office of Public Health
FOWG	Federal Office for Water and Geology (up to 2006)
GDP	General Drainage Plan: The GDP is a planning instrument at commune level. The purpose of the GDP is to ensure the preservation, operation, maintenance and remediation of the wastewater treatment plants and the coordinated expansion of the public sewage system. The GDP is used to implement water protection requirements at commune level. It specifies what drainage system should be used for sanitation purposes. Plans and reports prepared on various issues of sanitation and water protection show the drainage conditions of the commune and the need for action. <sup>195</sup>
Groundwater protection zone:	see Water protection planning
GSchG	Gewässerschutzgesetz [Water Protection Act]
GSchV	Gewässerschutzverordnung [Water Protection Ordinance]
GWP	General Water Supply Project: The GWP is a planning instrument at the water supply level. The GWP defines the installations that are needed to guarantee supplies of drinking, industrial and firefight water to current and future residential areas. GWPs are prescribed by law in a number of cantons, but not in all.

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<sup>195</sup> <http://www.abwasser.zh.ch/internet/bd/awel/gw/aw/de/EP/gep.html>

	Cantons where GWPs are mandatory have a central pool of information about the conditions of installations, maintenance measures, the implementation of measures and financing requirements.
Hydropeaking	Flow regime in watercourses downstream of hydroelectric power plants. The flow regime is characterised by the change, often several times a day, between very high and very low flow rates.
HyV	Hygieneverordnung [Hygiene Ordinance]
ICPR	International Commission for the Protection of the Rhine
IDANE water	Interagency platform of the Swiss government for water and development
IGKB	Internationale Gewässerschutzkommission für den Bodensee [International Commission for the Protection of Lake Constance]
IWRM	Integrated water resource management
LGV	Lebensmittel- und Gebrauchsgegenständeverordnung [Ordinance on Foodstuffs and Utility Articles]
Limit value	According to Art. 10, paragraph 1 of the Foodstuffs Act (LMG), limit value refers to the maximum concentration for foreign substances and components or the maximum quantities of micro-organisms or additives specified on the basis of a toxicological or epidemiological assessment.
LMG	Lebensmittelgesetz [Foodstuffs Act]
LwG	Landwirtschaftsgesetz
Micropollutants:	Micropollutants are organic trace elements that are detected in waters very low concentrations. Examples of micropollutants include the ingredients of medicinal products, body care products or agricultural pesticides.
NADUF	Nationale Daueruntersuchung der schweizerischen Fließgewässer
NAQUA	National Groundwater Monitoring
NAWA	National Surfacewater Monitoring
OSPAR	Commission for the Protection of the Marine Environment of the North-East Atlantic
PAH	Polycyclic aromatic hydrocarbons
RDP	Regional Drainage Plan: The planning level for the Regional Drainage Plan is the catchment area of a water body. The RDP shows how municipal drainage and other issues, e.g. agriculture, drinking water supply or flood protection are to be coordinated with each other. The need for action is presented and possible measures are initiated. The plan focuses particularly on weighing up the various interests in and demands on the water body.
RPG	Raumplanungsgesetz
SAEFL	Swiss Agency for the Environment, Forests and Landscape (up to 2006)
SDC	Swiss Agency for Development and Cooperation
SIA	Swiss Society of Engineers and Architects
SNF	Swiss National Fund for scientific research
SNSF	Swiss National Science Foundation
SVGW	Swiss Gas and Water Industry Association (Schweizerischer Verein des Gas- und Wasserfaches)
Tolerance limit	The maximum concentration or amount set according to Art. 10, paragraph 2 of the Foodstuffs Act (LMG). This value is lower than absolutely necessary for the protection of health.
VOC	Volatile Organic Compounds (Flüchtige organische Verbindungen)

VSA	Swiss Water Association (Verband Schweizer Abwasser- und Gewässerschutzfachleute)
VTN	Verordnung über die Sicherstellung der Trinkwasserversorgung in Notlagen [Ordinance on the Safeguarding of the Drinking Water Supply in Emergencies]
VHH	Volatile halogenated hydrocarbons
Water protection planning:	This comprises the designation of various zones in which certain uses are restricted or banned. A distinction is made between groundwater protection zones, groundwater protection areas and water protection areas. Groundwater protection zones serve to protect existing groundwater catchment installations, while groundwater protection areas protect groundwater resources that may be used for water supply in future. The water protection areas serve to protect particularly endangered water bodies.
WWTP	WasteWater Treatment Plant