Reporting for Switzerland under the Protocol on Water and Health

Submitted to:
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Regional Office for Europe of the World Health Organisation (WHO/EURO)
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1. Background

1.1 Requirements of the Protocol

The Protocol on Water and Health\(^1\) is an international agreement on the promotion of health through improved water management and control of water-related disease. The Protocol was ratified by Switzerland in 2006. One of the key features of this Protocol is the need for each Party to specify and announce targets to be achieved in accordance with article 6. These targets must produce a system of water management that enables human health and ecosystems to be protected according to the principles of sustainable development. Additionally, indicators and corresponding time frames should be specified for the implementation of these targets. In particular, the Parties and Signatories strive to provide access to clean drinking water and a functioning sanitation system for the whole population. The Protocol thus represents an innovative instrument, since it does not specify any technical standards, but rather a strategy for strengthening cooperation between the various authorities concerned with water management at national and local level and also across international boundaries.\(^2\)

In this report the Party to the Protocol Switzerland describes the results of a review of the existing situation for water management and quality, the targets that have already been set - largely independently of the Protocol - and the challenges and obstacles encountered in implementing the Protocol. This report does not focus so much on the progress that has been made in achieving the listed targets since most of these have been formulated independently of the Protocol (see section 4.2). The aim of this reporting is, on the one hand, to promote the sharing of experiences with the other Parties and Signatories to the Protocol and, on the other, to create a basis for defining future targets for Switzerland. The structure and content of this first report therefore constitute a review of the existing situation. Subsequent reports - issued at 3-yearly intervals - will focus more on the targets and their achievement.

In accordance with the "Guidelines on the Setting of Targets, Evaluation of Progress and Reporting"\(^3\) the report is structured as follows:

Section 1 contains information on the general conditions in Switzerland in respect of the Protocol and its implementation, focusing particularly on the legal bases in relation to drinking water, sanitation and water protection. The second section presents the results of a review process on the basis of the common indicators specified by the Protocol body "Task Force on Indicators and Reporting"\(^4\). The third section presents a general review of the existing or planned targets in the various subject areas mentioned in the guidelines. Finally, section 4 provides a general assessment on the fulfilment of the Protocol.

1.2 Responsibilities

The areas of health and water management addressed in the Protocol are managed in Switzerland primarily by two federal authorities, the Federal Office of Public Health (FOPH) and the Federal Office for the Environment (FOEN). The FOPH is concerned with subjects such as epidemics and infectious diseases, food safety and - according to Swiss law - the safety of drinking water. The FOEN is the Confederation's centre of competence for environmental issues. The FOEN is responsible for the long-term conservation and utilisation of Switzerland's natural

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4 http://www.unece.org/env/water/meetings/documents_TFIR.htm
resources (air, water, soil, forests, the landscape, biodiversity) on behalf of society and the economy. So a clear distinction exists, in relation to the Protocol, in respect of the tasks allocated to the FOPH (drinking water: ensuring safety and quality) and the FOEN (groundwater and surface waters: ensuring quantity and quality).

The Federal Office of Public Health (FOPH) and the Federal Office for the Environment (FOEN) work together in setting the targets and preparing this report. Other agencies involved in setting targets relating to the Protocol include the Federal Office for Agriculture (FOAG), the Swiss Agency for Development and Cooperation (SDC) and the Swiss Federal Institute of Aquatic Science and Technology (Eawag).

1.3 Strategic planning of the federal authorities in relation to water

Targets have been formulated in the field of water for the next few years in the strategic plans prepared by FOPH, FOEN, FOAG and SDA:

The FOPH strategy for drinking water describes targets for drinking water based on the Protocol and other more extensive targets independently of the Protocol. The strategy is designed to improve the findings for drinking water in Switzerland, for example on drinking water quality, and provide a better flow of information. 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" and "Sanitation 2025", which analyse the challenges and options for action in respect of water supply and sanitation over the coming decades. In the area of water protection, the project "Micropoll Strategy - Micropollutants in Waters" is in progress. The aim of this project is to develop and implement a strategy for further improving the quality of waters and for effectively reducing the discharge of micropollutants from municipal drainage.

Environmental targets for agriculture have been specified jointly by the FOEN and FOAG, with the aim of maintaining good water quality in the long term. A national research programme on "Sustainable water use" is also under way. This programme addresses the future challenges for Swiss water management, particularly in connection with climate change.

Finally, the activities of the SDC in connection with water should be mentioned at this point. The Water Initiatives Division (WIs) of the SDC is focusing on water and sanitation as a human right, integrated water resource management (IWRM), advocacy for rural areas and small towns, sanitation and global sector monitoring. In order to assure a strong and coherent Swiss positioning in the water sector, SDC Water initiatives participates in the interagency platform of the Swiss government for water and development (IDANE Wasser), which is coordinated by SDC. For more information on the activities of the SDC see section 4.6.

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

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5 http://www.eawag.ch/
6 FOPH 2009
7 http://www.bafu.admin.ch/gewaessenschutz/03716/03720/
8 FOEN and FOAG 2008
9 http://www.nfp61.ch/
24 January 1991 on the Protection of Waters (Water Protection Act, 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 the Drinking Water Supply in Emergencies (VTN; SR 531.32).10

Accordingly in Switzerland, many of the legal bases required for implementing 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).11 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.12

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 Act13 and the corresponding ordinances. Drinking water is also covered by the Ordinance on Foodstuffs and Utility Articles14, the Hygiene Ordinance15, the Ordinance on Contaminants and Constituents in Foodstuffs16 and the Ordinance on Drinking, Spring and Mineral Water17. The quality requirements for drinking water are laid down in the Ordinance on Drinking, Spring and Mineral Water (general requirements), the Hygiene Ordinance

10 Eawag 2009
11 Eawag 2009
12 Eawag 2009
13 Federal Act on Foodstuffs and Utility Articles (Foodstuffs Act, LMG) of 9 October 1992 (version: 1 April 2008) SR 817.0
14 Ordinance on Foodstuffs and Utility Articles (LGV) of 23 November 2005 (version: 1 May 2009) SR 817.02
15 Hygiene Ordinance of the DHA (HyV) of 23 November 2005 (version: 25 May 2009) SR 817.024.1
16 Ordinance of the DHA on Contaminants and Constituents in Foodstuffs (FIV) of 26 June 1995 (version: 1 October 2009) SR 817.021.23
17 Ordinance of the DHA on Drinking, Spring and Mineral Water of 23 November 2005 (version: 27 December 2005) SR 817.022.102
(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 commune level.  

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 waters on national level, Switzerland fulfils its international responsibilities by actively participating in international commissions, specifically: the International Commission for the Protection of the Rhine (ICPR), the International Commission for the Protection of Lake Constance (ICPEL), the Commission for the Protection of the Waters of Lake Geneva (CIPAS), the International Commission for the Protection of Italian-Swiss Waters (CIPAIS) and the Commission for the Protection of the Marine Environment of the North-East Atlantic (OSPAR).

1.6 Responsibilities for water supply and sanitation

Switzerland consists of 26 cantons and half-cantons and just under 2600 communes. The Confederation, cantons and communes undertake differing tasks in relation to drinking water provision and sanitation:

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18 Eawag 2009  
19 www.iksr.org  
20 www.igkb.org  
21 www.cipel.org  
22 www.cipaais.org  
23 www.ospar.org
1.6.1 Confederation

In food legislation, the Confederation lays down the requirements relating to the quality of drinking water. As regards water protection for example, it specifies the requirements for water quality and monitors the provision of drinking water in emergencies.

1.6.2 Cantons

The cantons manage the water resources and can levy charges for the use of water. The cantons are essentially responsible for implementing the water protection legislation, which assigns various tasks to the cantons. The cantons must produce an inventory of the water supply installations and groundwater resources on their territory. They are also responsible for ensuring the provision of drinking water in emergencies\(^\text{24}\). They designate those communes that are responsible for ensuring that specific areas are supplied with drinking water in emergencies. The cantons are also usually responsible for implementing the legislation in respect of sanitation. Furthermore, the spatial planning is under the responsibility of the cantons. The central instrument for this is the cantonal spatial plan (Richtplan), which has to be approved by the federal government. Finally, the cantons are responsible for enforcing the food legislation. By inspections and analyses, the cantonal executive agencies (cantonal laboratories) monitor the water quality and supervise compliance with self-monitoring of the water supplies.

1.6.3 Communes

Although the communes are usually responsible for the water supply, they can delegate this task to third parties (see section 1.6.4). Where a cantonal water supply network exists, control of the water supplies is usually delegated to the communes unless this task is carried out by the canton\(^\text{25}\).

As far as sanitation is concerned, the communes are usually responsible for the construction, operation and maintenance of the public sewage system, although the cantonal legislation often allows this to be delegated to third parties, for example to associations\(^\text{26}\).

1.6.4 Drinking water and sanitation networks

Drinking water and sanitation networks undertake certain basic tasks on behalf of the communes. This usually involves the operation and maintenance of the drinking water or sanitation installations. Since ownership of the network and the installations is rarely transferred to the associations, the strategic decisions and preservation of the infrastructure remain under the control of the communes.

1.6.5 Professional/technical associations

The Swiss Gas and Water Industry Association (SVGW) is a national organisation of gas and water suppliers. It produces guidelines, operates a comprehensive basic and advanced training programme, provides consultancy services and undertakes product testing.

The Swiss Water Association (VSA) issues standards and guidelines, trains the sewage plant personnel and organises further training events.

\(^{24}\) according to the Ordinance of 20 November 1991 on the Drinking Water Supply in Emergencies (VTN; SR 531.32)

\(^{25}\) Eawag 2009

\(^{26}\) BG Consulting Engineers 2008
2. Common indicators

For the sake of promoting harmonisation in the UNECE/WHO-Europe region, Parties have agreed to report on a limited number of issues using commonly agreed indicators that are closely related to the areas under article 6, paragraph 2, for which targets should be set. Data for Switzerland regarding these indicators is 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

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. These controls do not amount to monitoring, but rather 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 or epidemiological assessment. By contrast, tolerance value refers, according to Art. 10, paragraph 3, to specified maximum concentrations or amounts which are lower than absolutely necessary for the protection of health.

2.1.1 Bacteriological quality

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**
- **Aerobic mesophilic bacteria (AMB)**

The following tolerance values apply:

- **E. coli**: 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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27 Further information can be found in "The Swiss Confederation, a brief guide 2010" (Federal Chancellery 2010). [http://www.bk.admin.ch/dokumentation/02070/](http://www.bk.admin.ch/dokumentation/02070/)
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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\textsuperscript{29}. These controls do not amount to monitoring, but rather 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.

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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: \textit{E. coli}, \textit{Enterococci} and aerobic mesophilic bacteria (AMB). The following tolerance values apply:

\begin{itemize}
  \item \textit{E. coli} not detectable/100 ml
  \item \textit{Enterococci} not detectable/100 ml
  \item AMB at the catchment installation, untreated 100 CFU/ml
  \item AMB at the catchment installation, treated 20 CFU/ml
  \item AMB in the distribution network 300 CFU/ml
\end{itemize}

\textsuperscript{28} http://www.unece.org/env/water/meetings/TFIR/Third%20meeting/template_reporting_english.doc

\textsuperscript{29} http://www.bag.admin.ch/themen/lebensmittel/04865/06680/
### Conclusion: In terms of microbiological parameters, the drinking water quality can be rated as good. However, currently, no detailed nationwide overview is available.

#### 2.1.2 Chemical quality

##### 2.1.2.1 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\(^{34}\). 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 and 40,807 respectively, possibly resulting in percentages on the low side. Moreover, the percentage of the population covered by these statistics is not documented here.

<table>
<thead>
<tr>
<th>Sum parameter</th>
<th>Value in 2005</th>
<th>Current value (2008)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of samples faulted due to microbiological status (^{33}) / total number of investigated samples (in %)</td>
<td>See text</td>
<td>3234 / 45 223 (7.2%)</td>
</tr>
</tbody>
</table>

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

##### 2.1.2.2 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.

**Nitrate**

For the reporting data on nitrate concentrations in drinking water from two cantons, Berne and Vaud, is presented by way of example\(^{35}\). These two cantons together cover a good fifth of the Swiss population (1.7 million inhabitants out of a total of 7.7 million). These cantons are also representative of Switzerland in respect of the town-country ratio.

<table>
<thead>
<tr>
<th>Sum parameter</th>
<th>Value in 2005</th>
<th>Current value (2008)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of samples faulted due to constituents and contaminants / total number of investigated samples (in %)</td>
<td>356 / 45 223 (0.8%)</td>
<td>223 / 40 807 (0.5%)</td>
</tr>
</tbody>
</table>

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\(^{30}\) Tolerance value according to Hygiene Ordinance of the DHA (HyV) of 23 November 2005; SR 817.024.1


\(^{33}\) E. coli, Enterococci, aerobic mesophilic bacteria (AMB)

\(^{34}\) Data compiled from the reports of the cantonal laboratories: [http://www.bag.admin.ch/themen/lebensmittel/04865/06680/](http://www.bag.admin.ch/themen/lebensmittel/04865/06680/)

\(^{35}\) Canton of Vaud 2010; Cantonal Laboratory of Berne 2009; Cantonal Laboratory of Berne 2006
In recent years in Switzerland, various drinking water catchment installations were abandoned because of excessively high nitrate levels.

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.37

Elevated levels of heavy metals can occur in drinking water as a result of domestic installations and fittings, mainly in new buildings. While lead has not been detected in groundwater38, the cantonal chemists have found lead in the drinking water in new domestic installations39. Only a small amount of data is available on this subject however40. As far as lead is concerned, it should be mentioned that, according to Art. 4 of the Ordinance on Consumer Goods41, lead piping and lead-containing fittings are not permitted in Switzerland.

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/L42 only in rare cases. In these cases the drinking water catchment installations were closed or the drinking water was diluted43. Whereas the limit value in the EU and the USA is 10 μg/l, and the WHO also recommends this value, the limit in Switzerland is 50 μg/l. While a reduction in the limit for Switzerland is not envisaged in the short term44, a reduction in the limit value will be sought in the medium term45. A change in the limit value would 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 affected46, and 5,000 in Ticino47.

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<table>
<thead>
<tr>
<th>Substance</th>
<th>Tolerance value</th>
<th>Value in 2005</th>
<th>Current value (2008)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrate: proportion of water supplies in which the tolerance value was exceeded</td>
<td>40 mg/l</td>
<td>3%</td>
<td>1%</td>
</tr>
</tbody>
</table>

36 Tolerance value according to Hygiene Ordinance of the DHA (HyV) of 23 November 2005; SR 817.024.1
37 Cantonal Laboratory of Berne 2006
38 National Groundwater Monitoring NAQUA
39 Walker 2006
40 Eawag 2009
41 Ordinance of the DHA on Consumer Goods of 23 November 2005, SR 817.023.21
42 Pfeifer et al. 2000, FOPH 2005
43 Pfeifer & Zobrist 2002
44 personal communication: Pierre Studer (FOPH) in Eawag 2009
45 personal communication: Urs von Gunten (Eawag) in Eawag 2009
46 Schultz 2003
47 Pfeifer & Zobrist 2002
The number of people affected in the canton of Graubünden is not known\(^{48}\). Overall therefore, less than 0.05 percent of the Swiss population is affected.

**Fluoride**

No national overview of fluoride concentrations in drinking water is available. The head of the Drinking and Bathing Water section of the Consumer Protection Office for Aargau stated that the tolerance value for fluoride (1.5 mg/l) has not been exceeded in any of the canton's water supplies in recent years\(^{49}\). The population of the canton of Aargau (598,920 inhabitants) is supplied with drinking water from 273 water supplies.

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\(^{50}\), 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.\(^{51}\)

**Iron**

Likewise for iron, data from the canton Aarau is given by way of example.

In this canton (598,920 inhabitants) none of the drinking water samples analysed in 2008 in 59 official controls exceeded the tolerance value for iron (0.3 mg/l).

### 2.1.2.3 Additional chemical indicators

The Guidelines for Review and Assessment of Progress under the Protocol envisages the identification and submission by each country of data on five additional health-relevant chemical indicators, in addition to the five specified chemical indicators (see 2.1.2.2).

No other chemical parameters have been identified to date in Switzerland that would need to be assessed in future for summary reporting under the Protocol.

### 2.2 Reduction of the scale of outbreaks and incidence of infectious diseases potentially related to water

According to the Guidelines for Review and Assessment of Progress under the Protocol, the total number of actual cases (regardless of cause) and the number of water-related outbreaks should be listed for five specified 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\(^{52}\). 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.

\(^{48}\) Pfeiffer & Zobrist 2002  
\(^{49}\) personal communication: Irina Nüesch (canton of Aargau)  
\(^{50}\) Ordinance of the DHA on the addition of essential or physiologically beneficial substances to foods of 23 November 2005 (version: 25 May 2009), RS 817.022.32  
\(^{51}\) Cantonal Laboratory of Basel-Stadt 2003  
\(^{52}\) [http://www.bag.admin.ch/themen/lebensmittel/04921/index.html](http://www.bag.admin.ch/themen/lebensmittel/04921/index.html)
<table>
<thead>
<tr>
<th>Pathogen / Disease</th>
<th>Total no. of reported cases</th>
<th>Value in 2005</th>
<th>Current value (2008)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cholera</td>
<td></td>
<td>See text</td>
<td>See text</td>
</tr>
<tr>
<td>Bacillary dysentery (shigellosis)</td>
<td></td>
<td>346</td>
<td>302</td>
</tr>
<tr>
<td>EHEC</td>
<td></td>
<td>62</td>
<td>70</td>
</tr>
<tr>
<td>Hepatitis A</td>
<td></td>
<td>147</td>
<td>149</td>
</tr>
<tr>
<td>Typhoid fever</td>
<td></td>
<td>See text</td>
<td>See text</td>
</tr>
</tbody>
</table>

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 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 gastrointestinal illnesses occurred and were caused by pathogens such as *Campylobacter*, noroviruses and enterotoxic *E. coli*. 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 1600 people were affected.

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

### 2.3 Access to drinking water

<table>
<thead>
<tr>
<th>Proportion of individuals with access to clean drinking water</th>
<th>Value in 2005</th>
<th>Current value (2008)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>100 %</td>
<td>100 %</td>
</tr>
<tr>
<td>In urban areas</td>
<td>100 %</td>
<td>100 %</td>
</tr>
<tr>
<td>In rural areas</td>
<td>100 %</td>
<td>100 %</td>
</tr>
</tbody>
</table>

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

---

53 http://www.bag.admin.ch/k_m_meldesystem/00733/00804/
54 Füchslin et al. 2005
55 Cantonal Laboratory Zurich, 2009
56 Maurer und Stürchler 2000
57 Assessment of SVGW
2.4 Connection to sanitation system

<table>
<thead>
<tr>
<th>Proportion of individuals connected to a collective sanitation system</th>
<th>Value in 2005</th>
<th>Current value (2008)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>99%</td>
<td>99%</td>
</tr>
<tr>
<td>In urban areas</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>In rural areas</td>
<td>97% (collective systems)</td>
<td>97% (collective systems)</td>
</tr>
<tr>
<td></td>
<td>2% (decentralised systems)</td>
<td>2% (decentralised systems)</td>
</tr>
</tbody>
</table>

**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 Effectiveness of management, protection and use of freshwater resources

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.)\(^{63}\) 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"\(^{60}\). This overview allows an assessment to be made in this report on the nutrient contamination of watercourses in Switzerland. 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. Furthermore, this assessment does not take account of the organic trace elements (see section 3.6.), not the hydrobiology or the aspects of water flow rate and water structure (ecomorphology) of watercourses.

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\(^{61}\). The following requirements apply in watercourses:

For the total of NH4+ - N and NH3 – N:

- At temperatures:
  - above 10 °C: 0.2 mg/l N
  - below 10 °C: 0.4 mg/l N

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\(^{59}\) Jakob et al. 2001
\(^{60}\) 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)
\(^{61}\) Jakob et al. 2001
Based on the available data, a declining trend in the pollution of watercourses by ammonium can be discerned.

The following table shows the classification based on nitrate-nitrogen, as an indicator of agricultural and residential pollution:\(^\text{62}\). The requirement of 5.6 mg/l N applies to nitrate (NO$_3^{-}$N) in watercourses used for drinking water (corresponds to 25 mg/l nitrate).

Based on the available data no positive conclusion can be derived 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):\(^\text{64}\). The maximum levels for phosphate in lakes are regulated indirectly by the Water Protection Ordinance, Annex 2, paragraph 13.2.

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

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\(^{\text{62}}\) Jakob et al. 2001

\(^{\text{63}}\) according to the Modular Stepwise Procedure: \text{http://www.modul-stufen-konzept.ch/download/chemie_klassen_07112006.pdf}

\(^{\text{64}}\) Jakob et al. 2001

\(^{\text{65}}\) according to the Modular Stepwise Procedure: \text{http://www.modul-stufen-konzept.ch/download/chemie_klassen_07112006.pdf}
still being enriched with phosphorus in catchment areas with a high livestock density, a further improvement cannot be guaranteed for all lakes\(^{66}\) (see also section 3.14.2).

In the future the quality of surface waters will be assessed by means of nationally coordinated monitoring according to the harmonised "Methods for assessing the ecological status of rivers in Switzerland"\(^{67}\). These standardised methods have not yet been implemented nationwide in Switzerland, but will be operational in around 120 representative locations from 2011 as part of the "Coordinated Monitoring of Surface Waters" project. See section 3.14.2 for further details.

### 2.5.1.2 Groundwater

In Switzerland, roughly 80% of the total drinking water supply is obtained from groundwater resources\(^{68}\). Compared to many other countries, groundwater in Switzerland is available almost anywhere, in sufficient quality and generally in excellent quality. The National Groundwater Monitoring NAQUA\(^{69}\) provides a nation-wide overview over the situation and development of the groundwater resources in terms of both quality and quantity. The quality of groundwater is evaluated on the basis of three substances / substance groups.

For nitrate in groundwater, two guide values exist are of importance: The Water Protection Ordinance (Annex 2) specifies that groundwater should possess a nitrate concentration below 25 mg/l. The health-related tolerance value for nitrate in drinking water is 40 mg/l\(^70\).

<table>
<thead>
<tr>
<th>Proportion of groundwater measuring sites with a nitrate concentration of</th>
<th>Value in 2005(^71)</th>
<th>Current value (2008)(^72)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 25 mg/l</td>
<td>81% of measuring sites</td>
<td>83% of measuring sites</td>
</tr>
<tr>
<td>25 – 40 mg/l</td>
<td>15% of measuring sites</td>
<td>13% of measuring sites</td>
</tr>
<tr>
<td>&gt; 40 mg/l</td>
<td>4% of measuring sites</td>
<td>4% of measuring sites</td>
</tr>
</tbody>
</table>

For agricultural pesticides (AP) the requirement according to Annex 2 of the Water Protection Ordinance (GSchV) is 0.1 μg/l for each substance unless some other value is specified as a result of the registration procedure. The two figures (2005 and 2008) are only comparable to a limited extent since the analysed range of substances has been increased over the years.

<table>
<thead>
<tr>
<th>Proportion of groundwater measuring sites with an AP concentration of</th>
<th>Value in 2005(^73)</th>
<th>Current value (2008)(^74)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not detectable</td>
<td>50% of measuring sites</td>
<td>52% of measuring sites</td>
</tr>
<tr>
<td>≤ 0.1 μg/l</td>
<td>39% of measuring sites</td>
<td>40% of measuring sites</td>
</tr>
<tr>
<td>&gt; 0.1 μg/l</td>
<td>11% of measuring sites</td>
<td>8% of measuring sites</td>
</tr>
</tbody>
</table>

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\(^{67}\) [http://www.modul-stufen-konzept.ch/](http://www.modul-stufen-konzept.ch/)

\(^{68}\) [SVGW 2009](http://www.svw.ch)

\(^{69}\) [SAEFL/FOWG 2004 and FOEN 2009](http://www.saefl.ch)


\(^{71}\) [National Groundwater Monitoring NAQUA](http://www.naquag.ch)

\(^{72}\) [National Groundwater Monitoring NAQUA](http://www.naquag.ch)

\(^{73}\) [National Groundwater Monitoring NAQUA](http://www.naquag.ch)

\(^{74}\) [National Groundwater Monitoring NAQUA](http://www.naquag.ch)

From the perspective of water protection, the following requirements apply to volatile hydrocarbons (VOC):

- Aliphatic hydrocarbons: 0.001 mg/l for each substance;
- Monocyclic aromatic hydrocarbons: 0.001 mg/l for each substance;
- Polycyclic aromatic hydrocarbons (PAH): 0.1 μg/l for each substance;
- Volatile halogenated hydrocarbons (VHH): 0.001 mg/l for each substance;
- Adsorbable organic halides (AOX): 0.01 mg/l for all substances.

The two figures (2005 and 2008) are only comparable to a limited extent since the analysed range of substances has been increased over the years.

<table>
<thead>
<tr>
<th>Proportion of groundwater measuring sites with a VOC concentration of</th>
<th>Value in 2005(^\text{76}) (505 measuring sites)</th>
<th>Current value (2008)(^\text{77}) (503 measuring sites)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not detectable</td>
<td>65% of measuring sites</td>
<td>64% of measuring sites</td>
</tr>
<tr>
<td>Measured value &lt; requirement(^\text{78})</td>
<td>29% of measuring sites</td>
<td>31% of measuring sites</td>
</tr>
<tr>
<td>Measured value &gt; requirement</td>
<td>6% of measuring sites</td>
<td>5% of measuring sites</td>
</tr>
</tbody>
</table>

**Conclusion:** In general, the requirements of the Water Protection Ordinance are fulfilled. For nitrate the requirements are not met at around 20% of measuring sites. For agricultural pesticides and volatile organic compounds, the requirements are not met at approx. 10% and 5% of measuring sites, respectively. The limits are exceeded primarily in intensively farmed and densely populated areas.

### 2.5.2 Water use

The water use index in respect of the various sectors of agriculture, industry, etc. corresponds to the mean annual water withdrawal relative to the total amount of renewable water in the country and is stated as a percentage.\(^\text{79}\)

<table>
<thead>
<tr>
<th>Water use index(^\text{80})</th>
<th>Reference value (1972)</th>
<th>Current value (2006)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>No figures</td>
<td>0.7%</td>
</tr>
<tr>
<td>Industry</td>
<td>2.8%</td>
<td>1.9%</td>
</tr>
<tr>
<td>Power plant cooling</td>
<td>No figures</td>
<td>2.7%</td>
</tr>
<tr>
<td>Public purposes and losses</td>
<td>No figures</td>
<td>0.3%</td>
</tr>
<tr>
<td>Households</td>
<td>No figures</td>
<td>0.8%</td>
</tr>
</tbody>
</table>

\(^{76}\) National Groundwater Monitoring NAQUA
\(^{77}\) National Groundwater Monitoring NAQUA
\(^{78}\) Requirement according to Annex 2 of the Water Protection Ordinance (GSchV)
**Conclusion:** The very low water use index for Switzerland is a reflection of the high water availability in Switzerland. As part of the alpine region, Switzerland represents a water tower for Europe. 6% of the freshwater reserves in Europe are stored in Switzerland, even though the country represents only 0.4% in terms of Europe’s surface area. Some of the largest rivers in the continent, the Rhine and the Rhône, rise in the central Gotthard Massif in Switzerland.

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80 calculated from Freiburghaus 2009 and the figures on precipitation in Switzerland in Eawag 2009 (Quantity chapter)
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\(^{81}\), which are based on Art.6 Paragraph 2 of the Protocol\(^{82}\). 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 Quality of the drinking water supplied [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 with 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 on water supplies recorded in connection with the legally stipulated self-monitoring. This will counteract any distorted picture arising from partly risk-based official controls in future (see section 2.1).

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 individual parameters in drinking water. 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.

**Target achievement**: A firm of consulting engineers has been commissioned to develop a national drinking water database in collaboration with the FOPH. The development of an initial operational version of the database, together with an interface for transferring data from the cantons is currently in its final stages. During the course of 2010 and 2011 the drinking water database will be importing the first records from the cantons.

### 3.2 Reduction of the 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 drinking water therefore constitutes one possible target. This could be modelled on the Swedish system for example.

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\(^{81}\) UNECE 2009: Preliminary Guidelines for Review and Assessment of Progress under the Protocol

\(^{82}\) Protocol on Water and Health to the 1992 Convention on the Protection and Use of Transboundary Watercourses and International Lakes of 17 June 1999
Possible target: Development of a reporting system for incidents and outbreaks of disease caused by drinking 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. One proposed target concerns the drinking water supply in emergencies.

Proposed target: To safeguard the national drinking water supply, the supply is based on two pillars. In future, a drinking water supply should always be able to draw upon water from at least two different water bodies.

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 Confederation in the Ordinance on the Safeguarding of the Drinking Water Supply in Emergencies (VTN). To support this work, the Swiss Gas and Water Industry Association (SVGW) has produced a guideline for the planning and implementation of the drinking water supply in emergencies83.

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. A few cantons (e.g. Geneva) have already implemented the strategy and are cross-linked/interconnected up to 100%. Other cantons, e.g. 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 implementation of the Ordinance on the Safeguarding of the Drinking Water Supply in Emergencies. Based on the survey results, the federal government is now reviewing the situation in order to determine which ordinance requirements need to be adapted and whether new rules need to be drafted in order to safeguard a sustained and reliable water supply in future84. The so-called "Two-Pillar Strategy" could be made mandatory in connection with these adaptations.

3.4 Access to sanitation [Art. 6, Paragraph 2 (d)]
Since practically the whole population of Switzerland is connected to a sanitation system (see section 2.4), the definition of targets in this area is not a priority.

3.5 Levels of performance of collective systems and other systems for water supply [Art. 6, Paragraph 2 (e)]

Target: The federal government determines the possible future challenges and potential courses of action in respect of water supply and derives further measures.

83 SVGW 2007
84 FONES and FOEN, unpublished
**Target achievement:** An initial analysis has been made and shortcomings identified in the preliminary project Water Supply 2025\(^{85}\). The next step is to define and introduce specific targets and action plans.

Possible areas for which further targets might be formulated include the levels of performance of small-scale water supplies, interconnecting/cross-linking water supplies to improve their performance level, value conservation of the infrastructure as well as education and further training of personnel.

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

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**Example for actions regarding water supply taken in the canton Schaffhausen: future development analysis\(^{86}\)**

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 supplies guarantees high 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.

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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.\(^{87}\) Currently in Switzerland, 20% of the wastewater is treated in two stages, 77% in three stages and 2% in decentralised plants\(^{88}\). See

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\(^{85}\) Eawag 2009

\(^{86}\) http://www.kantlab.ch/index.php?id=191&L=4

\(^{87}\) The cantons monitor the situation and possess corresponding data.

\(^{88}\) http://www.bafu.admin.ch/gewaesserschutz/01295/01296/01298/
The Water Protection Ordinance is amended to include requirements for 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. 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 FO EN “Micropoll Strategy - Micropollutants in Waters”, focusing on organic trace elements from municipal drainage. 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. The following three criteria were used to identify the WWTP 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 80% of the micropollutants contained in wastewater, which would more than double their treatment capacity. This target can be achieved by upgrading 100 of the total 700 WWTPs in Switzerland over the next few years. This will require a revision of the Water Protection Ordinance, of which the draft version has been sent by the Department of the Environment, Transport, Energy and Communications (DETEC) for consultation/hearing.

Target: The federal government determines the possible future challenges and potential courses of action in respect of sanitation and derives further measures.

Target achievement: The preliminary project Water Sanitation 2025 is currently under way. On completion of this project towards the end of 2010, targets and action plans will be prepared, as for the project “Water Supply 2025”.

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

Background: Wastewater treatment in Switzerland is currently of a high standard. The development of treatment infrastructure 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...
**Proposed target:** The Water Protection Ordinance is amended to include requirements for 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 reserves90. 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. 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.90 The following three criteria were used to identify the WWTP 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 80% of the micropollutants contained in wastewater, which would more than double their treatment capacity. This target can be achieved by upgrading 100 of the total 700 WWTPs in Switzerland over the next few years. This will require a revision of the Water Protection Ordinance, of which the draft version has been sent by the Department of the Environment, Transport, Energy and Communications (DETEC) for consultation/hearing.

**Target:** The federal government determines the possible future challenges and potential courses of action in respect of sanitation and derives further measures.

**Target achievement:** The preliminary project Water Sanitation 202591 is currently under way. On completion of this project towards the end of 2010, targets and action plans will be prepared, as for the project "Water Supply 2025".

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

**Background:** Wastewater treatment in Switzerland is currently of a high standard. The development of treatment infrastructure 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

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90 FOEN unpublished
91 Eawag (in preparation)
estimation of sustainable wastewater management and ongoing optimization of the treatment system.92

**Target achievement:** This target is currently being discussed by the federal offices concerned. The target achievement is particularly subject to the availability of funding and staff resources.

**Possible target:** Promote the regionalisation of wastewater management.

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 the lack of continuity are contrasted with a growing complexity of the regulations and additional challenges such as cost control, infrastructure maintenance or the management of micropollutants93. An example of successful regionalisation is presented in the box below:

**Practical example of regionalisation**

A central element of the reorganisation of 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 respective smallest WWTPs. Finally, this solution shall also ensure a better funding of the long-term infrastructure maintenance94.

### 3.7 Application of recognised good practice to the management of water supply

[Art. 6, Paragraph 2 (f)]

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

**Background:** Article 52 of the LGV envisages the drawing up, by the food industry, of guidelines for good practice which are then approved by the FOPH. Such guidelines could replace individual self-supervision strategies and a guideline for drinking water should help the water suppliers (particularly the small and medium-sized water 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 the "Guidelines for good practice in simple drinking water supplies". The FOPH is monitoring the drafting process and will approve the final guidelines. An initial version of the guidelines was

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93 BG Consulting Engineers 2008
94 GSA 2007
issued by the SVGW in September 2009. This version will now be amended and supplemented on the basis of discussions with the FOPH.

**Possible target:** Groundwater is protected and drinking water is obtained and distributed on the basis of enforcement aids issued by the FOEN and the detailed guidelines issued by the SVGW trade association and the FOPH.

**Background:** FOPH documents describing recognised treatment processes for drinking water and a management system for drinking water safety already exist. The regulations of the SVGW association include guidelines for the monitoring of quality in the drinking water supply\(^{95}\), quality assurance in groundwater protection zones\(^{96}\) and recommendations for a quality assurance system\(^{97}\). The FOEN has also issued various implementation guides explaining in concrete terms the legal bases and thus serving as a practical aid for water suppliers. There are certain areas however 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 be made about small and medium-sized water supplies. The cantons are monitoring the situation and possess corresponding data. However, not much is known at national level about how effectively the plans for groundwater protection are being implemented. In particular, the designation of protection zones is often very expensive for smaller water supplies.\(^{98}\) The shortcomings in wastewater disposal in Switzerland mentioned in section 3.6 in respect of regionalisation should also be borne in mind.

**Target:** In accordance with the Water Protection Act, overextraction of the groundwater resources only occurs for 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 possess corresponding data. A nationwide overview for Switzerland would be desirable.

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

**Target:** Recognized 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\(^{99}\), practical guidance on

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\(^{95}\) SVGW 2005a  
\(^{96}\) SVGW 2005b  
\(^{97}\) SVGW 2003  
\(^{98}\) Eawag 2009  
\(^{99}\) SAEFL 2004
the state of the art in water protection\textsuperscript{100}, the guidelines on traffic route drainage\textsuperscript{101} or the practical guidance on industrial wastewater treatment\textsuperscript{102}.

The Swiss Water Association (VSA) also publishes guidelines on a wide variety of aspects of sanitation including, for example, a standard on property drainage\textsuperscript{103}, guidelines on the optimal discharge of storm water\textsuperscript{104}, on wastewater discharge into water bodies during rainy weather\textsuperscript{105}, guidelines on wastewater in rural areas\textsuperscript{106}, guidelines on the maintenance of sewers\textsuperscript{107} or on the financing of wastewater management\textsuperscript{108}. 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 (IKSR)\textsuperscript{109}.

**Target achievement:** The cantons monitor the situation and manage the corresponding data. The degree of target achievement at national level could be determined with relatively little effort.

**Target:** The total sealed surface area in the housing area 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 and 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 obliged to produce a GDP. The elaboration of the GDP has been subsidised by the federal government and the cantons and the subsidies are usually linked to compliance with binding deadlines.

**Target achievement:** Comprehensive GDP availability does not yet exist in many cantons and progress is variable. The degree of target achievement at national level has not been recorded to date. Target achievement is estimated at about 50 %.

### 3.9 Occurrence of 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 waters.\textsuperscript{110}

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

\textsuperscript{100} SAEFL 2001b

\textsuperscript{101} Ernst Basler + Partner 2002

\textsuperscript{102} SAEFL 2001a

\textsuperscript{103} VSA and SSIV 2002

\textsuperscript{104} VSA 2002

\textsuperscript{105} VSA 2007

\textsuperscript{106} VSA 2005

\textsuperscript{107} Various guidelines: \url{http://www.vsa.ch/publikationen/}

\textsuperscript{108} VSA / FES 1994

\textsuperscript{109} see \url{http://www.bafu.admin.ch/chemikalien/01405/01408/} and \url{http://www.iksr.org/}

\textsuperscript{110} Art. 7 Water Protection Act, Art. 8 Water Protection Ordinance
Target achievement: Inappropriate connections should be identified and rectified by means of GDPs. The GDPs can thus be used to implement this ban.

3.9 Occurrence of discharges of untreated storm water overflows from wastewater collection systems to waters within the scope of the Protocol [Art. 6, Paragraph 2 (g) (ii)]

3.9.1 Discharges of untreated storm water overflows

Detailed guidelines for the management of storm water in Switzerland have been issued by the VSA\(^{111}\). As a general rule, non-polluted storm water must be allowed to infiltrate into the ground if permitted by the 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.

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

3.9.2 Road run-off

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

Background: Towards 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 on the “State of the art for the management of road run-off” – a product of this collaboration – will be 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 for those situations in which technical measures are required are not yet established. Therefore, at the present stage, an assessment of target achievement does not yet make much sense.

3.10 Quality of discharges of wastewater from wastewater treatment installations to waters within the scope of the Protocol [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 are in charge of the corresponding data. The degree of target achievement at national level could be established with relatively little effort.

\(^{111}\) VSA 2002
Possible target: Optimise the central data management at federal government level.

This target is currently being discussed and prepared by the federal offices concerned.

**Background:** The required data are currently being recorded by the WWTP operators and industry and forwarded to a central WWTP database at the FOEN. However, since this will not be managed in a fully comprehensive and standardised manner, it will be difficult to obtain a nationwide overview allowing nationwide statements to be made for Switzerland.

### 3.11 Disposal or reuse of sewage sludge from collective systems of sanitation or other sanitation installations [Art. 6, Paragraph 2 (i), first part]

The agricultural use of sewage sludge has been banned in Switzerland since 2008. Sewage sludge is incinerated.

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 is to investigate the disposal of sewage sludge and the recovery of nitrogen and phosphorus from sewage sludge. The aim is to establish the most sustainable way in the long term of utilising the sewage sludge. The recommended disposal method should involve the least pollution of the environment and waters while also considering energy-related and economic aspects as well as public acceptance.

### 3.12 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.

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

#### 3.13.1 Groundwater

**Target:** The groundwater quality meets the requirements of the Water Protection Ordinance, Annex 1.

**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 projects (see next target).

**Target achievement:** The quality of groundwater used or envisaged for use as drinking water is generally very good. In many areas the groundwater (including spring water) does not need to be treated. The National Groundwater Monitoring NAQUA allows the compliance of groundwater quality according to the requirements of the Water Protection Ordinance (GSchV) to be

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112 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 May 2005, SR 814.81

113 OECD 2007
pesticides, chlorinated hydrocarbons and, in particular, nitrate, are found in concentrations exceeding the requirements of the Water Protection Ordinance, although not harmful to human health. See also section 2.1.2.

**Target:** Reduction of the nitrate levels in groundwater (nitrate strategy)

**Background:** Based on Article 62a of the Water Protection Act, the nitrate strategy aims to reduce nitrate levels in groundwater in clearly defined, contaminated catchment areas (resp. the areas of contribution) to values below 25 mg/l by agricultural measures.

**Target achievement:** If nitrate concentrations in excess of 25 mg/l are detected in a groundwater body from which drinking water is abstracted, the canton concerned is required to draw up and implement remediation measures in accordance with water protection legislation. In order to actively promote this reduction in nitrate levels, targeted cantonal remediation projects for reducing excessive nitrate levels in individual groundwater resources are financially supported by the federal government (Article 62a GSchG). Farmers are compensated for the costs and reduced yields associated with projects of this kind, primarily from the federal government, but also, to a lesser extent, from the cantons, communes, water suppliers or sponsors. When implemented consistently, such projects can prove successful, as shown by the examples of catchment installations in Wohlenschwil (canton of Aargau) or Thierrens (canton of Vaud) (Figure 2). In view of the current nitrate situation in groundwater, in many cases the cantons are reluctant to undertake these targeted remediation projects and therefore, often the nitrate problem is "solved" by abandoning a nitrate-polluted drinking water catchment installation or combining polluted water with less severely contaminated groundwater.

![Nitrate concentrations in the nitrate projects Thierrens and Wohlenschwil](image)

Figure 2: Nitrate projects according to Article 62a GSchG: Nitrate profiles for catchments in Wohlenschwil (canton of Aargau) and Thierrens (canton of Vaud).

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114 FOEN 2009

Examples of successful nitrate projects

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 now-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.\(^{116}\)

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

3.13.2 Surface waters

**Target:** The quality requirements of the Water Protection Ordinance, Annex 1, are fulfilled.

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

**Target achievement:** In terms of nutrient pollution, the quality of Switzerland’s waterbodies is excellent, with the exception of small watercourses in the densely populated parts of Central Switzerland\(^ {117}\). 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 (see also section 3.6.)

The state of Swiss lakes is considered good\(^ {118}\). Improvements in the quality of rivers and streams, along with more sophisticated wastewater treatment have produced positive effects on lake water quality. This also benefits those drinking water supply companies drawing from lake water\(^ {119}\). 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"\(^ {120}\) provide standardised methods for investigating and assessing the state of rivers in Switzerland. Corresponding methods are currently being developed for lakes. In levels of differing 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 in the field of water protection.

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116 SAEFL/FOWG 2004
117 OECD 2007
118 Spreafico & Weingartner 2005
119 Eawag 2009
120 http://www.modul-stufen-konzept.ch/
Target achievement: In future the condition of surface waters is to be assessed by means of nationally coordinated monitoring and evaluation using the harmonised methods described above. The methods for rivers that have already been prepared will be applied by the cantons as part of the cantonal monitoring of waters. From 2011, the methods will be applied at national level in around 120 representative locations in Switzerland as part of the "Coordinated Monitoring of Surface Waters" project. 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 2.5.2).

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) and the associated Data Access project (DaZu) provide a coherent basis for the provision of environmental information covering the whole of Switzerland.

Background: Environmental data can currently be obtained from numerous different data sources in FOEN, institutes and cantonal departments. In future, the "Swiss Environmental Monitoring Network NUS" will be responsible for providing a coherent basis of information on environmental and resource policy and for informing the public. The data provided by NUS must be quickly and easily accessible to all data users at all times. The Data Access (DaZu) project is currently developing the technical infrastructure for enabling this central and standardised access to the NUS data.

Target achievement: In October 2008 the "Swiss Environmental Monitoring Network" 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 DaZu project was started in 2006 with the initialisation and subsequent preliminary study and is expected to be concluded at the end of 2010.

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

Proposed target: Revision of the existing recommendation in accordance with EU Directive 2006/7/EC on the standardisation of controls.

Background: Since the nineteen sixties, 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.\(^\text{121}\) In Switzerland, a recommendation for the hygiene assessment of lake and river baths was issued in 1991\(^\text{122}\). To this day, this recommendation has been used by the cantonal laboratories as basis for 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

\(^{121}\) http://www.bag.admin.ch/themen/lebensmittel/04858/04864/04904/04937/

\(^{122}\) FOPH et al. 1991
methods, it seems appropriate to formulate the new findings in the form of recommendations\textsuperscript{123}. The existing recommendation should now be updated on the basis of EU Directive 2006/7/EC.

**Target achievement:** The FOPH will appoint a working group, consisting of representatives of FOPH, FOEN, the cantonal laboratories and possibly cantonal medical officers, to revise the recommendation of 1991 on the basis of EU Directive 2006/7/EC.

3.15 **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.

3.16 **Application of recognized good practice in the management of enclosed waters generally available for bathing** [Art. 6, Paragraph 2 (k)]

**Target:** Produce a Bathing Water Ordinance for Switzerland.

**Background:** No ordinance on the water quality of swimming baths currently exists nationwide for Switzerland, although there is a standard, 385/1 (version: 2000), issued by the Swiss Society of Engineers and Architects (SIA), on the requirements relating to water and water treatment plants in baths open to the public\textsuperscript{124}. Bathing water regulations also already exist in individual cantons, for example in the cantons of Aargau\textsuperscript{125} or Fribourg\textsuperscript{126}.

**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 2011. On the basis of the revised LMG, the FOPH will prepare a draft version of a Bathing Water Ordinance.

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

**Target:** The cantons fulfil their obligations concerning local pollutants that could jeopardise waters.

**Background:** According to the Ordinance on Contaminated Sites (AltIV)\textsuperscript{127} and the Water Protection Ordinance (GSchV), if the cantons detect any pollutants 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. contaminated site management, water protection, spatial planning)\textsuperscript{128}. Most of the cantons have already produced their land registers. The other cantons are due to produce their land registers by 2011.

\textsuperscript{123} http://www.baq.admin.ch/themen/lebensmittel/04858/04864/04904/04937/

\textsuperscript{124} SIA 2000

\textsuperscript{125} Ordinance on Public Baths (Baths Ordinance, BäV) of 21 March 2001

\textsuperscript{126} Ordinance on Hygiene in Public Swimming Baths and Lidos of 29 June 2004

\textsuperscript{127} Ordinance on the Remediation of Contaminated Sites (Contaminated Site Ordinance, AltIV) of 26 August 1998, SR 814.680

\textsuperscript{128} http://www.bafu.admin.ch/altlasten/01608/
3.18 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 1.5), Switzerland is working with its neighbouring countries and is thus indirectly concerned with certain principles of the Water Framework Directive.129

**Target achievement:** A national "Integrated River Basin Management" working group was established in 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 is preparing a set of guiding principles130. These principles should create a common framework and explain, in comprehensible language, why Switzerland promotes the Integrated River Basin Management approach and what are the implications, benefits and long-term implementation objectives that are being pursued. 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 water resource management activities. Certain river basins are already being managed according to these principles. See box below.

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**Practical examples of integrated water management**

In the Jura region of Switzerland, 37 water supply companies in five cantons (Solothurn, Basel-Stadt, Basel-Land, Berne and Jura) have produced a common strategy in the context of the Regional Drainage Plan (RDP) with the aim of achieving sustainable management of the Birs river basin. The strategy includes the identification of river segments requiring revitalisation, the evaluation of flood-prone areas and the optimisation of the operation of wastewater treatment plants. The RDP is based on a comprehensive, interdisciplinary concept. The project covers the entire hydrological system and includes, in particular, the surface waters, the groundwater, the natural and landscape values, the fish stocks, hydraulic engineering, spatial planning, drinking water supply and wastewater treatment.131

The Regional Drainage Plan (RDP) of Val-de-Ruz in the Neuenburg Jura was initiated in order to improve the generally poor condition of the Seyon River and its tributaries132. As a result of the realization that the measures formulated in the RDP would be very difficult to implement without a regional approach, an integrated regionalisation project is currently being implemented that involves the merging of both the water supply and wastewater management into one organising body.

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129 SOER 2010
131 OECD 2007
132 BG Consulting Engineers 2010
Proposed target: Within a few generations the waters are transformed into as natural a condition as possible.

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 are formulated in a parliamentary counter-proposal to an initiative of the Swiss Fisheries Association. This counter-proposal includes amendments to the laws on water protection, hydraulic engineering\textsuperscript{133} and energy\textsuperscript{134} and on agricultural land rights\textsuperscript{135} and will be submitted to a referendum by mid-May 2010.

Target achievement: If this referendum deadline expires unused, i.e. the proposal is not voted on by the public, the corresponding ordinances will be amended accordingly. The new provisions should then enter into force in 2011.

\textsuperscript{133} Federal Act on Hydraulic Engineering of 21 June 1991 (version: 1 August 2008) SR 721.100
\textsuperscript{134} Energy Act (EnG) of 26 June 1998 (version: 1 January 2009) SR 730.0
\textsuperscript{135} Federal Act on Agricultural Land Rights (BGBB) of 04 October 1991 (version: 1 September 2008) SR 211.412.11
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 the comprehensive water protection efforts that have been made in the last decades. 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 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 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 has been discussed at the start of April 2010 in a bilateral meeting of the Heads of the FOPH and 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 FOEN is to be continued in the first half of 2010 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 (SVGW, VSA, etc.) in order to formulate the definitive targets with corresponding indicators, time frames, 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 time frame. The Protocol also promotes cooperation between the relevant departments and other stakeholders concerned with water. Finally, the Protocol provides the option of enforcing 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 rated as very good. For some issues however, it is difficult to prove this assertion or to make corresponding nationwide data available to the public (see also section 2). For example, there is no central overview on the quality of drinking water in Switzerland, and the corresponding data must be obtained from the cantons and water suppliers. The development of a national drinking water database (see section 3.1) should prove helpful in this respect.

As far as water resources are concerned, the national monitoring programmes managed by the FOEN - NAQUA and NADUF - provide data on the quality of groundwater and watercourses respectively. The "Coordinated Monitoring of Surface Waters" project is designed to form the basis for documenting and evaluating the status and development of Swiss surface waters at national level. Additional environmental data can currently be obtained from numerous different data sources in the FOEN, from institutes and cantonal departments. In future, the "Swiss Environmental Monitoring Network NUS" and the associated DaZu data access project, data for the whole of Switzerland are to be collated and imported into a harmonised environmental database in order to satisfy the need for information on environmental and resource policy and for informing the public.

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" website136 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, which has been set up and provided free of charge by the SVGW137. 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.

136 http://www.bag.admin.ch/themen/lebensmittel/04858/04864/
137 http://www.wasserqualitaet.ch/
The public can also obtain comprehensive information on water protection (surface and groundwater) from the FOEN website\(^{138}\). Information on the state and development of the environment, including on water quality, is presented on the FOEN "Environmental state" web page\(^{139}\). 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\(^{140}\) 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" (NRP 61\(^{141}\)). 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. 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 the 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.

Finally, the industry associations SVGW und VSA offer numerous further training opportunities, including courses, professional conferences, information in the form of journals, etc.

### 4.6 International cooperation

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 the 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

\(^{139}\) [http://www.bafu.admin.ch/umwelt/]
\(^{140}\) [http://www.eawag.ch/]
\(^{141}\) [http://www.nfp61.ch/]
the Protocol in Moldova and to outline the current situation. Further similar meeting 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 rural drinking water supply and sanitation\textsuperscript{142}, 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 that have no access to clean drinking water by 2015. The strategy also includes targets relating to food safety (water for nutrition).\textsuperscript{143}

In the area of water protection Switzerland has entered into various obligations at international level, specifically in connection with the following five water protection commissions: the International Commission for the Protection of the Rhine\textsuperscript{144} (ICPR), the International Commission for the Protection of Lake Constance\textsuperscript{145} (IGKB), the Commission for the Protection of the Waters of Lake Geneva\textsuperscript{146} (CIPEL), the International Commission for the Protection of Italian-Swiss Waters\textsuperscript{147} (CIPAIS) and the Commission for the Protection of the Marine Environment of the North-East Atlantic\textsuperscript{148} (OSPAR).\textsuperscript{149} 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 percent 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.

\textsuperscript{142} http://www.deza.admin.ch/de/Laender/Gemeinschaft_Unabhaengiger_Staaten_GUS/Moldau_Republik
\textsuperscript{143} SDC 2005
\textsuperscript{144} www.iksr.org
\textsuperscript{145} www.igkb.org
\textsuperscript{146} www.cipel.org
\textsuperscript{147} www.cipais.org
\textsuperscript{148} www.ospar.org
\textsuperscript{149} OECD 2007
5. **Information on the persons preparing the report**

The following report is submitted to UNECE and WHO/EURO on behalf of Switzerland in accordance with article 7 of the Protocol on Water and Health.

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6. References


SVGW (2007): Wegleitung für die Planung und Realisierung der Trinkwasserversorgungen in Notlagen (TWN). W/VN300d


**Mentioned legislative texts at international level:**


**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/d/sr/sr.html


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


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

Mentioned cantonal legislative texts:


### 7. Glossary and list of abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AltIV</td>
<td>Altlasten-Verordnung [Contaminated Sites Ordinance]</td>
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<tr>
<td>AMB</td>
<td>Aerobic Mesophilic Bacteria</td>
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<td>AP</td>
<td>Agricultural Pesticides</td>
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<td>AOX</td>
<td>Adsorbable organic halogens</td>
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<tr>
<td>BGBB</td>
<td>Bundesgesetz über das bäuerliche Bodenrecht [Federal Act on Agricultural Land Rights]</td>
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<td>CFU</td>
<td>Colony Forming Units</td>
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<tr>
<td>ChemRRV</td>
<td>Chemikalien-Risikoreduktions-Verordnung [Chemical Risk Reduction Ordinance]</td>
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<tr>
<td>CIPAlS</td>
<td>International Commission for the Protection of Italian-Swiss Waters</td>
</tr>
<tr>
<td>CIPEL</td>
<td>Commission for the Protection of the Waters of Lake Geneva</td>
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<tr>
<td>DHA</td>
<td>Department of Home Affairs</td>
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<tr>
<td>Discharge conditions</td>
<td>Requirements that may be imposed by cantons on companies and WWTPs before they are allowed to discharge wastewater into water bodies.</td>
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<td>Eawag</td>
<td>Swiss Federal Institute of Aquatic Science and Technology</td>
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<td>EnG</td>
<td>Energiegesetz [Energy Act]</td>
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<td>FEDRO</td>
<td>Federal Roads Office</td>
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<tr>
<td>FIV</td>
<td>Fremd- und Inhaltsstoffverordnung [Ordinance on Contaminants and Constituents in Foodstuffs]</td>
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<tr>
<td>FOAG</td>
<td>Federal Office for Agriculture</td>
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<td>FOEN</td>
<td>Federal Office for the Environment (formed in 2006 from the merger of SAEFL and FOWG)</td>
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<tr>
<td>FONES</td>
<td>Federal Office for National Economic Supply</td>
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<tr>
<td>FOPH</td>
<td>Federal Office of Public Health</td>
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<tr>
<td>FOWG</td>
<td>Federal Office for Water and Geology (up to 2006)</td>
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<td>GDP</td>
<td>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.</td>
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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. 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 NAQUA
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 |
| 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
Reporting for Switzerland under the Protocol on Water and Health

Submitted to:
United Nations Economic Commission for Europe (UNECE)
Regional Office for Europe of the World Health Organisation (WHO/EURO)