

Implementation of the Protocol on Water and Health in Switzerland

Status report 2016 – 2018
in accordance with article 7 of the Protocol



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Preamble

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

This report shows many facets of water management that can affect human health in various ways. This holistic approach shows that many groups are involved in ensuring that the guarantees required by the Protocol are fulfilled. Only concerted action among these groups will allow solutions to be found to the current issues related to drinking water and sanitation.

This report has been made possible thanks to the cooperation between the cantonal inspection authorities and the water suppliers. In a decentralised system like the one in Switzerland, it is these organisations which have the relevant information to enable an objective evaluation of the situation. We would like to express our sincere thanks for their active participation.

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

We hope that the presented items will give readers a good overview of all the work being done to ensure sustainable water and sanitation management in Switzerland.

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Executive summary

Switzerland's national targets were officially announced in 2017 in line with the requirements stipulated in article 6 paragraph 2 of the Protocol on Water and Health. These targets contribute towards upholding the commitments made by Switzerland within the Sustainable Development Goals (SDGs), in particular Goal No. 6 (clean water and sanitation).

Chapter 2 of this report is based on these targets. This year, just like in previous years, Switzerland's report describes the relevant targets taking into account current legal provisions, those that are awaiting a political decision as well as other possible objectives, which are still under discussion among relevant stakeholders. This differentiation indicates that all the aspects of article 6 paragraph 2 of the Protocol have been analysed and prioritised, resulting in a substantive programme of work for all the stakeholders involved in Switzerland.

The targets related to access to water and sanitation have been largely achieved both in the urban as well as in the rural areas. However, we are not in a position to document the extent to which access to water by vulnerable population groups (e.g. the impoverished, nomads, etc.) has been guaranteed. In this regard, it would be worth conducting a survey based on the scorecards, which were developed under the auspices of the Protocol.

As regards access to sanitation, it should be noted that more than 97% of the Swiss population is connected to a central Waste Water Treatment Plant. It can thus be concluded that this target has also been reached. Furthermore, an important development worth noting is the decision by the Swiss Parliament to put in place a new generation of Waste Water Treatment Plants, which would be capable of eliminating micro-pollutants. The objective of this investment programme is to ensure that one hundred of the most important Waste Water Treatment Plants in Switzerland are adequately equipped within the next twenty years.

As regards the quality of potable water, it is important to note that for the first time, the indicators mentioned in Chapter 3 come from various geographical regions (Jura, Plateau, the Alps, etc.) and they can thus be considered as being representative of the whole country. The data gathered for this evaluation came from twenty cantons and it covers more than 77% of the population in Switzerland whereas the previous exercise only covered ten cantons and it represented approximately 35% of the population.

The cantonal enforcement authorities reported that for the past three years, they had not registered any cases in which the maximum limits for fluoride and lead had been exceeded. However, they highlighted the following cases in which the maximum limits had been exceeded: arsenic (6% of the samples), iron (0.3% of the samples), nitrates (0.7% of the samples) and nitrites (0.03% of the samples). In each specific case, the water distributors took the necessary corrective measures in order to ensure compliance with the legal requirements.

Furthermore, it is worth highlighting the fact that thirteen cantons reported eighty-eight cases of faecal origin contamination for which very urgent corrective measures were taken, in certain cases, these included the abandoning of the contaminated supply sources.

The major challenges regarding water management and sanitation are related to multidisciplinary areas. The diverging interests associated with the utilisation of the soil oblige the relevant stakeholders to seek compromise solutions through negotiations. The compliance with the protection zones is becoming increasingly problematic due to the rise in the population. Regional planning could possibly remedy this situation. However, regionalisation would call into question the decentralised structures of the water suppliers: certain communes are small water suppliers and they wish to maintain their level of autonomy. Currently, 80% of the population in Switzerland drinks potable water originating from a protected site. The evolution of this situation is under scrutiny by the enforcement authorities in order to prevent any possible threats to the health of the consumers.

Switzerland is in a privileged situation in many aspects related to the water supply, noting that, the water demand (abstraction, irrigation, etc.) represents 4% of the precipitations in the entire country. Nevertheless, sometimes problems arise due to the lack of water for agriculture at the local level.

Switzerland experienced a hot and dry summer for several months in 2018. Nonetheless, based on the assessments carried out by the cantons over the past three years, we are in a position to demonstrate that this exceptional situation did not have any negative repercussions on the quality of distributed drinking water. This data enables us to confirm that the water supply systems in place are resilient to drought.

Switzerland fulfils the essential requirements of the Protocol on Water and Health and just like in the past, our country remains committed to sharing the Swiss experience in the management of water and sanitation with other countries in the European Region.

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1. General aspects

1.1. Publication of national targets

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

An initial preliminary report was prepared and published by the Federal Office for the Environment FOEN and the Federal Office of Public Health FOPH in April 2013. This document, which is available on the Internet¹, examined the various current issues related to water management in relation to health in Switzerland. This holistic approach allowed the work being done in this area by the federal and cantonal authorities to be highlighted.

Switzerland officially set its targets in 2017. These targets were approved by the competent federal offices and publicised on the FSVO website. These evaluations have been conducted on the basis of these targets, which are set out in Section 2 of this document.

1.2. Coordination among the competent authorities

The Swiss authorities have not set up an additional coordination group dedicated to activities related to the Protocol, as this comes within the remit of the Federal Food Safety and Veterinary Office FSVO. The federal and cantonal authorities regularly attend meetings of the working groups described in Section 5.

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

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

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 ongoing. These serve to analyse the challenges and options for action facing water suppliers and sanitation over the coming decades. The precautions taken by the communes and cantons to guarantee drinking water supplies in emergencies are currently being assessed.

In respect of micropollutants in waters, the FOEN is monitoring both local and diffuse contamination. Information from the project on micropollutants in waters from diffuse sources, entitled "Mikroverunreinigungen aus diffusen Quellen", has been published in a report². Furthermore, tests are under way to ascertain to what extent measures taken at the source for reducing and preventing micropollutants from entering waters might be reinforced³.

Environmental targets for agriculture have been specified jointly by the FOEN and FOAG⁴, with the aim of maintaining good water quality in the long term. A national research programme on "Sustainable Water Management" is also under way. This programme addresses the future challenges for Swiss water management, particularly in connection with climate change⁵ (see Section 1.10).

¹Protocol on Water and Health: <https://www.blv.admin.ch/blv/fr/home/lebensmittel-und-ernaehrung/lebensmittelsicherheit/verantwortlichkeiten/sicheres-trinkwasser.html>

²Braun et al. 2015

³Postulate 12.3090 "Mikroverunreinigungen im Wasser. Verstärkung der Massnahmen an der Quelle", see <https://www.parlament.ch/de/ratsbetrieb/suche-curia-vista/geschaefft?AffairId=20123090>

⁴FOEN and FOAG 2008

⁵<http://www.nfp61.ch/en>

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 (Cst.; SR 101), the Federal Act of 24 January 1991 on the Protection of Waters (Waters Protection Act, WPA; SR 814.20) and the Waters Protection Ordinance of 28 October 1998 (WPO; SR 814.201), the Federal Act of 20 June 2014 on Foodstuffs and Utility Articles (Foodstuffs Act, FoodA; SR 817.0), the corresponding implementing ordinances and in the Ordinance of 20 November 1991 on the Guaranteed Supply of Drinking Water in Emergencies (EDWO; SR 531.32).

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

1.4.1. Federal Constitution

According to Article 76 of the Cst., the Confederation shall, within the scope of its powers, ensure the economical 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 Cst.). 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 Cst.).⁶ According to Article 97 of the Cst., 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 Waters Protection Act (WPA) and the Waters Protection Ordinance (WPO) constitute the water protection legislation of Switzerland at national level. The Waters 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 WPA) and other regulations for maintaining the quality of waters, the Waters Protection Act also regulates the spatial planning related to the protection of waters. The law provides for the designation of water protection areas, groundwater protection zones and groundwater protection areas, in which measures are taken to protect water catchment areas in both quantitative and qualitative respects. Sanitation is governed by the principle that contaminated wastewater may only be discharged into waters after being treated. The disposal of wastewater is managed, among other things, by a drainage plan.

The Ordinance on the Guaranteed Supply of Drinking Water in Emergencies (EDWO) regulates the supply of drinking water in times of crisis. It states that the cantons and water suppliers should take precautions to maintain the regular drinking water supplies for as long as possible, rapidly resolve any 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, i.e. the Foodstuffs Act⁷ and the corresponding ordinances. Drinking water is covered by the Ordinance on Foodstuffs and Utility Articles⁸ (FUAO), the Ordinance on Hygiene when handling Foodstuffs⁹ and the Ordinance on Drinking Water and Water in Public Baths and Shower Facilities (DWBSO)¹⁰. Quality requirements for drinking water are set out in the DWBSO. Additionally, a key element of the Foodstuffs Act, namely self-monitoring, also applies to water supplies. According to Art. 74 et seqq. of the FUAO, important instruments of self-monitoring are: (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.

⁶ Eawag 2009

⁷ Federal Act on Foodstuffs and Utility Articles (Foodstuffs Act, FoodA) of 20 June 2014 SR 817.0

⁸ Ordinance on Foodstuffs and Utility Articles (FUAO) of 16 December 2016 SR 817.02

⁹ FDHA Ordinance on Hygiene when handling Foodstuffs of 16 December 2016 SR 817.024.1

¹⁰ FDHA Ordinance on Drinking Water and Water in Public Baths and Shower Facilities (DWBSO) of 16 December 2016 SR 817.022.102.

Finally, the purpose of the Federal Act on Spatial Planning (Spatial Planning Act, SPA, SR 700) is to protect natural resources (soil, air, water, forests and landscape) and to guarantee the basis for the provision of sufficient supplies for the country (Art. 1). According to Art. 93 of the Federal Act on Agriculture (Agriculture Act, AgricA, SR 910.1), investment projects relating to water supply and sanitation infrastructure in rural regions (in particular in mountain regions) can also be financially supported.

1.4.3. Cantonal and communal provisions

Cantonal and communal provisions can supplement and specify the federal legislation. Some cantons have laws and ordinances which are especially concerned with water use or water supply, while in other cantons, the water supply is regulated differently, for example in the cantonal Fire Protection Ordinance. Details concerning the water supply are also often legislated at communal level¹¹.

Sanitation at cantonal level is regulated in enforcement provisions to the national Waters 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 Waters Protection Act. Here too, the provisions vary 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 to maintain the quality of its own waters, Switzerland fulfils its responsibilities by actively participating in international commissions, specifically the International Commission for the Protection of the Rhine¹² (ICPR), the International Commission for the Protection of Lake Constance¹³ (IGKB), the International Commission for the Protection of Lake Geneva¹⁴ (CIPEL), the Joint Commission for the Protection of Swiss-Italian Waters¹⁵ (CIP AIS) and the Commission for the Protection of the Marine Environment of the North-East Atlantic¹⁶ (OSPAR) (see Section 4.7.3).

1.6. Cost-benefit analysis of projects undertaken

1.6.1. Wastewater treatment

A survey conducted in 2010 into the costs and quality of service of public wastewater management in Switzerland¹⁷ showed that the quality of wastewater treatment had improved again in the past few years with no increase in overall costs. The proportion of communes with a General Drainage Plan (GDP) has increased again, while sanitation has become more professionally run and more contaminated water is being treated at comparable cost.

1.6.2. Water supply

A water supply benchmarking study¹⁸ showed that the relevant factor affecting the cost of drinking water in CHF/m³ is the specific network output in m³/km x year¹⁹. This is why large water supply companies with a dense connection structure tend to offer their customers lower fees and charges than smaller ones, even though they incur higher water acquisition and treatment costs. The fee structure of Swiss water supplies is

¹¹ Eawag 2009

¹² www.iksr.org/en/

¹³ www.igkb.org

¹⁴ www.cipel.org/en/

¹⁵ www.cipais.org

¹⁶ www.ospar.org

¹⁷ VSA 2011

¹⁸ Kappeler 2010

¹⁹ If losses are very high for equivalent amounts of water entering the network, then the cost per cubic metre rises accordingly.

highly variable. Charges paid at regular intervals usually comprise a fixed standing charge and a price based on volume.

The Swiss Gas and Water Industry Association (SGWA) has issued recommendations on the funding of water supplies (W1006), laying down principles for cost calculation and for the calculation of fees and charges based on usage. As water supply companies have high fixed costs, the recommendations are that 50% to 80% of the costs should be covered by standing charges and 20% to 50% by prices based on volume. Water supply companies are generally supposed to be not-for-profit bodies. This means that the fees they charge must cover all their costs, but they must not actually make a profit.

1.7. Public participation

The political system in Switzerland is characterised by direct democracy and federalism. The people's right of co-determination includes voting, initiative, referendum and petition rights.²⁰ Accordingly, the Swiss population is actively involved in framing legislation. This is achieved at national and cantonal level via compulsory and optional referendums and by people's initiatives. Likewise at cantonal and communal level, the population frequently decides on specific projects, e.g. budgets, project loans, etc.

1.8. Production of the status report

Responsibility for the management of the Protocol on Water and Health has been handed over to the FSVO. This federal office, which is responsible for drinking water legislation in particular, is in charge of coordinating the implementation of the Protocol in Switzerland. The FOEN was called on to make a significant contribution to the production of this report, as it is responsible for all issues relating to water management and sanitation. Other cantonal bodies, primarily the cantonal laboratories, were also involved in providing the information needed to produce this report, since under the Swiss federal system water belongs to the cantons.

1.9. Decentralised water management

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

1.10. Emerging challenges in water management

1.10.1. Climate change and water

As part of the project on climate change and hydrology in Switzerland (CCHydro)²¹, the effects of climate change on Switzerland's water supplies up until 2100 were investigated. Ten regional sample calculations, which were compiled as part of the Swiss Climate Change Scenarios CH2011, served as a climatological basis. The key results are documented in this project's synthesis report and are summarised here.

As an alpine country, Switzerland is affected by climate change more than average. Climate-related changes to the water cycle affect all parts of the water sector. Action is needed as a result of possible changes such as lower discharge at certain times of the year, more frequent drought and low water levels in summer, higher water temperatures and more frequent flooding. The change in water availability may lead to conflicts over use. This particularly affects the sectors of flood protection, municipal water management, water-related biodiversity, crop irrigation, thermal water usage and artificial snow-making. However, as the results of the

²⁰ The Swiss Confederation – a brief guide : <https://www.bk.admin.ch/bk/en/home/dokumentation/the-swiss-confederation--a-brief-guide.html>

²¹ <http://www.bafu.admin.ch/publikationen/publikation/01670/index.html?lang=de>

National Research Programme 6122 show, the effects of settlement development and changes in land use on waters and water resources are at least as great as the effects of climate change.

1.10.1.1. Switzerland's climate adaptation strategy – water sub-strategy

The Federal Council's strategy for adapting to climate change includes two cross-sector sub-strategies. The first was adopted in 2012 and covers the targets and basic principles of adaptation²³. The second is a plan of action for the period 2014-2019²⁴. In the area of water management (for all affected areas see the section on climate change and water), around a dozen measures have been adopted and are currently being implemented. In addition, measures from the Federal Council's report entitled "Umgang mit lokaler Wasserknappheit" on managing local water shortages are also being implemented in order to adapt to the challenge of summer drought.²⁵

As part of its pilot programme of adaptation to climate change²⁶, the federal government is also supporting innovative projects instigated by cantons, regions, research institutes and private companies in order to make this adaptation part of everyday life. As regards water, projects are currently under way in clusters covering local water shortages, dealing with natural hazards and managing changes in the ecosystem and land use.

1.10.1.2. Planning and managing water resources

Even as Europe's "water tower", Switzerland can still be affected by local temporary water shortage problems, as demonstrated by those of summer 2003, spring 2011 or the 2015 drought. On top of this, buildings in groundwater protection zones and areas are increasingly endangering water security.

Such problems can be tackled in good time and disputes over water supply avoided with the proactive regional planning of water resources. The FOEN is providing practical guidelines for dealing with these water shortage problems that come in three modules and are based on the guiding principles of river basin management (see Section 3.19). The practical guidelines are directed at cantonal authorities, regional stakeholders in the Swiss water sector, communes, water suppliers and, last but not least, engineers and technical consultancies. Among other things, they explain potential regional approaches for tackling land use disputes between water catchment areas and buildings in groundwater protection zones or for withdrawing water for irrigation during droughts.

1.10.2. Micropollutants in waters

Action taken by some communal wastewater treatment plants (WWTP) should reduce the discharge of micropollutants (pharmaceuticals and chemicals) into waters in order to protect drinking water resources and aquatic flora and fauna²⁷. At the same time, the FOEN is preparing a comprehensive examination of the issue at a national level in respect of diffuse sources²⁸. This will form the basis for a comprehensive micropollutant survey and assessment plan, specific proposals to reduce micropollutant levels and provide scientific data to help increase understanding of the system.

1.10.2.1. Micropollutants from municipal drainage

Various work carried out over the past few years has shown that treated communal wastewater in the densely populated parts of Switzerland makes a significant contribution to water contamination by micropollutants. This

²² www.nfp61.ch/en/

²³ nccs

²⁴ <http://www.bafu.admin.ch/publikationen/publikation/01673/index.html?lang=de>

²⁵ <http://www.bafu.admin.ch/publikationen/publikation/01762/index.html?lang=de>

²⁶ <https://www.bafu.admin.ch/bafu/en/home/documentation.html>

³³ <https://www.bafu.admin.ch/bafu/en/home/topics/climate.html>

²⁷ <http://www.bafu.admin.ch/gewaesserschutz/03716/11218/11223/index.html?lang=de>

²⁸ <http://www.bafu.admin.ch/gewaesserschutz/03716/11217/index.html?lang=de>

discharge can be further reduced by expanding existing wastewater treatment plants. Sophisticated pilot trials carried out as part of the "Strategie Micropoll" project showed that more advanced techniques such as powdered activated carbon adsorption or ozonation can significantly improve water quality²⁹.

The federal government's plan for implementation stipulates that the largest wastewater treatment plants (WWTPs), large WWTPs in the drainage basin of lakes and other WWTPs for waters that are heavily polluted with wastewater are to be upgraded with additional processes to eradicate micropollutants. A special grant has been made to cover 75 per cent of the start-up costs thanks to an amendment to the Waters Protection Act: all Swiss WWTPs pay a levy based on the number of customers they have. The necessary legal basis for this was adopted by the Swiss Federal Assembly in spring 2014. The statutory provisions came into force on 1 January 2016. The targeted upgrade of WWTPs will be implemented by 2040. By then, over 50% of communal wastewater in Switzerland will be treated for micropollutants. Around 100 of the approximate 800 WWTPs in Switzerland are likely to be upgraded, pushing the cost of sanitation in Switzerland up by around 12%.

1.10.2.2. Micropollutants in waters from diffuse sources

In 2015, the FOEN completed an extensive situational analysis of micropollutants in overground waters from diffuse sources, demonstrating that many Swiss watercourses are polluted by micropollutants from diffuse inputs. These inputs are often highly dynamic and mean that ecotoxicologically derived quality criteria are repeatedly being exceeded, particularly in small watercourses. The most crucial sources of the diffuse input of micropollutants are agriculture and, to a lesser degree, settlements; the most relevant substances are pesticides, some heavy metals and a few biocides.

In order to assess the condition of overground waters in terms of micropollutants based on the ecotoxicological effect of these substances, corresponding changes were implemented in the Waters Protection Ordinance in January 2016. On this basis, ecotoxicologically related numerical requirements (comparable to environmental quality standards) will be included in the ordinance by 2018 for selected micropollutants. On the basis of the water quality assessment that uses these values, efficient measures to improve water quality must be implemented in future, primarily in the affected waters, if the requirements are not met. The National Action Plan for Risk Reduction and the Sustainable Use of Pesticides, which will be compiled by late 2016 and led by the Federal Office for Agriculture, plays a crucial role in this regard.

To protect groundwater, the source of around 80% of Switzerland's drinking water, it will also be ascertained whether new numerical requirements for certain micropollutants should be included in the Waters Protection Ordinance. The pesticide metabolites that were classified as not relevant at the time of the pesticide approval and that still lack a legally supported assessment value are key here. The numerical requirements in groundwater are intended to allow the competent authorities to take measures to protect water quality before the values required by food law are exceeded. This is of major importance, since groundwater reserves often only react very slowly to changes in pollutant levels, and the process of compiling and implementing measures at the source of contamination is usually lengthy as well.

1.10.3. Micropollutants in drinking water

The detection of micropollutants in drinking water has led the federal authorities to publish a guide for use in assessing these unregulated foreign substances. This assessment of substances that have recently been identified and whose toxicity is not known is based on the TTC concept. This concept takes account of the precautionary principle and sets a maximum threshold for potentially genotoxic substances (around 0.1 µg/litre) and another threshold for all other substances (10 µg/litre). This concept was reinforced in the FDHA Ordinance on Drinking Water and Water in Public Baths and Shower Facilities (DWBSO) on 1 January 2014.

²⁹ <http://www.bafu.admin.ch/publikationen/publikation/01661/index.html?lang=de>

2. Targets and target achievement: review of the current situation

The following subsections correspond to those set out in the guidelines on reporting and achieving targets³⁰, which follow Art. 6 Paragraph 2 of the Protocol³¹. The targets described in the following subsections are set differently. The following classification applies:

Target: A target that was discussed and laid down definitively by the federal offices and established on a legal basis.

Proposed target: A target decided by the authorities but which will require the law to be amended. However, not all the steps associated with amending the corresponding act or ordinance (consultation process, referendum, possible vote) have yet been completed.

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

2.1. Quality of drinking water supply [Art. 6, Paragraph 2 (a)]

Defined target (classification)	Deadline	Responsibility	Target indicator
Setting of national evaluations based on optimal drinking water data management. (C).	1.1.2020	FSVO	National evaluation on drinking water

Target: Setting of national evaluations based on optimal drinking water data management.

Background: Art. 5 of the DWBSO states that any party supplying drinking water to consumers via a water supply plant must provide consumers with comprehensive information about the quality of the drinking water at least once a year. The SGWA offers interested parties the opportunity to publish their quality data at www.wasserqualitaet.ch.

The information supplied by the cantonal enforcement authorities is published in 20 separate annual reports.

Target achievement: The Food Chain Strategy stipulates that the federal government and the enforcement authorities must carry out detailed analysis of drinking water quality throughout Switzerland. To this end, the Commission for Drinking and Bathing Water led by the Swiss Association of Cantonal Chemists defines the optimal analysis based on the available data.

This target contributes to the fulfilment of the target 6.1 of the 2030 Sustainable Development Agenda.

³⁰ UNECE 2009: Preliminary Guidelines for Review and Assessment of Progress under the Protocol <http://www.unece.org/env/documents/2007/wat/wh/ece.mp.wh.2007.4.e.pdf>

³¹ Protocol on Water and Health to the 1992 Convention on the Protection and Use of Transboundary Watercourses and International Lakes of 17 June 1999

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

Defined target (classification)	Deadline	Responsibility	Target indicator
Developing a reporting system for incidents and outbreaks of disease caused by water, in collaboration with the reporting systems for infectious diseases (B)	1.1.2022	FSVO in collaboration with FOPH	No. of registered cases for drinking water

No targets have been set for this point so far. However, the existing national statistics regarding diseases caused by drinking water are not satisfactory (see Section 2.2). The development of a reporting system for incidents and outbreaks of disease caused by water therefore constitutes one possible target.

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

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

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

Defined target (classification)	Deadline	Responsibility	Target indicator
Creating emergency infrastructure to improve water supply in exceptional situations. Revision of the Ordinance on the Guaranteed Supply of Drinking Water in Emergencies (B)	2019	FOEN	Approval of the new ordinance

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

Proposed target: Devising emergency strategies to improve water supply in exceptional situations.

Background: The existing strategies to guarantee the supply of drinking water in emergencies are limited to times of crisis and no longer meet today's challenges (e.g. local water shortages).

Severe weather conditions in recent years have also affected water suppliers at various locations over a prolonged period. These incidents demonstrate the increasing need for communes and water supply companies to address the drinking water supply in emergencies and to develop corresponding explicit strategies. This is also stipulated by the federal government in the Ordinance on the Guaranteed Supply of Drinking Water in Emergencies (EDWO). To support this work, the Swiss Gas and Water Association (SGWA) has produced a guideline for the planning and implementation of the drinking water supply in emergencies³².

Target achievement: The federal government surveyed the cantons in 2016 to determine the extent to which the Ordinance on the Guaranteed Supply of Drinking Water in Emergencies was being enforced. This involved discussing to what extent the existing legal instruments, in particular the EDWO, could be expanded in order to prepare for exceptional situations. Individual cantons have already adapted their strategies for guaranteeing the supply of drinking water in emergencies to this effect.

³² SGWA 2007: "Wegleitung zur Planung und Realisierung der Trinkwasserversorgungen in Notlagen", published: W/VN300d.

Furthermore, in some cantons experts have observed a consistent trend towards cross-linking water suppliers and thus towards improved reliability of supply. However, this does not apply across the whole of Switzerland. Some cities (e.g. Geneva, Zurich) have already implemented the strategy. Cantons, such as Zurich, Bern and Aargau, are actively pursuing this strategy.

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

Defined target (classification)	Deadline	Responsibility	Target indicator
97% of the Swiss population is connected to a central wastewater treatment plant (WWTP). No further targets	Target completed	FOEN	% of the Swiss population connected to a central wastewater treatment plant

Wastewater infrastructure was, for the most part, constructed during the second half of the 20th century. This involved passing legislation and federal subsidies were required in order to implement it. Today, 97% of the Swiss population is connected to a central wastewater treatment plant (WWTP). The target has therefore been achieved and there is no need to define further targets.

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

Defined target (classification)	Deadline	Responsibility	Target indicator
Conserving the value of infrastructure (water supply network, catchment areas, reservoirs, laboratories) (A). Encouraging regional planning and cross-linking of water suppliers. C	Ongoing	FOEN	Implementation of regional plans for water supply

Target: Conserving the value of infrastructure (water supply network, catchment areas, reservoirs and labs).

Background: The necessary drinking water supply infrastructure is widely available. Expanding and maintaining this in a targeted way will be a priority in future. The public drinking water supply system is self-financing as a basic principle, i.e. its funding is secure in the long term as required by law. Value conservation is generally covered by charges, although federal legislation makes no provision to this effect. Cantonal regulations are of major importance and the water supply companies also follow the guidelines and recommendations issued by professional associations.

This target contributes to the fulfilment of the target 6.1 of the 2030 Sustainable Development Agenda.

Target achievement: Long-term task. Depending on the sector, recommendations for the management of infrastructure will be developed by the competent authorities. A cross-sector recommendation for the strategic

planning, creation and conservation of communal network infrastructure was compiled in 2014 by various professional associations working with the FOEN³³.

Proposed target: Encouraging regional planning and cross-linking of water suppliers.

Background: There are no provisions whatsoever in Switzerland regarding planning for water supply infrastructure. The cantons are therefore implementing this in very different ways. Many water suppliers are coming under increasing pressure as a result of the high density of use in Switzerland. People are increasingly giving up on drinking water catchment areas due to conflicts with settlements or transport infrastructure over use. This pressure will increase further.

Regional planning needs to identify strategically important drinking water catchment areas and groundwater resources that must be protected in any conflicts over use as a matter of priority. In order to resolve conflicts over use at planning level as early as possible, groundwater protection zones in drinking water catchment areas and groundwater protection areas for important groundwater resources must be embedded in spatial planning. Links should likewise be forged between water suppliers across different communes in order to minimise the effects of disruptions and to mobilise additional capacities if need be.

This target contributes to the fulfilment of the target 6.4, 6.5 and 6b of the 2030 Sustainable Development Agenda.

Target achievement: Various cantons are stipulating a regional plan for water supply and have made cross-links. In the absence of federal regulations, other cantons have not taken any precautionary measures whatsoever in this regard.

2.6. Levels of performance in sanitation [Art. 6, Paragraph 2 (e)]

Defined target (classification)	Deadline	Responsibility	Target indicator
In order to protect plants and animals in waters as well as in drinking water resources, the largest WWTPs, large WWTPs in the drainage basin of lakes and other WWTPs for waters that are polluted are to be upgraded with additional processes targeted at eradicating organic trace elements. (A)	Long-term task 2040	FOEN	No. of WWTPs upgraded
Ensuring the value of infrastructure is conserved (sewerage system, sewage treatment plants) (B)	Ongoing		Not applicable
Promoting the regionalisation of municipal drainage (C)	Ongoing		Not applicable

Target: In order to protect plants and animals in waters as well as drinking water resources, the largest WWTPs, large WWTPs in the drainage basin of lakes and other WWTPs for waters that are polluted are to be upgraded with additional processes targeted at eradicating organic trace elements.

Background: WWTPs 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 pesticides. 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, particularly when surface waters polluted with treated wastewater infiltrate groundwater. Upgrading selected WWTPs is intended to reduce the quantity of organic trace elements entering waters. Parliament

³³ "Handbuch Infrastrukturmanagement" 2014 edition, Organisation Kommunale Infrastruktur and Wasser-Agenda 21

endorsed this approach and approved nationwide funding for these measures on 21 March 2014 by amending the Waters Protection Act (WPA). These statutory provisions came into force on 1 January 2016.

This target contributes to the fulfilment of the target 6.3 of the 2030 Sustainable Development Agenda.

Target achievement: The legislation came into force on 1 January 2016. Eight treatment plants have already been upgraded, while more than 30 are undergoing work or have concrete planning projects in place. At present, it is thought that measures to eradicate organic trace elements will need to be taken in around 130 WWTPs by 2040. To finance the measures, a fund has been set up that is supported by Swiss WWTPs and that will run until 2040. All of the relevant measures must have been launched by this point.

Possible target: Ensuring the value of infrastructure is conserved (sewerage system, sewage treatment plants).

Background: The value of wastewater infrastructure in Switzerland is estimated to be around CHF 80 billion. Communal infrastructure is widespread and expanding and maintaining this in a targeted way will be a priority in future. This target contributes to the long-term fulfilment of target 6.2 of the 2030 Sustainable Development Agenda.

Target achievement: Depending on the sector, recommendations for the management of infrastructure will be developed by the competent authorities. A cross-sector recommendation for the strategic planning, creation and conservation of communal network infrastructure was compiled in 2014 by various professional associations working with the FOEN³⁴. The current value of the infrastructure and the investments made in the past years will be ascertained in a national key data study in the coming years. This will be a long-term task for the cantons, so there is little point in defining targets.

Possible target: Promoting the regionalisation of municipal drainage.

This target is currently being discussed and prepared by the federal offices concerned. At cantonal level, regionalisation measures are already being implemented in some cases.

Background: The organisation of wastewater management in Switzerland is characterised by federalism, direct democracy and municipal autonomy. Small-scale organisational structures (usually communes), a "militia" political system with inadequately qualified personnel and a lack of continuity contrast with the growing complexity of the regulations and additional challenges such as cost control, infrastructure maintenance and the management of micropollutants³⁵.

This target contributes to the fulfilment of the target 6b of the 2030 Sustainable Development Agenda.

Target achievement: The Swiss Water Association (VSA) immediately included the topic in its guidelines for General Drainage Plans (GDPs), explicitly recommending regionalisation. Regionalisation is a continuous process: at the start of 2016, there were around 770 WWTPs with a capacity exceeding 200 population equivalents in operation. Over the course of the year, 14 of these WWTPs were abolished and instead connected to a more powerful WWTP. In 2017, 12 WWTPs were abolished. This will be a long-term task for the cantons. The practicality of regionalisation depends on (local) economic, geographical and technical aspects. It is therefore not appropriate to define a national target.

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

³⁴ "Handbuch Infrastrukturmanagement" 2014 edition, Organisation Kommunale Infrastruktur and Wasser-Agenda 21

³⁵ BG Consulting Engineers 2008

Defined target (classification)	Deadline	Responsibility	Target indicator
Producing good practice guidelines in accordance with the HACCP concept defined in Art. 78 of the Ordinance on Foodstuffs and Utility Articles (A)	2018	FSVO	No. of non-conformities during cantonal inspections by the DW Inspectorates
Preparing and distributing drinking water in line with the detailed guidelines issued by the SGWA trade association, the FSVO and the FOEN (B)	Ongoing		

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

Background: Article 52 of the FUAO envisages the drawing up by the food industry of guidelines for good practice, which will then need to be approved by the FSVO. Guidelines like these can replace self-monitoring systems and a guideline for drinking water should help water suppliers (particularly small and medium-sized suppliers) to observe the basic rules of hygiene and apply the HACCP principles specified for the catchment, preparation and distribution of water.

This target contributes to the fulfilment of the target 6.1 of the 2030 Sustainable Development Agenda.

Target achievement: The Swiss Gas and Water Industry Association (SGWA) will draft guidelines for good practice in simple drinking water supplies ("Leitlinie für Gute Verfahrenspraxis in einfachen Trinkwasserversorgungen"). The enforcement authorities are monitoring the drafting process and the FSVO will approve the final guidelines.

Defined target (classification)	Deadline	Resp.	Target indicator
In accordance with the Waters Protection Act, allowing over-extraction of groundwater resources to occur for limited periods only (A)	Ongoing	FOEN	Not applicable
Implementation of the recommendation for strategic planning of the water supply, published by the SGWA. (A)	Ongoing		Not applicable
Designating water protection areas and groundwater protection zones as defined in the water protection legislation and the FOEN implementation guidelines in order to protect the quality and quantity of the groundwater, while systematically enforcing the restrictions on use within the groundwater protection zones and areas in accordance with the Waters Protection Ordinance and, where applicable, far-reaching regulations for groundwater protection zones (enforcement of groundwater protection planning). (A)	Ongoing		% of the population provided by protected catchment, in compliance with the national legislation
Safeguarding groundwater reserves for future water requirements. The cantons designate appropriate	Ongoing		Not applicable

Defined target (classification)	Deadline	Resp.	Target indicator
groundwater protection areas (future reserves) to safeguard the water supply for future generations (A)	Ongoing		Not applicable
Sustainable agricultural production; conserving natural resources. (A)			

Possible target: Preparing and distributing drinking water in line with the detailed guidelines issued by the SGWA trade association, the FSVO and the FOEN.

Background: The FSVO has already issued documents describing recognised treatment processes and substances for drinking water. The regulations of the SGWA association include guidelines for monitoring quality in the drinking water supply³⁶, quality assurance in groundwater protection zones³⁷ and recommendations for a quality assurance system³⁸. The FOEN has also issued various implementation guidelines explaining in concrete terms the legal bases and thus serving as a practical aid for water suppliers. There are still certain areas, however, where further documents should be provided, for example guidelines or recommendations for water treatment. Furthermore, the corresponding specialist groups must be informed about the existing documents so that these are also put into practice.

This target contributes to the fulfilment of the target 6.1 of the 2030 Sustainable Development Agenda.

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

Defined target (classification)	Deadline	Responsibility	Target indicator
Recognised practice for communal sanitation is defined in, and ensured by, the FOEN recommendations and Swiss Water Association (VSA) guidelines. For industrial wastewater, the latest technology according to the Waters Protection Ordinance and the decisions and recommendations of international water protection commissions apply (A)	Completed	FOEN	Recommendations published
Draining the total sealed surface area in housing areas according to GDPs (A)	Ongoing		Not applicable

Target: In accordance with the Waters Protection Act, allowing over-extraction of groundwater resources to occur, at most, for limited periods only.

Background: In order to preserve groundwater resources in the long term, the Waters Protection Act only allows short-term periods of over-extraction.

³⁶ SGWA 2005a

³⁷ SGWA 2005b

³⁸ SGWA 2003

This target contributes to the fulfilment of the target 6.6 of the 2030 Sustainable Development Agenda.

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

Target: Support for strategic planning of the water supply.

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

This target contributes to the fulfilment of the target 6b of the 2030 Sustainable Development Agenda.

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

Target: Designating water protection areas and groundwater protection zones as defined in the water protection legislation and the FOEN implementation guidelines in order to protect the quality and quantity of the groundwater, while systematically enforcing the restrictions on use within the groundwater protection zones and areas in accordance with the Waters Protection Ordinance and, where applicable, far-reaching regulations for groundwater protection zones (enforcement of groundwater protection planning).

Background: Groundwater protection planning has been anchored in law since 1972.

This target contributes to the fulfilment of the target 6.4 and 6.6 of the 2030 Sustainable Development Agenda.

Target achievement: The cantons enforce these regulations. The degree of implementation varies between the cantons. A survey conducted in the cantons in 2017-2018 provided an overview of the situation regarding the protection of groundwater in Switzerland. It demonstrates that approximately 80% of the population is consuming drinking water that comes from a protected resource in compliance with federal legislation. The development of the situation will constitute an indicator.

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

Background and target achievement: the different information collected to date demonstrates that there are sufficient groundwater resources available to supply the population with drinking water. More than 400 groundwater protection zones have already been designated. A further, more precise survey of the groundwater protection zones will be conducted.

This target contributes to the fulfilment of the target 6.4 and 6.6 of the 2030 Sustainable Development Agenda.

Target: Sustainable agricultural production; conserving natural resources.

Background: The federal constitution states that agriculture should pursue sustainable and market-oriented production in order to make a substantial contribution to reliably supplying the population and conserving natural resources. The federal government provides support in this context. One important instrument in agricultural policy with a bearing on water quality is proof of ecological performance (PEP), which is required in order to receive direct payments. To a large extent, it covers complying with the applicable law, e.g. a balanced use of nutrients (Art. 14, Paragraph 1 WPA, Annex 2.6 Clause 3.1 ORRChem), crop rotation and a limited selection and specific application of pesticides (Art. 61, Paragraph 2 PlantPPO). Ecological direct

payments provide farmers with an incentive to provide specific ecological services that go beyond generally applicable environmental laws. Switzerland's agricultural policy for the period 2014-2017 refined the existing system of direct payments and placed a more systematic emphasis on non-market-oriented services in agriculture, e.g. paying contributions to ensure supplies. The following elements can play an important role in the context of water:

- More specific measures to demonstrate ecological performance to encourage improvements in locations at risk of erosion and crops, and better administration of the supply of fertilisers to farms.
- Introduction of production-system payments to promote particularly natural production forms which are environmentally and animal-friendly.
- Introduction of resource-efficiency payments to promote rapid adoption of target-oriented, resource-saving techniques, e.g. in crop protection or soil processing.

This target contributes to the fulfilment of the target 6.3 and 6.6 of the 2030 Sustainable Development Agenda.

Target achievement: The legal basis for the agricultural policy 2014-2017 came into force on 1 January 2014. Agricultural environmental monitoring tracks environmentally relevant developments in agriculture on an ongoing basis and draws attention to them in annual agricultural reports. The implemented measures are not sufficient to fully reach the target, however. For instance, many surface waters, predominantly small ones, are so heavily polluted with agricultural pesticides (see Section 1.10.3) that the living conditions required for sensitive aquatic organisms to survive are compromised. Moreover, the agricultural nitrogen surplus has remained virtually unchanged for around 20 years, at approximately 110,000 t of nitrogen per year. The agricultural policy 2014-2017 was extended to 2021 with some minor amendments, but the environmental targets derived from environmental law cannot be achieved with this policy. As regards the agricultural policy from 2022, the Federal Council is proposing additional measures which, if systematically implemented in terms of pesticides, would lead to a significant improvement in achieving targets, but major improvements still cannot be expected in regard to nutrients, especially as far as the nitrogen surplus is concerned. The actual implementation of the Federal Council's proposals is not yet foreseeable.

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

Defined target (classification)	Deadline	Responsibility	Target indicator
Recognised practice for communal sanitation is defined in, and ensured by, the FOEN recommendations and Swiss Water Association (VSA) guidelines. For industrial wastewater, the latest technology according to the Waters Protection Ordinance and the decisions and recommendations of international water protection commissions apply (A)	Completed	FOEN	Recommendations published
Draining the total sealed surface area in housing areas according to GDPs (A)	Ongoing		Not applicable

Target: Recognised practice for communal sanitation is defined in, and ensured by, the FOEN recommendations and Swiss Water Association (VSA) guidelines. For industrial wastewater, the latest technology according to the Waters Protection Ordinance and the decisions and recommendations of international water protection commissions apply.

Background: The FOEN issues guidelines and practical guidance for various aspects relating to sanitation. Worth mentioning here are the groundwater protection guidelines³⁹, practical guidance on the latest technology in water protection⁴⁰, the guidelines on protecting waters when draining traffic routes⁴¹ and practical guidance on industrial wastewater⁴².

The VSA also publishes guidelines on a wide variety of aspects of sanitation including, for example, a standard on property drainage⁴³, guidelines on the optimal discharge of storm⁴⁴ water, guidelines on wastewater discharge into water bodies during rainy weather⁴⁵, guidelines on wastewater in rural areas⁴⁶, guidelines on maintaining sewers⁴⁷ and guidelines on financing wastewater management⁴⁸. The content of these documents has been agreed with the FOEN.

Finally, various guidelines and recommendations have also been issued in connection with international agreements such as the OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic or the International Commission for the Protection of the Rhine (ICPR)⁴⁹.

This target contributes to the fulfilment of the target 6.3, 6.5 and 6.6 of the 2030 Sustainable Development Agenda.

Target achievement: The cantons monitor the situation and possess corresponding data. The VSA carried out a comprehensive survey in 2011 in order to obtain an overview of the key data relating to sanitation at the national level. The report on costs and services relating to sanitation entitled "Kosten und Leistungen der Abwasserentsorgung" summarises the results⁵⁰. The intention is to carry out surveys of this type periodically in the future.

Target: Draining the total sealed surface area in housing areas according to GDPs.

Background: The General Drainage Plan (GDP) is the communes' central planning instrument for municipal drainage and forms the basis for the extension, adaptation, maintenance and repair (preservation) of the public sewage network. It should guarantee adequate water protection in communes and effective draining of housing areas. Every commune is required by law to produce a GDP. This process is subsidised by the federal government and by cantons. The subsidies are mostly dependent on compliance with binding deadlines.

This target contributes to the fulfilment of the target 6.3, 6.5 and 6.6 of the 2030 Sustainable Development Agenda.

³⁹ SAEFL 2004

⁴⁰ SAEFL 2001b

⁴¹ Ernst Basler + Partner 2002

⁴² SAEFL 2001a

⁴³ VSA and SSIV 2002

⁴⁴ VSA 2002

⁴⁵ VSA 2007

⁴⁶ VSA 2005

⁴⁷ Various guidelines: <http://www.vsa.ch/publikationen/>

⁴⁸ VSA / FES 1994

⁴⁹ see <http://www.iksr.org/en/>

⁵⁰ VSA 2011

Target achievement: The creation of the GDPs should largely have been completed. A survey will be conducted in 2019 in order to ascertain the degree to which the target has been achieved.

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

Defined target (classification)	Deadline	Responsibility	Target indicator
Not allowing contaminated wastewater to be discharged untreated or allowed to leach into water bodies in Switzerland (A)	Ongoing	FOEN	Not applicable

Target: Not allowing contaminated wastewater to be discharged untreated or allowed to leach into water bodies in Switzerland.⁵¹

Background: According to Article 5 of the Waters Protection Ordinance (WPO), the cantons are responsible for drawing up General Drainage Plans which guarantee adequate water protection in communes and effective municipal drainage (see VIII.).

This target contributes to the fulfilment of the target 6.3 of the 2030 Sustainable Development Agenda.

Target achievement: Identifying and rectifying inappropriate sewer connections by means of GDPs. The GDPs therefore aid implementation of this ban. Varying degrees of progress have been made on implementing these measures to date, since an initial GDP was not completed at the same time in all cantons.

2.10. Storm water [Art. 6, Paragraph 2 (g) (ii)]

Defined target (classification)	Deadline	Responsibility	Target indicator
Putting appropriate measures in place to prevent direct infiltration of agricultural pesticides and nutrients in runoff from farmyards and open fields and from drainage systems. (A)	2023	FOAG	Implementation of the national pesticide action plan
Carrying out a data survey of untreated storm water overflows (C)	2021	FOEN	Completed by 2021

Target: Putting appropriate measures in place to prevent direct infiltration of agricultural pesticides and nutrients in runoff from farmyards and open fields and from drainage systems.

Background: Enforcement of measures stipulated in the water protection legislation is regulated under Switzerland's federal system, i.e. differently in each of the 26 cantons. The federal government issues implementation guidelines with the aim of standardising and reinforcing implementation. In the agricultural sector, there are implementation guidelines on the use of agricultural pesticides and the use of nutrients and fertilisers, which explain the legal principles behind water protection and clean air.

⁵¹Art. 7 Waters Protection Act, Art. 8 Waters Protection Ordinance

This target contributes to the fulfilment of the target 6.3 of the 2030 Sustainable Development Agenda.

Target achievement: The implementation guidelines on nutrients and the use of fertilisers in agriculture entitled "Nährstoffe und Verwendung von Dünger in der Landwirtschaft" were published in 2012. The implementation guidelines on the use of pesticides in agriculture entitled "Verwendung von PSM in der Landwirtschaft" were published in 2013. In 2017, the action plan for risk reduction and the sustainable use of pesticides was enacted by the Federal Council. If the measures set out in this plan for reducing emissions and the use of pesticides and for better protecting the waters are systematically implemented, they could make a significant contribution to achieving the target.

2.10.1. Discharges of untreated storm water overflows

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

Background: Detailed guidelines for the management of storm water in Switzerland have been issued by the VSA⁵². As a general rule, non-polluted storm water must be allowed to infiltrate into the ground if permitted by local conditions. This practice will be introduced in stages in the course of drafting and updating the General Drainage Plans (GDPs). This will reduce the quantity of storm water in mixed water sewers in the long term and thus the frequency of discharges of untreated storm water overflows into waters. At the same time, however, it is important to ensure that the groundwater is not put at risk due to improper or unlawful leaching. However, no nationwide data are currently available on the frequency, quantities and pollution levels of discharges of untreated storm water overflows.

This target contributes to the fulfilment of the target 6.3 of the 2030 Sustainable Development Agenda.

Target achievement: New guidelines on discharges of storm water overflows into water bodies during rainy weather entitled "Abwassereinleitungen in Gewässer bei Regenwetter" have been produced, in which the design and dimensions of storm water relief systems and storm water tanks have been revised in line with a new, impact-oriented approach. The guidelines will be used for new infrastructure and, in particular, infrastructure requiring remediation. As yet there is no national data-survey project.

2.11. Quality of discharges from treatment plants [Art. 6, Paragraph 2 (h)]

Defined target (classification)	Deadline	Responsibility	Target indicator
100% of wastewater treatment plants fulfilling the requirements for discharges of communal wastewater specified in the Waters Protection Ordinance. Treating industrial wastewater according to the latest technology (A)	Ongoing	FOEN	Not applicable
Optimising central data capture with respect to wastewater treatment at federal level. (B)	2021		Not applicable

Target: 100% of wastewater treatment plants fulfilling the requirements for discharges of communal wastewater specified in the Waters Protection Ordinance. Treating industrial wastewater according to the latest technology.

Background and target achievement: By law, cantonal authorities verify periodically whether enterprises which discharge industrial wastewater into public sewers and wastewater treatment plants which discharge

⁵² VSA 2002

wastewater into public sewers or into a body of water are complying with the requirements. They adjust the authorisations if necessary and order the required measures. The cantons possess the corresponding data. The degree of target achievement has not so far been established at national level.

This target contributes to the fulfilment of the target 6.3 of the 2030 Sustainable Development Agenda.

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

Background: In Switzerland, more than 700 central wastewater treatment plants (WWTPs) treat the country's wastewater to a high technical standard. For this reason, the current emphasis is on preserving the value and performance of these plants and on optimising operational and organisational processes. It may be necessary to expand the capacity of the WWTPs and to incorporate further treatment stages in order to equip existing plants for the future (see Section VI.). An implementation guideline defines the reporting of operational data from WWTPs, taking this into account. This target contributes to the fulfilment of target 6.3 of the 2030 Sustainable Development Agenda

Target achievement: Based on the Federal Act on Geoinformation (GeolA), which has been in force since 2008, two data models (WWTP and GDP) were created in 2017, which establish binding federal legal standards at national level for the recording, modelling and exchange of federal government geodata. This will improve access for federal offices, the business community and the population to these data, which are recorded and managed at great expense. A first collection of data is scheduled for completion by 2022.

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

Defined target (classification)	Deadline	Responsibility	Target indicator
The agricultural use of sewage sludge has been banned in Switzerland since 2008	None	FOEN	Not applicable

The agricultural use of sewage sludge has been banned in Switzerland since 2008⁵³. Sewage sludge is burned at incineration plants, cement works and waste incineration plants. Target for 2026: The Waste Ordinance ADWO (Ordinance on the Avoidance and the Disposal of Waste) saw the introduction of an obligation to recover phosphorus from sewage sludge and carcass meal with a transitional period lasting until 2026.

This target contributes to the fulfilment of the target 6.3 of the 2030 Sustainable Development Agenda.

Background and target achievement: Phosphorus is a non-renewable and non-substitutable resource. FOEN studies show that waste areas are phosphorus traps; phosphorus ends up in landfills together with bottom ash from waste incineration plants or in building materials due to the use of sewage sludge to generate heat in cement works. This unused potential amounts to around 6,000 t per year of phosphorus, about the same volume as is imported as mineral fertilisers. With the obligation to recover phosphorus, this potential is set to be exploited. The ADWO does not prescribe a procedure for recovering phosphorus, although the FOEN describes the latest phosphorus recovery techniques in an implementation guideline. This ensures that phosphorus is recovered in compliance with a standard that applies to all providers offering these techniques. This implementation guideline is being compiled in collaboration with cantons, federal offices and business organisations.

⁵³Annex to the Ordinance on Risk Reduction related to the Use of certain particularly dangerous Substances, Preparations and Articles (Chemical Risk Reduction Ordinance, ORRChem) of 18 May 2005, SR 814.81

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

Defined target (classification)	Deadline	Responsibility	Target indicator
According to Art. 7 of the Waters Protection Act (WPA) and Art. 8 of the Waters Protection Ordinance (WPO), contaminated wastewater may not be used for irrigation purposes in Switzerland. Therefore no targets are set in this regard.	None	FOEN	Not applicable

According to Art. 7 of the Waters Protection Act (WPA) and Art. 8 of the Waters Protection Ordinance (WPO), contaminated wastewater may not be used for irrigation purposes in Switzerland. No targets are therefore set for this parameter.

This target contributes to the fulfilment of the target 6.3 of the 2030 Sustainable Development Agenda.

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

2.14.1. Groundwater

Defined target (classification)	Deadline	Responsibility	Target indicator
The quality of groundwater used or intended for use as drinking water meets the requirements of Annex 2 WPO (A)	None	FOEN	Not applicable
Reducing the nitrate levels in groundwater (projects according to Article 62a WPA) (A)	None		
Improving water protection enforcement: increasing information and supervision (B)	None		
Fulfilling the quality requirements of the Waters Protection Ordinance, Annex 2 (A)	None		
Comprehensively recording surface water quality in Switzerland by means of the harmonised "Methods for assessing the ecological status of rivers" and by corresponding methods for the lakes (A)	2022		

Target: The quality of groundwater used or intended for use as drinking water meets the requirements of Annex 2 WPO.

Background: The quality of waters is continuously being improved with all manner of measures, including planning-related water protection and nitrate or pesticide projects (see next target).

This target contributes to the fulfilment of the target 6.1 of the 2030 Sustainable Development Agenda.

Target achievement: Overall, the quality of groundwater used or intended for use as drinking water is good (FOEN 2019, report currently being compiled). 80% of drinking water is taken from groundwater and around 40% of this can be supplied without treatment (Freiburghaus 2012). A further 40% or so of the groundwater is treated using a simple, single-stage method (often a preventative measure, such as disinfection using chlorine or UV). The National Groundwater Quality Monitoring Network (NAQUA) is monitoring the extent to which the groundwater quality requirements set out in the Waters Protection Ordinance are being complied with at national level. Nitrates and various organic substances such as pesticides or halogenated hydrocarbons are having a negative impact on groundwater quality at many measuring sites (FOEN 2019).

The implementation guideline on environmental protection in agriculture brings together the provisions of water protection legislation applicable to agriculture and explains unclear legal terms. These include the provisions for protecting groundwater. The implementation guideline reinforces implementation and achieves a more uniform standard throughout Switzerland. It contains various modules including construction-related environmental protection, nutrients and the use of fertilisers and pesticides.

If they breach the quality requirements for waters, cantons are obliged to clarify the extent and causes of the contamination, to determine possible measures and implement these if they are deemed reasonable and expedient. As in various other areas, the extent of enforcement varies widely from canton to canton. Some remediation projects receive funding from federal sources (Art. 62a WPA, contaminated sites, see following targets).

Target: Reducing the nitrate levels in groundwater (projects according to Article 62a WPA)

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

This target contributes to the fulfilment of the target 6.1 and 6.6 of the 2030 Sustainable Development Agenda.

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

Comprehensively reducing the negative effect on waters can only be achieved by decreasing the surplus of nutrients. The economic incentive for nutrient-intensive land management must be reduced, e.g. by means of minimum requirements, differentiated according to region, in respect of proof of ecological performance (PEP) providing entitlement to direct payments, which are adjusted to take ecological sustainability, which varies from region to region, into account. This would allow the existing options for enforcement to be more easily implemented in accordance with Article 62a WPA on compensation for agricultural measures for avoiding the runoff and leaching of substances.

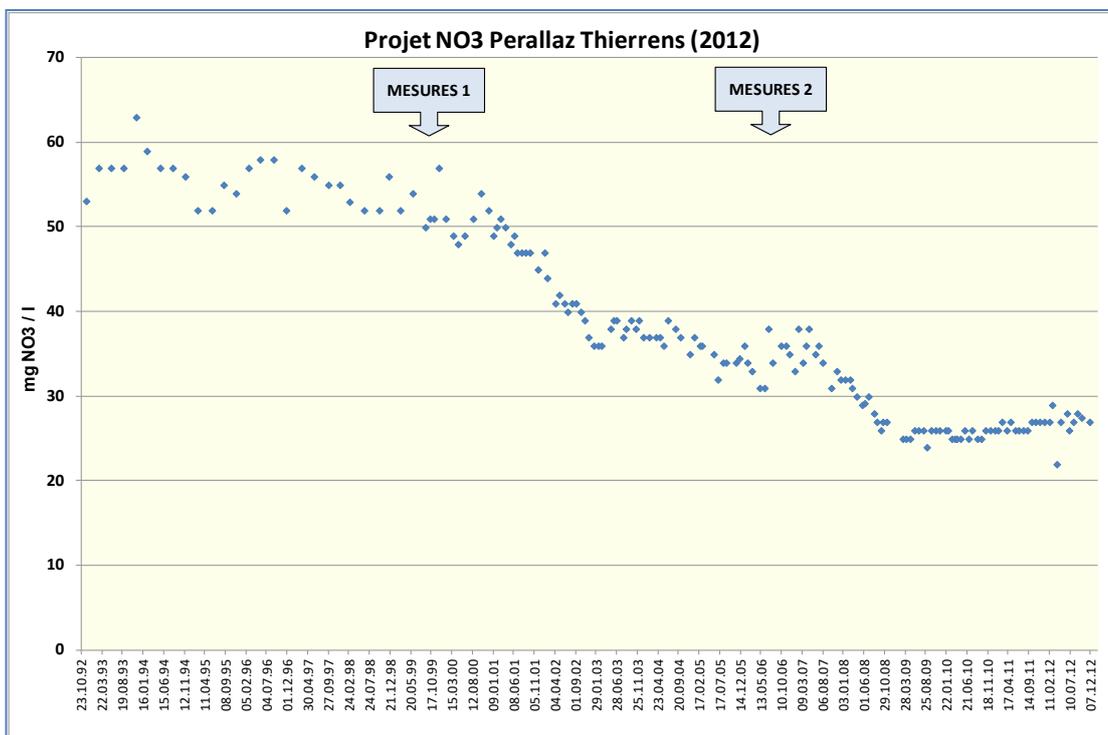
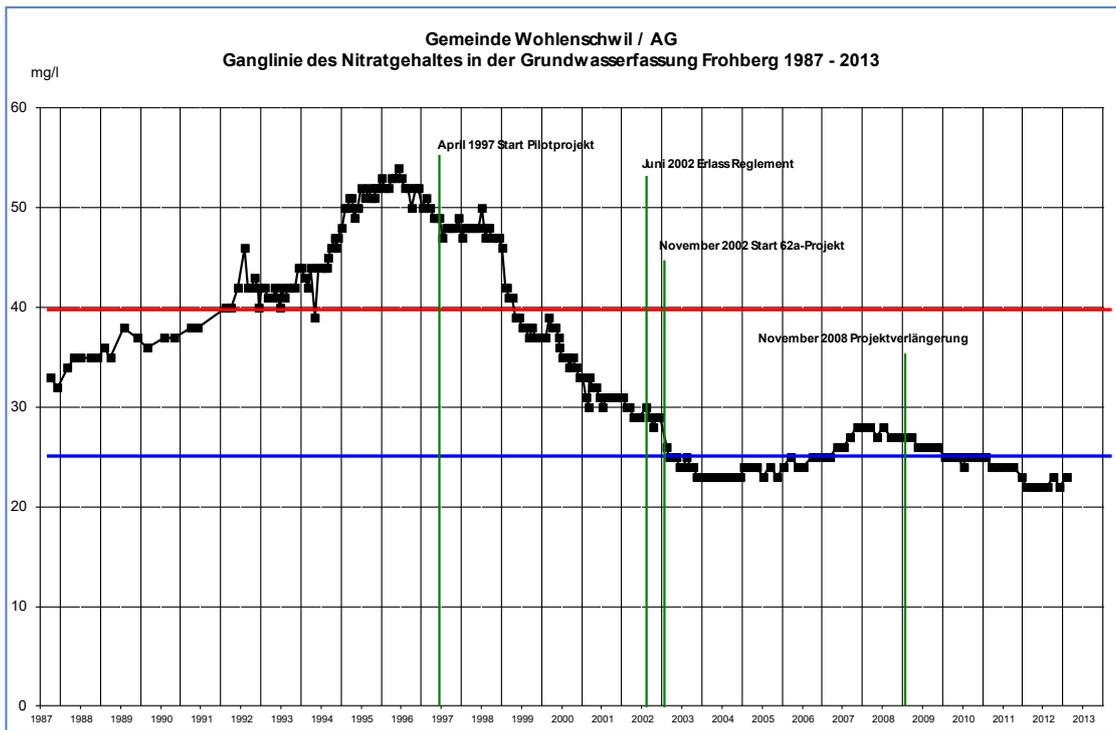


Figure 2: Nitrate projects in accordance with Article 62a WPA: Nitrate profiles for catchment areas in Wohlenschwil, canton of Aargau (top) and Thierrens, canton of Vaud (bottom).

Examples of nitrate projects in practice

An illustrative example of a targeted nitrate remediation project is Wohlenschwil (canton of Aargau), where intensive efforts have been made to reduce nitrate leaching since 1996. In addition to measures such as maintaining a green cover in winter or introducing no-till systems, around 22 hectares of arable land have been converted to pasture, with the result that about 45 of the 62 hectares of agricultural land in the drainage basin are now used as grassland.⁵⁴

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

One problem as yet unsolved is that measures for reducing nitrate pollution in groundwater must be pursued and financed for an indefinite period if agricultural policy and the legal basis for setting up direct payments to farms remain unaltered. Otherwise, it will not be long before all that has been achieved at great cost will be called into question. The same problem is also true of other waters that have been contaminated by agriculture (e.g. excessive amounts of phosphorus in lakes in central Switzerland). As part of the agricultural policy from 2022, the Federal Council is proposing regional-level adjustments to the proof of ecological performance requirements for a number of reasons, including the problem of nitrates in groundwater used for drinking water. It is not yet known whether this proposed new regulation will actually be implemented.

Proposed target: Improving water protection enforcement: increasing information and supervision.

Background: In some areas, there is a backlog in the designation and management of groundwater protection zones. This proposed target was developed as part of the Federal Council's report on the management of local water shortages in Switzerland⁵⁵.

This target contributes to the fulfilment of the target 6.6 of the 2030 Sustainable Development Agenda.

2.14.2. Surface waters

Target: Fulfilling the quality requirements of the Waters Protection Ordinance, Annex 2.

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

This target contributes to the fulfilment of the target 6.3 of the 2030 Sustainable Development Agenda.

Target achievement: In terms of contamination with nutrients, the quality of Switzerland's watercourses is good to very good, with the exception of small watercourses in the densely populated parts of central Switzerland⁵⁶. However, the discharge of organic trace elements resulting from agriculture, municipal drainage and other sources (e.g. road runoff, sealed surfaces) remains a challenge for water protection. Concentrations that can lead to adverse effects on plants and animals in waters have been measured, particularly in small to medium-sized watercourses in intensively used regions of central Switzerland.

Nutrient loads in Swiss lakes have been reduced since the 1980s due to intensive efforts to protect bodies of water. Although water quality has improved significantly, several lakes are still over-fertilised⁵⁷. In many lakes,

⁵⁴ SAEFL / FOWG 2004

⁵⁵ FOEN 2012: Umgang mit lokaler Wasserknappheit in der Schweiz. Federal Council's report on the postulate "Wasser und Landwirtschaft. Zukünftige Herausforderungen". <https://www.bafu.admin.ch/bafu/en/home/topics/water.html>.

⁵⁶ Zustand Oberflächengewässer Schweiz: <https://www.bafu.admin.ch/bafu/de/home/themen/wasser/dossiers/zustand-schweizer-fluessgewaesser.html>

⁵⁷ <https://www.bafu.admin.ch/bafu/en/home/topics/water/info-specialists/state-of-waterbodies/state-of-lakes.html>

the drop in phosphorus concentrations is resulting in improved oxygenation of the deep waters. This is an ongoing process. However, in approximately 50% of the larger lakes, the 4 mg of oxygen per litre requirement stipulated by the Waters Protection Ordinance is not yet being achieved, or is being achieved only thanks to artificial aeration. In some lakes, a decrease in the oxygen content of deep waters is being observed as a result of reduced mixing. In addition, many ecologically important sections of shore are affected: control structures reduce the quality of the habitats of plants and animals. The drinking water supply from lake water is monitored and safeguarded thanks to effective treatment plants.

Target: Comprehensively recording surface water quality in Switzerland by means of the harmonised methods for assessing watercourses ("Methoden zur Erhebung und Beurteilung der Fließgewässer") and by corresponding methods for the lakes.

Background: The harmonised "Methoden zur Erhebung und Beurteilung der Fließgewässer"⁵⁸ provide standardised methods for investigating and assessing the state of watercourses in Switzerland. There is a plan for investigating and assessing the state of the lakes. In levels of different processing intensity (stages), the methods record the structural and hydrological, biological, chemical and ecotoxicological aspects of water quality. The developed methods serve as implementation aids for the cantonal authorities.

Target achievement: The methods for watercourses that have already been prepared will be applied by the cantons as part of the cantonal monitoring of waters. Since 2011, the methods have also been applied at national level at around 100 locations across Switzerland as part of the "National Surface Water Quality Monitoring Programme" (NAWA)⁵⁹. 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).

In 2018, NAWA was supplemented with the collection of data concerning micropollutants, particularly pesticides in small watercourses. 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 partnership with research and industry.

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

Defined target (classification)	Deadline	Responsibility	Target indicator
Revising the existing recommendation on recording and assessing the quality of the water in bathing lakes and rivers, in line with EU Directive 2006/7/EC (B)	Earliest 2024	FOEN	Not applicable

Proposed target: Revising the existing recommendation on recording and assessing the quality of the water in bathing lakes and rivers, in line with EU Directive 2006/7/EC.

Background: Since the 1960s, efforts have been made in Switzerland to protect the health of bathers by the hygiene assessment of bathing lakes and rivers. At European level, the authorities have, for the first time, set uniform standards for investigating and evaluating bathing waters in the "Bathing Water Directive". This European Directive was published in 1976 and revised in 2006.

⁵⁸ http://www.modul-stufen-konzept.ch/index_EN

⁵⁹ FOEN 2013b

In Switzerland, the quality of bathing water is monitored by the cantonal laboratories. A recommendation for the hygiene assessment of bathing lakes and rivers issued in 1991 used to serve as the methodological basis of this monitoring. In view of the experience acquired over the past few years in the practical implementation of hygiene assessments of bathing lakes and rivers, and in view of developments in microbiological methods, it was decided to revise the recommendation of 1991 on the basis of EU Directive 2006/7/EC.

This target contributes to the fulfilment of the target 6.3 of the 2030 Sustainable Development Agenda.

Target achievement: A working group, consisting of representatives of the FOPH, FOEN and the cantonal laboratories, has revised the recommendation of 1991 on the basis of EU Directive 2006/7/EC and in consultation with the cantonal laboratories⁶⁰. The new recommendation was published in May 2013 and formed the basis for recording and evaluating the quality of water used for bathing for the first time in the 2013 bathing season. The data collected show that people need have no concerns about bathing in almost any lake or river in Switzerland. Thanks to a range of protective measures and major efforts in terms of wastewater treatment that have been undertaken in recent decades, the hygienic water quality in Swiss rivers and lakes is now very good.

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

Defined target (classification)	Deadline	Responsibility	Target indicator
Since no significant aquacultures exist in Switzerland, no targets are set for this parameter.	None	FOEN	Not applicable

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

2.17. Application of recognised good practice to the management of enclosed waters used for bathing [Art. 6, Paragraph 2 (k)]

Defined target (classification)	Deadline	Responsibility	Target indicator
Lay down a Swiss Bathing Water Ordinance at national level (A).	2018	SFVO	Adoption of the new legislation

Target: Producing a Bathing Water Ordinance for Switzerland.

Background: When the Foodstuffs Act was completely revised, a new Ordinance on Drinking Water and Water in Public Baths and Shower Facilities was enacted. In particular, this sets out national requirements for water in public swimming baths, including whirlpools, thermal baths, mineral baths, salt-water baths, spa baths, therapeutic baths, children's paddling pools and similar facilities, as well as public swimming baths with biological regeneration. This ordinance entered into force on 1 May 2017.

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

⁶⁰ <https://www.bafu.admin.ch/bafu/de/home/themen/wasser/publikationen-studien/publikationen-wasser/beurteilung-der-badegewaesser.html>

Defined target (classification)	Deadline	Responsibility	Target indicator
Recording, investigating and remediating contaminated sites. The cantons fulfil their obligations in accordance with the Contaminated Sites Ordinance concerning local pollutants that could jeopardise waters, soil and air (A)	2007 2025 2040	FOEN	All the polluted sites are registered Investigations of the sites are finished Remediation is finished

Target: Recording, investigating and remediating contaminated sites. The cantons fulfil their obligations in accordance with the Contaminated Sites Ordinance concerning local pollutants that could jeopardise waters.

Background: According to the Contaminated Sites Ordinance (CSO)⁶¹ and the Waters Protection Ordinance (WPO), if the cantons detect any pollutants originating from contaminated sites (landfills, industrial sites or sites of accidents) which could jeopardise waters, they must determine their causes and define and implement corresponding measures. Target achievement: The cantons monitor the situation and possess corresponding data. A register managed by the relevant cantonal departments provides an overview of all contaminated sites and thus forms the basis for future action (e.g. investigating the need for monitoring and remediation, sustainable remediation of contaminated sites depending on urgency)⁶². All registers have been compiled.

This target contributes to the fulfilment of the target 6.3 of the 2030 Sustainable Development Agenda.

Target achievement: The management of contaminated sites in Switzerland is on target: both the federal government's and the cantons' registers of contaminated sites have been completed and are available on the Internet. There are around 38,000 contaminated sites in total and approximately 4,000 of these may require remediation. There were originally almost 16,000 sites which needed to be investigated; by the end of 2018, approximately 11,000 of them had already been investigated and classified by the authorities. More than 1,300 remediation projects – including major cases such as the landfill sites in Kölliken, Bonfol and Monthey (Pont Rouge landfill site) – have already been completed. The authorities are dedicating substantial resources to dealing with contaminated sites⁶³.

2.19. Effectiveness of systems for managing, developing, protecting and using water resources [Art. 6, Paragraph 2 (m)]

⁶¹ Ordinance on the Remediation of Contaminated Sites (Contaminated Sites Ordinance, CSO) of 26 August 1998, SR 814.680

⁶² <https://www.bafu.admin.ch/bafu/en/home/topics/contaminated-sites.html>

⁶³ <https://www.bafu.admin.ch/bafu/de/home/themen/alllasten/fachinformationen/alllastenbearbeitung/stand-der-alllastenbearbeitung-in-der-schweiz.html>

Defined target (classification)	Deadline	Resp.	Target indicator
<p>The federal government promotes integrated river basin management (A) and aquatic restoration.</p> <p>Restoring one quarter of the heavily engineered waters to conditions that are as natural as possible. Allocate adequate space to all waters, which may only be managed extensively (no fertilisers, no pesticides) and as ecological compensation areas (biodiversity promotion areas).</p> <p>In addition, mitigating the negative effects of hydroelectric power production (hydropowering, bed-load balance, accessibility for fish) as far as possible within 20 years from 2011 (A)</p>	<p>2090</p> <p>2030</p>	FOEN	<p>25% of waters in a bad morphological state must be restored</p> <p>All water bodies must be allocated adequate space for natural development</p> <p>Mitigate negative impact of hydropower production in a defined number of hydropower plants</p>

Target: The federal government promotes integrated river basin management.

Background: Although Switzerland has not adopted the EU's 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 commissions (see Section 4.7), Switzerland is working with its neighbouring countries and thus indirectly applies certain principles of the Water Framework Directive⁶⁴. The aim in the long term is to produce a wide-ranging strategy for the management of water resources, waters and water infrastructure. The efforts to promote integrated water management are based on partnerships between the various users, which take into account all the interests of water management. Certain drainage basins are already being managed according to these principles.

This approach particularly highlights conflicting targets, e.g. the use of water to generate hydroelectric power versus the need to protect waters/landscapes, and the space needed for the waters to perform their function and for renaturing waters (see next target) versus agriculture, and, to a significantly lesser extent, protecting groundwater as a resource for drinking water. The principles of integrated river basin management, which take a wide-ranging, long-term and cross-sectoral approach, can provide greater freedom in the search for solutions in this context.

This target contributes to the fulfilment of the target 6.5 of the 2030 Sustainable Development Agenda.

Target achievement: River basin management offers an opportunity for taking an efficient approach to new cross-sectoral challenges in the area of water management, whether these are related to climate change or the pressure resulting from settlements or use. Between 2008 and 2017, a national "Integrated River Basin Management"⁶⁵ working group coordinated activities in order to devise basic principles for integrated river basin management.

The federal government is taking action at various levels in order to get one step closer to implementing the principles of river basin management. This action has included supporting pilot projects at cantonal level. The principles were explained in a mission statement. A practical guideline fleshes out these principles, describes the methodical approach, illustrating this through case studies, and offers resources. In order to implement this, committed stakeholders are required at all levels who are willing to align their activities with the commonly devised targets for the river basin.

⁶⁴ SOER 2010

⁶⁵ <https://wa21.ch/themen/einzugsgebietsmanagement/>
; <https://www.bafu.admin.ch/bafu/en/home/topics/water.html>

Some cantons have already enshrined the management of waters in river basins in their legislation, initiated corresponding processes and achieved success in implementing projects.

Target: Transforming some of the heavily engineered waters into as natural a condition as possible within a few generations, and defining an adequate area for all waters which may only be managed extensively (i.e. as a biodiversity promotion area for agricultural land). In addition, eliminating the negative effects on waters of hydroelectric power generation (hydropeaking, bed-load balance, accessibility for fish) as far as possible within 20 years.

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

This target contributes to the fulfilment of the target 6.6 of the 2030 Sustainable Development Agenda.

Target achievement: The revised Waters Protection Act came into force on 1 January 2011, with the corresponding changes to the Waters Protection Ordinance taking effect on 1 June 2011. In order to support the implementation of the new requirements, they were explained in detail in modular implementation guidelines (with modules covering the aspects of revitalisation, fish migration, hydropeaking and bed-load balance) and as a working aid (for the aquatic environment)⁶⁶. In 2014, the cantons completed their strategic planning. An important result of this work is the definition of the hydropower plants/obstacles for which rehabilitation measures (regarding hydropeaking, bed-load balance and accessibility for fish) need to be studied and implemented by 2030 and of those river stretches that should be primarily restored. Ensuring sufficient, ecologically valuable aquatic environments is proving to be very challenging, especially due to the resistance in agricultural circles.

The revision of the Waters Protection Act in 2011 represents one of the most important stages in Switzerland's water protection efforts. Currently about 40% of the watercourses in central Switzerland, and more than 80% in urban areas, are engineered. Energy is generated from more than 90% of all usable waters. Water bodies should once again be given more space so that they can perform their natural functions. The changes to the Waters Protection Act are an important step towards ensuring that watercourses and lake shores in Switzerland can become more natural again and can contribute to maintaining biodiversity by becoming species-rich habitats. Moreover, this will increase the benefit they provide to the population in the form of recreation areas and tourist attractions.

⁶⁶ <https://www.bafu.admin.ch/bafu/de/home/themen/wasser/fachinformationen/massnahmen-zum-schutz-der-gewaesser/renaturierung-der-gewaesser/vollzugshilfe--renaturierung-der-gewaesser-.html>

2.20. Risk-based inspections by water suppliers

Defined target (classification)	Deadline	Responsibility	Target indicator
Implementation of a risk-based evaluation of the drinking water suppliers by the cantonal laboratories	Ongoing	FSVO	Implementation through the enforcement authorities

The supervisory authorities, acting through the Swiss Association of Cantonal Chemists, have published a plan for determining risk in a drinking water⁶⁷ supply. This document describes the procedure for evaluating the risk associated with the supply of drinking water by the official supervisory authorities. It applies to all forms of drinking water distribution, irrespective of whether an HACCP process or Good Manufacturing Practice guidelines (Directive W 12) are used.

This target contributes to the fulfilment of the target 6.6 of the 2030 Sustainable Development Agenda.

⁶⁷ <http://www.bag.admin.ch/themen/lebensmittel/04865/04892/index.html?lang=de>

3. Indicators

To achieve a degree of consistency throughout the EEC UN/WHO EURO region, the contracting parties of the Protocol reached an agreement to supply information on several indicators that were determined jointly. These indicators are closely related to the areas under Article 6 Paragraph 2 of the Protocol, for which targets should be set. Data for Switzerland regarding these indicators are presented below in the sequence specified in the template for summary reports under the Protocol⁶⁸ on Water and Health.

3.1. Quality of the drinking water supplied

3.1.1. Framework conditions

Information from 20 cantons was put together for the following statements. It is not possible to distinguish between urban and rural populations on the basis of this information. Moreover, this differentiation is not relevant to Switzerland, since there is guaranteed access to water and sanitary facilities for the entire population.

The information relates to around 2,970 water suppliers that serve 6,475,000 residents or 77% of the Swiss population. For the first time, the results may be considered **representative** of Switzerland as a whole. All of Switzerland's geographical regions are represented (the Alps, central Switzerland and Jura).

The data survey was sent to all cantonal authorities. They were asked to report on official drinking water tests for all parameters. The reports for each parameter from every authority that responded positively cover the 2016-2018 annual analyses.

They were not asked to give individual measured values or specific data but rather for summary statements relating to water suppliers. Thus, in the case of microbiological impurities, for example, they were asked how many water suppliers were affected by microbiological impurities (in relation to the faecal bacteria *E. coli* and Enterococci) and how many consumers this affected.

The food control authorities in Switzerland analyse over 20,000 drinking water samples (official samples) each year and carry out regular inspections of water suppliers. They also obtain information about problems with drinking water via complaints from consumers. Even if the food control authorities do not supervise drinking water solidly around the clock and carry out their inspections based on risk, they still have a good overview of the quality of the drinking water.

The present analysis cannot be compared with earlier estimates. Today's representative data can generally be used as a reference for future trends.

3.1.2. Microbiological parameters

In most cases, both parameters (*E. coli* and Enterococci) are systematically measured simultaneously. The registered results are summarised in the two tables below:

E. Coli :

- 20 cantons submitting reports
- 64,633 measurements in 3 years
- 846 results above the threshold = 1.3% of samples
- 197,600 residents affected in the short term by levels above the maximum threshold = 1% of residents

Legal requirement: not detectable per 100 ml of water

⁶⁸ http://www.unece.org/env/water/protocol_third_reporting_cycle.html

Enterococci:

- 20 cantons submitting reports
- 63,526 measurements in 3 years
- 1,032 results above the threshold = 1.6% of samples
- 366,526 residents affected in the short term by levels above the maximum threshold = 1.8% of residents

Legal requirement: not detectable per 100 ml of water

Statements: Enterococci are more commonly above the maximum threshold. 1% and 1.8% of residents respectively were affected in the short term by levels above the maximum threshold. Suitable measures were taken and the situation was rectified within a short period of time.

Measures: In the case of microbiological impurities, the enforcement authorities took the necessary measures with the aim of restoring the required quality as quickly as possible. In a few cases, the population was asked to boil their drinking water. Measures such as rinsing or chlorinating the network were also instigated.

Conclusion: The microbiological quality can be rated very good overall.

3.1.3. Chemical quality

3.1.3.1. Arsenic

- 16 cantons with measurements out of the 20 cantons submitting reports represent 5.2 million residents
- 2,434 measurements in 3 years
- 140 results above the threshold = 6% of samples
- 18,722 residents affected by levels above the maximum threshold = 0.1% of residents in the measurement area

Legal requirement: max. 10 µg/l (from 2014, with a 4-year transition period)

Measures: The vast majority of residents are supplied with water that has an arsenic concentration below the threshold. However, there are some regions in the Alps (including Valais, Graubünden and Ticino) that have a higher arsenic content in drinking water due to the geogenic conditions. In these cases, measures were introduced such as an additional treatment process (e.g. a filter to remove arsenic) or the combining of water from different sources (= dilution). These measures enabled concentrations to be reduced before the water was released for drinking and sources with a high level of arsenic pollution to be removed from the network.

3.1.3.2. Lead

- 13 cantons with measurements out of the 20 cantons submitting reports represent 4.7 million residents
- 2,151 measurements in 3 years
- All measurements below the maximum threshold
- A few cantons with increased sampling in certain years (GE, VS)

Legal requirement: max. 10 µg/l

- Statements:**
- No levels above the maximum threshold in the measurement area
 - The number of measurements and the distribution to supplied residents enable a conclusion to be drawn about Switzerland: no risk in Switzerland and reduced sampling possible (few measurement values required)
 - Most measurements were taken at the supplier stations. Suppliers and consumers are themselves responsible for supervising the distribution network.

3.1.3.3. Iron

- 15 cantons with measurements out of the 20 cantons submitting reports represent 5.7 million residents
- 3,095 measurements in 3 years
- 9 results above the threshold = 0.3% of samples (single samples in 4 cantons)

Legal requirement: max. 0.2 mg/l

- Statements:**
- In 4 cantons, single suppliers were exposed to raised iron levels.
 - The source is usually geogenic deposits
 - The data feedback from the cantons did not include details of any measures

The cantonal laboratories are aware, however, that corroded domestic systems can commonly lead to a higher iron content.

3.1.3.4. Fluoride

- 14 cantons with measurements out of the 20 cantons submitting reports represent 4.9 million residents
- 6,982 measurements in 3 years
- All measurements below the maximum threshold

Legal requirement: max. 1.5 mg/l

- Statements:**
- No levels above the maximum threshold in the measurement area
 - The number of measurements and the distribution to supplied residents enable a conclusion to be drawn about Switzerland – no risk in Switzerland and reduced sampling possible (few measurement values required)

3.1.3.5. Nitrate

- 19 cantons with measurements out of the 20 cantons submitting reports represent 6.4 million residents
- 15,982 measurements in 3 years
- 115 results above the threshold = 0.7% of samples
- 4,081 residents affected by levels above the maximum threshold = 0.02% of residents in the measurement area per year

Legal requirement: max. 40 mg/l

Statements: - Measurements were performed in drinking water supply systems only

- Based on the maximum threshold for nitrate currently applicable, i.e. 40mg/l, only 0.02% of residents were exposed to a level exceeding this.

Measures: Mixtures from different sources / dilution are possible

3.1.3.6. Nitrite

- 19 cantons with measurements out of the 20 cantons submitting reports represent 6.0 million residents
- 12,456 measurements in 3 years
- 4 results above the threshold = 0.03% of samples
- Almost 100% of the measurements produced no results above the maximum threshold

Legal requirement: max. 0.1 mg/l

Statements: - Based on the maximum threshold currently applicable, virtually no levels above the maximum threshold were recorded

- Almost 100% of the measurements produced no results above the maximum threshold

Conclusion: In terms of chemical parameters, the drinking water quality can be rated very good. The data allow for a nationwide overview of the individual parameters investigated.

3.1.4. Incidents

Definition An incident is defined as a situation in which foodstuffs law requirements are not complied with for a certain period of time due to an occurrence, necessitating specific measures in order to restore perfect quality of the drinking water supply (it is entirely possible that one incident may require multiple analyses, inspections or measures).

- 14 out of the 20 cantons submitting reports managed incidents
- A total of 112 incidents were reported during the 3-year period

3.1.4.1. Faecal contamination incidents

- 13 out of the 20 cantons submitting reports managed incidents caused by faecal contamination
- 78% of cases were caused by faecal contamination (88 of the 112 incidents in total)
- On average, 980 residents were affected by each incident

Statements: Many incidents were detected through the water suppliers' reporting of their self-monitoring results and the authorities were generally involved in the measures that were taken

Measures:

- Affected consumers instructed to boil water
- Chlorination or UV treatment
- Connection to alternative supply of drinking water
- Taking the water catchment area out of service
- Rinsing the network

3.1.4.2. Incidents involving chemical or physical contamination

- 8 out of the 20 cantons submitting reports managed incidents caused by chemical or physical contamination
- 20% of cases were caused by chemical or physical contamination (23 of the 112 incidents in total)
- On average, 1,702 residents were affected by each incident

Pollution: Turbidity, smell, taste, arsenic, hydrocarbons, nitrates, pesticides

Causes: Drought, heavy rainfall, agricultural cause, accidents

Statement: The figures are not homogeneous and do not lend themselves to statistically reliable statements. There are no reports about any further chemical or physical pollutants in the Water Protocol 2016-2018.

3.2. Outbreaks of infectious diseases and incidents of water-related diseases

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

Cholera and typhoid fever are not included in the FOPH⁶⁹ statistics retrievable via the Internet. 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.

<i>Pathogen/disease</i>	Total number of reported cases ⁷⁰		
	<i>Value in 2005</i>	<i>Value in 2015</i>	<i>Current value (2018)</i>
Cholera	see text	see text	see text
Bacillary dysentery (Shigellosis)	346	144	249
EHEC	62	297	841
Hepatitis A	147	48	104
Typhoid fever	see text	see text	see text

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 and from karst sources (see Incidents, Section).

One example of a disease outbreak due to contaminated drinking water is the incident in La Neuveville in 1998, where *Campylobacter*, *Shigella* and noroviruses were all detected in the drinking water. More than 1,600 people were affected⁷¹.

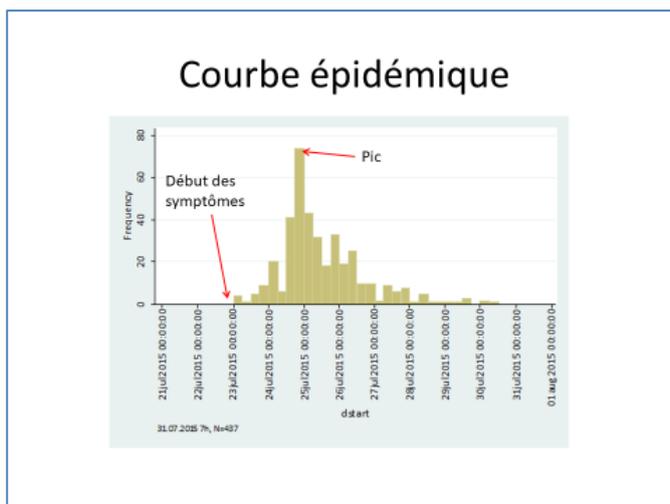
⁶⁹ <http://www.bag.admin.ch/themen/lebensmittel/04921/index.html>

⁷⁰ http://www.bag.admin.ch/k_m_meldesystem/00733/00804/

⁷¹ Maurer and Stürchler 2000

On 22 July 2015, the commune of Le Locle, a town with 11,000 residents, had to deal with contamination of its entire water supply. On that day, the water due to a violent storm flowed out of wastewater pipes, polluting the town's two drinking water reservoirs, as the non-return valves were not watertight. The following day, the emergency department at the local hospital recorded the first cases of an outbreak (reports of diarrhoea). The health authorities launched an appeal via social media (Facebook and Tweet) and more than 900 people reported that they had become ill.

Figure 3: Development of the epidemic curve in Le Locle



Conclusion: According to the national statistics on infectious diseases, water-related infectious diseases rarely occur in Switzerland. Nevertheless, sporadic water-related outbreaks have occurred.

3.3. Access to drinking water

Percentage of individuals with access to clean drinking water ⁷²	Value in 2005	Value in 2012	Current value (2018)
Overall	100%	100%	100%
In urban areas	100%	100%	100%
In rural areas	100%	100%	100%

Conclusion: The total urban and rural population of Switzerland has access to clean drinking water.
=> Access to improved drinking water sources (as per JMP definition)

⁷²SGWA assessment

3.4. Connection to sanitation system

<i>Proportion of individuals connected to a collective sanitation system⁷³</i>	<i>Value in 2005</i>	<i>Value in 2012</i>	<i>Current value (2018)</i>
Overall	99%	99%	99%
In urban areas	100%	100%	100%
In rural areas	97% (collective systems) 2% (decentralised systems)	97% (collective systems) 2% (decentralised systems)	97% (collective systems) 2% (decentralised systems)

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.

=> Access to improved sanitation facilities (as per JMP definition)

3.5. General condition of waters and water use

3.5.1. Water quality

3.5.1.1. Surface waters

Over the past few decades, the water quality of lakes and rivers has vastly improved in relation to nutrients, primarily thanks to the provision and improvement of wastewater treatment plants. Nevertheless, there are still shortcomings in the condition of surface waters, some of them significant. Specifically, these are due to the entry of micropollutants and, in isolated cases, nutrients, as well as to their biological condition. As a result, not all the waters are able to perform their key functions for people and ecosystems. This particularly affects small waters.

With its National Surface Water Quality Monitoring Programme (NAWA), the federal government and cantons have been running a joint monitoring programme to thoroughly examine the condition of watercourses⁷⁴ since 2011. The NAWA surveys are being carried out at around 100 measuring sites. The NAWA survey period 2011-2014 has given rise to a nationwide overview of the ecological condition of watercourses in Switzerland⁷⁵. As regards nutrients, the trend since the 1970s can be demonstrated by a comparison of data from the periods 1976-1980 and 1996-2000 of the Hydrological Atlas of Switzerland (map sheet 7.6)⁷⁶. The assessment is carried out using the Modular Stepwise Procedure (MSP)⁷⁷. The NAWA results also enable the condition of watercourses to be estimated in terms of micropollutants (see also Section 3.6) as well as their hydrobiology. This assessment does not take into account the aspects of water flow rate and water structure (ecomorphology) in watercourses.

The tables show the percentages of measuring sites in each MSP quality class; for each NAWA measurement, the mean has been taken of the annual values 2011-2014. When comparing values from previous periods (1976-1980 and 1996-2000), note the different make-up of the measuring sites, meaning that developments over time must be interpreted with caution. Despite this, there still is a stark decrease in nutrient pollution in watercourses.

⁷³ <http://www.bafu.admin.ch/gewaesserschutz/01295/01296/01297/>

⁷⁴ FOEN (2013b).

⁷⁵ FOEN (2016)

⁷⁶ Jakob et al. 2001

⁷⁷ http://www.modul-stufen-konzept.ch/index_EN

The following table shows the classification based on ammoniacal nitrogen. Currently, 95% of measuring sites are in a very good or good condition, illustrating an improvement on the periods 1996-2000 (89% of measuring sites) and 1976-1980 (66%). Ammonium is harmful for aquatic organisms because higher temperatures and pH values speed up its transformation into ammonia, which is poisonous to fish. Ammonium enters waters at isolated points via wastewater discharges and diffusely from agriculture. The numerical requirements in accordance with Annex 2 of the Waters Protection Ordinance (equivalent to the class boundaries between good and fair according to the MSP) apply to watercourses.

Classification based on NH_4 nitrogen ⁷⁸	Value 1976 – 1980 117 measuring sites	Value (1996-2000) 117 measuring sites	Current value (mean from 2011-2014) 111 measuring sites
Very good	19% of measuring sites	52%	53%
Good	47% of measuring sites	37%	42%
Fair	13% of measuring sites	7%	3%
Unsatisfactory	0% of measuring sites	0%	1%
Poor	21% of measuring sites	4%	1%

Based on the available data, the pollution of water courses by ammonium has reduced since the late 1990s and has remained stable ever since. Around 95% of the measuring sites currently meet the value required by the WPO.

The following table shows the classification based on nitrate-nitrogen, as an indicator of agricultural and residential nutrient pollution⁷⁹: A requirement of 5.6 mg/l N (equivalent to the class boundaries between good and fair according to the MSP) applies to nitrate ($\text{NO}_3\text{-N}$) in overground waters used for drinking water in accordance with Annex 2 WPO.

Classification based on NH_3 nitrogen ⁸⁰	Value in 2012 107 measuring sites	Value (1996-2000) 107 measuring sites	Current value (2011-2014) 109 measuring sites
Very good (<1.5 mg/l N)	43% of measuring sites	43%	42%
Good (1.5 – 5.6 mg/l N)	48% of measuring sites	45%	49%
Fair (5.6 – 8.4 mg/l N)	8% of measuring sites	11%	7%
Unsatisfactory (8.4 – 11.2 mg/l N)	1% of measuring sites	0%	1%
Poor (≥ 11.2 mg/l N)	0% of measuring sites	1%	1%

Based on the available data it can be concluded that there has been no clear change regarding the pollution of watercourses by nitrate. Around 90% of the measuring sites meet the value required by the WPO.

⁷⁸ http://www.modul-stufen-konzept.ch/index_EN

⁷⁹ Jakob et al. 2001

⁸⁰ http://www.modul-stufen-konzept.ch/index_EN

As part of the first NAWA special investigation in 2012, 239 of the 563 substances examined at five measuring sites at medium-sized watercourses were found to be micropollutants, some of which were in dangerously high concentrations for aquatic organisms⁸¹. The concentrations determined indicate that micropollutants in Swiss watercourses may be partly responsible for shortcomings in biodiversity. The micropollutants in the highest concentrations were those that had entered the waters via treated wastewater, whereas the quality criteria were most commonly breached due to residual pesticides used in agriculture and pharmaceuticals from water treatment plants.

In the second NAWA special investigation in 2015, pesticides – the most relevant micropollutants in these types of waters – were still found in high concentrations in five small watercourses⁸². In every case, the legal requirements for water quality were being breached. Even concentrations of substances which are acutely toxic to aquatic organisms were being exceeded. Additional hydrobiological tests revealed that flora and fauna are being adversely affected by the mixtures of substances.

Alongside nutrient pollution, the biological condition of watercourses has also improved over the last few decades, albeit only in some cases. For fish, only around one third of the NAWA measuring sites were rated good or very good. Around two thirds of the measuring sites rated positively for the indicators macrozoobenthos (invertebrates) and macrophytes (aquatic plants). The following table shows the classification of NAWA measuring sites for the bioindicators fish, invertebrates and aquatic plants from the first survey in 2012. The shortcomings established can be traced back to water contamination due to substances entering the water, damming and hydroelectric power plants. In general, the condition of the waters at the NAWA measuring sites tended to rate worse the higher their proportion of wastewater and settlement area or the worse their ecomorphological condition.

Classification based on bioindicators⁸³	Fish Value in 2012	Invertebrates Value in 2012	Aquatic plants Value in 2012
Very good	2% of measuring sites	7%	15%
Good	27% of measuring sites	55%	47%
Fair	60% of measuring sites	32%	17%
Unsatisfactory	11% of measuring sites	6%	-
Poor	0% of measuring sites	0%	21%

Measured against the biological parameters of fish, invertebrates and aquatic plants, the functionality of watercourses at at least 30% of the measuring sites was insufficient.

Phosphorus usually limits algae growth in lakes. The more phosphorus enters the lakes, the higher the oxygen consumption as dead organic matter decomposes, which in eutrophic lakes has led to a lack of oxygen. Since the 1980s, the concentration of phosphorus in Swiss lakes has decreased, alleviating the problem of eutrophication in most lakes. However, in drainage basins with intensive agriculture (particularly with a high livestock density) or in a large settlement area, individual lakes are still too heavily polluted with phosphorus. Despite a reduced input of phosphorus, the numerical requirements of the WPO – for the oxygen content never to fall below 4 mg/l at any depth of the lake – were not reached or only with the help of artificial aeration or circulation. This is due partly to the large volume of organic matter stored in the sediments that continues to consume oxygen as it decomposes.

⁸¹ Wittmer et al. 2014

⁸² Doppler et al. 2017

⁸³ http://www.modul-stufen-konzept.ch/index_EN

Around half of the 20 largest Swiss lakes currently fulfil the numerical requirement of 4 mg O₂/l at all times. The input of phosphorus into the other half of the lakes from settlements and/or agriculture must be further reduced.

There is no national overview of the oxygen content of small lakes. However, regional studies show that all of the small lakes analysed, apart from alpine areas, do not meet the numerical requirements and require urgent action to deal with phosphorus input from agriculture⁸⁴.

3.5.1.2. Groundwater

In Switzerland, around 80% of the total drinking water and industrial water supply is obtained from groundwater⁸⁵. Compared to many other countries, groundwater in Switzerland is available almost anywhere, in sufficient quantity and in good quality overall. National Groundwater Monitoring NAQUA collects groundwater quality data representative of the country⁸⁶ as a whole. NAQUA comprises a total of 545 measuring sites and has been run in close cooperation by the FOEN and specialist cantonal agencies since 2002. The quality of groundwater is evaluated on the basis of nitrate, pesticide residues and volatile halogenated hydrocarbons in the context of the WHO Protocol.

In 2014 nitrate concentrations were above the 25 mg/l threshold value set in Annex 2 of the Waters Protection Ordinance at 14% of the NAQUA measuring sites and thus at a slightly lower level than three years earlier. The maximum threshold of 40 mg/l, which is ⁸⁷the value applicable to drinking water, was also exceeded at 2% of the measuring sites.

Proportion of groundwater measuring sites with a nitrate concentration of	2008 ⁸⁸ (526 measuring sites)	2011 ⁸⁹ (531 measuring sites)	2014 ⁹⁰ (529 measuring sites)
> 25 mg/l	16% of measuring sites	16% of measuring sites	14% of measuring sites
> 40 mg/l	4% of measuring sites	3% of measuring sites	2% of measuring sites

Pesticide residues were found in groundwater at a total of 56% of NAQUA measuring sites in 2014. The threshold value of 0.1 µg/l laid down in Annex 2 of the Waters Protection Ordinance was exceeded at 2% of the measuring sites due to active substances from pesticides. Products of decomposing agricultural pesticides were found at concentrations over 0.1 µg/l at 20% of measuring sites. Since the range of substances analysed in groundwater has greatly expanded in recent years and it has been possible to reduce the detection limit, the data from this period cannot be compared directly. The long-term development can only be assessed specifically for particular substances.

⁸⁴ awa 2015

⁸⁵ SGWA 2011

⁸⁶ FOEN 2019

⁸⁷ Annex of the DWBSO

⁸⁸ National Groundwater Monitoring NAQUA, Federal Office for the Environment FOEN

⁸⁹ National Groundwater Monitoring NAQUA, Federal Office for the Environment FOEN:
<http://www.bafu.admin.ch/grundwasser/07500/07563/07577/index.html?lang=de>

⁹⁰ National Groundwater Monitoring NAQUA, Federal Office for the Environment FOEN:
<http://www.bafu.admin.ch/grundwasser/07500/07563/07577/index.html?lang=de>

Proportion of groundwater measuring sites with pesticide residue concentrations of	2008 ⁹¹ (503 measuring sites)	2011 ⁹² (531 measuring sites)	2014 ⁹³ (530 measuring sites)
> DL (detection limit)	48% of measuring sites	55% of measuring sites	56% of measuring sites
> 0.1 µg/l	8% of measuring sites	21% of measuring sites	20% of measuring sites

In 2014, the threshold value for volatile halogenated hydrocarbons of 1 µg/l laid down in Annex 2 of the Waters Protection Ordinance was exceeded at 4% of the NAQUA measuring sites. Volatile halogenated hydrocarbons were detected in groundwater at 25% of the measuring sites in total. The number of measuring sites where VOCs were present in elevated concentrations has dropped slightly over the last few years.

Proportion of groundwater measuring sites with a volatile halogenated hydrocarbon concentration of	2008 ⁹⁴ (503 measuring sites)	2011 ⁹⁵ (531 measuring sites)	2014 ⁹⁶ (527 measuring sites)
> DL (detection limit)	27% of measuring sites	25% of measuring sites	25% of measuring sites
> 1 µg/l	5% of measuring sites	5% of measuring sites	4% of measuring sites

Conclusion: The threshold values laid down in the Waters Protection Ordinance are being met at the vast majority of groundwater measuring sites run by National Groundwater Monitoring NAQUA. Residues of fertilisers, pesticides and other synthetic organic substances occur in groundwater particularly where the land is intensively farmed and in densely populated areas.

3.5.2. Water use

Questions concerning water consumption in Switzerland usually involve recourse to the SGWA's annual statistics on drinking water, which first appeared in the operating year 1900. In addition to public water suppliers, which served 931 million m³ in 2017⁹⁷, business, industry and agriculture also obtain substantial volumes of water, as an SGWA study demonstrated for the first time in 1975.

The FOEN-backed survey by the SGWA in 2007/2008 demonstrates that half of the volume of water required by the Swiss economy is covered by private supply and that private supply from industry remains at the same level as it was three decades ago, albeit with a major shift between sectors⁹⁸.

⁹¹National Groundwater Monitoring NAQUA, Federal Office for the Environment FOEN

⁹²National Groundwater Monitoring NAQUA, Federal Office for the Environment FOEN:
<http://www.bafu.admin.ch/grundwasser/07500/07563/07581/index.html?lang=de>

⁹³National Groundwater Monitoring NAQUA, Federal Office for the Environment FOEN:
<http://www.bafu.admin.ch/grundwasser/07500/07563/07581/index.html?lang=de>

⁹⁴National Groundwater Monitoring NAQUA, Federal Office for the Environment FOEN

⁹⁵National Groundwater Monitoring NAQUA, Federal Office for the Environment FOEN:
<http://www.bafu.admin.ch/grundwasser/07500/07563/07581/index.html?lang=de>

⁹⁶National Groundwater Monitoring NAQUA, Federal Office for the Environment FOEN:
<http://www.bafu.admin.ch/grundwasser/07500/07563/07581/index.html?lang=de>

⁹⁷ SGWA (2018)

⁹⁸ Freiburghaus (2009)

Table 1 provides an overview of the estimated annual volume of water required for the various modes of use in Switzerland. Hydropower is not listed as a use and neither is the use of water in cooling at nuclear power plants. It makes no sense to quantify these uses due to their complexity (transitions between drainage basins, multiple uses in pumped-storage and run-of-river power stations, questions about whether the water is being used or consumed).

Use	Description	Total
Households	Households and small businesses	0.5
Business and industry	Business and industry	1.1
Agriculture	Total ⁹⁹	0.4
Public purposes	Incl. fountains	0.05
Waste		0.12
Total		2.2

Table 1: Water requirements for different modes of use in Switzerland (km³/a)¹⁰⁰

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

Water balance ¹⁰¹	km ³ /a	% of total demand
Precipitation	60	4
Runoff	40.5	6

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

Conclusion: The huge difference between the two (Table 2) clearly illustrates that, at national level, Switzerland deserves to be called the "water tower". This will continue to be the case in future, regardless of any changes there may be in supply or demand (FOEN 2012b). Despite this conclusion on the overall level of Switzerland, there are vulnerable areas at local and regional level which are temporarily affected by problems of scarcity (Pfaundler 2010; FOEN 2012), see also Section 1.10.1

⁹⁹ without use of rainwater

¹⁰⁰ Freiburghaus 2009

¹⁰¹ Hubacher & Schädler (2010). Average for the period 1901-2000.

4. Water-related disease surveillance and response systems

1. In accordance with the provisions of article 8 of the Protocol:

Has your country established comprehensive water-related disease surveillance and early warning systems according to paragraph 1 (a)?

YES NO IN PROGRESS

Has your country prepared comprehensive national or local contingency plans for responses to outbreaks and incidents of water-related disease according to paragraph 1 (b)?

YES NO IN PROGRESS

Do relevant public authorities have the necessary capacity to respond to such outbreaks, incidents or risks in accordance with the relevant contingency plan according to paragraph 1 (c)?

YES NO IN PROGRESS

This program is included in the detection of food born diseases. An early warning system is actually in development in order to identify more precisely the food related diseases. It is not yet evident to differentiate between food related and water related diseases, except for specific microorganisms like legionella.

The research program aim to set a procedure dedicated to the cantonal authorities (medical doctors and cantonal laboratories) for a quicker identification of outbreaks. First results have shown that it is a real challenge to identify properly the causes.

5. Overall evaluation

5.1. Switzerland the "water tower"

Switzerland, Europe's "water tower", is in the fortunate position of having adequate natural water resources. The demand for drinking water, industrial water and firefighting water for the whole of Switzerland can be covered by just 2% of its annual precipitation. With its 1,500 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 a microbiological and chemical point of view. This is largely due to extensive water protection efforts.

Around 3,000 water supply companies ensure the availability of drinking water. Sophisticated water treatment processes are rarely required thanks to the high quality of untreated water resources. 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 3,500 small-scale sewage treatment plants and 90,000 km of sewage pipes ensure almost complete coverage for the removal and comprehensive treatment of wastewater.

Switzerland meets the key requirements of the Protocol on Water and Health thanks to the high quality of water resources and drinking water it has achieved as well as the existing infrastructure.

5.2. 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 Waters Protection Act came into effect in 1957 on the basis of this article. This was followed in 1992 by a new, more comprehensive Waters Protection Act, which was designed to protect waters from all kinds of adverse influences. As a foodstuff, drinking water is subject to comprehensive food legislation.

Irrespective of the Protocol on Water and Health, the two federal authorities responsible for water protection and for drinking water, the FOEN and the FSVO, 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 in Switzerland to the Protocol on Water and Health until now. The targets in this report have thus far been specified largely independently of the Protocol.

Setting targets in relation to water is not new for Switzerland – targets and requirements are embedded in the legislation (for example in the Waters Protection Act). What is new for Switzerland about the strategy of the Protocol, 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 forcing targets to be set or of lending greater weight to certain targets.

5.3. Data on water quality

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

The national observation programmes conducted by FOEN in collaboration with the cantonal authorities – the National Groundwater Monitoring NAQUA, the National Long-term Surveillance of Swiss Rivers NADUF and

the National Surface Water Quality Monitoring Programme NAWA – deliver representative data at national level on the quality of groundwater or watercourses. The data from these three monitoring programmes have been managed centrally by the FOEN in a single database since 2013.

The National Surface Water Quality Monitoring Programme NAWA established the basis for documenting and assessing the status and development of the Swiss surface waters at national level. The project has been in progress since 2011¹⁰². Until now, however, there has been no representative monitoring of the water quality of small watercourses, which make up around 75% of Switzerland's water network. Additional environmental data are located in a variety of different data sources in the FOEN and within institutions and cantonal authorities.

5.4. Raising public awareness

The public has hitherto been informed about the Protocol mainly via the FSVO "Water and Health" website¹⁰³ and corresponding media releases. Further information on drinking and bathing water can be found on this website. Furthermore, according to the Foodstuffs 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 SGWA¹⁰⁴. Important information on drinking and bathing water is also made available to the public by the cantonal laboratories, e.g. in the form of their annual reports or via the Internet. In addition, a national overview of the quality of bathing waters which are relevant from a European perspective is published.

The public can obtain comprehensive information on water protection (surface and groundwater) from the FOEN website¹⁰⁵ and the FOEN environmental¹⁰⁶ report. More detailed information and analyses on groundwater quality are published every four years in the NAQUA report¹⁰⁷, which is a key element of reporting on groundwater resources. 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.

5.5. Research and education

The state of research in Switzerland in respect of water is highly varied and there are a wide range of educational opportunities at basic and advanced levels.

Eawag¹⁰⁸ 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 undisturbed 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)¹⁰⁹ (see also Section 1.10.1). One aim of this programme is to devise scientific principles and methods for the sustainable management of water resources in Switzerland. The 16 projects were initiated in January 2010

¹⁰² FOEN 2013

¹⁰³ <https://www.blv.admin.ch/blv/fr/home/lebensmittel-und-ernaehrung/lebensmittelsicherheit/verantwortlichkeiten/sicheres-trinkwasser.html>

¹⁰⁴ <http://www.wasserqualitaet.ch/>

¹⁰⁵ <http://www.bafu.admin.ch/grundwasser/index.html?lang=de>

¹⁰⁶ <https://www.bafu.admin.ch/bafu/en/home/state.html>

¹⁰⁷ FOEN 2009

¹⁰⁸ <https://www.eawag.ch/en/>

¹⁰⁹ <http://www.nfp61.ch/en>

and were completed in mid-2014. Like all other NRPs, NRP 61 attaches great importance to implementation and communication. The public is kept regularly updated on the status of the research. The researchers present their results to decision-makers and the interested public, thereby promoting both awareness of the programme in political and public discussions and implementation in practice.

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

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

5.6. National cooperation

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

Organisation, working group:	Coordination:	Purpose:
Federal Group on Water in Switzerland	<u>FOEN</u> , ARE ¹¹⁰ , FOAG, FSVO, SECO, SFOE	Exchange between the federal departments on the subject of water; identification of emerging issues
Strategic Advisory Group on the evaluation of waters SBGB Steering Committee on the evaluation of waters LGB	<u>FOEN</u> , <u>EAWAG</u> , <u>cantonal authorities</u>	Strategic and technical support for analysing waters as a basis for enforcement, planning measures and environmental monitoring (with a focus on chemistry, biology and morphology)
Working group on NAQUA parameters	<u>FOEN</u> , cantons (KVU, SACCh), FSVO, FOAG, FOPH, SGWA, research, industry	Advising the National Groundwater Quality Monitoring Network (NAQUA) on the priorities and focus of issues relating to groundwater quality
Working group on Article 62a WPA, federal government	FOAG, FOEN, FSVO, KVU, KOLAS	Supporting and advising projects on remediating waters contaminated by substances from agriculture; further developing the basic principles
Drinking water and bathing water commission of the Swiss Association of Cantonal Chemists SACCh ¹¹¹	<u>SACCh</u> , FSVO	Uniform implementation of legislation on drinking water and bathing water
Principal commission of the SGWA (Swiss Gas	<u>SGWA</u> , FOEN, FSVO, SACCh	Management of drinking water, decisions concerning water distribution

¹¹⁰ ARE: Federal Office for Spatial Development

¹¹¹SACCh: Swiss Association of Cantonal Chemists

Organisation, working group:	Coordination:	Purpose:
and Water Industry Association)		
ISDC – water, Interdepartmental Sustainable Development Committee on Water	SDC, FOAG, FOEN, FSVO, SECO	Coordination of international activities, joint statements
Division responsible for water supply in emergencies	FONES, FOEN, FSVO, SGWA	Coordination of measures in situations where there are problems with the national supply

5.7. International cooperation

5.7.1. Protocol on Water and Health and sustainability indicators

As part of its activities connected with the Protocol on Water and Health, Switzerland is responsible for managing the "Task Force on Indicators and Reporting", which was set up at the initial meeting of the Protocol signatories. Important results of this task force include guidelines on setting targets, on evaluating the process and on reporting, as well as guidelines and a new template for the fourth reporting cycle.

Under the auspices of the SDC, Switzerland supports the implementation of the Protocol on Water and Health in the Republic of Moldova, which ratified the Protocol in 2005. In this connection, the SDC is initially involved in the process of target setting and reporting. One of the first challenges was to organise a meeting of the stakeholders concerned in order to announce the Protocol in Moldova and to outline the current situation. Further similar meetings have been planned in order to identify and set national targets. Since one of the key aspects of the Swiss development aid programme for Moldova is concerned with the rural drinking water supply and sanitation¹¹², 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 the context of the Sustainable Development Goals (SDGs). On the basis of the Target 6, the SDC is committed to ensuring the availability of clean drinking water for all by 2030. The strategy also includes targets relating to food safety (water for nutrition).¹¹³

5.7.2. International commissions

In the area of water protection, Switzerland has entered into various obligations at international level, specifically in connection with the following six international water protection commissions: the International Commission for the Protection of the Rhine¹¹⁴ (ICPR), the International Commission for the Protection of Lake Constance¹¹⁵ (IGKB), the Association of Waterworks in the Lake Constance/River Rhine Region (AWBR)¹¹⁶, the Commission for the Protection of the Waters of Lake Geneva¹¹⁷ (CIPEL), the International Commission for

¹¹²http://www.deza.admin.ch/de/Home/Laender/Gemeinschaft_Unabhaengiger_Staaten_GUS/Moldau_Republik

¹¹³ SDC 2005

¹¹⁴ www.iksr.org/en/

¹¹⁵ www.igkb.org

¹¹⁶ www.awbr.org

¹¹⁷ www.cipel.org/en/

the Protection of Italian-Swiss Waters¹¹⁸ (CIP AIS) and the Commission for the Protection of the Marine Environment of the North-East Atlantic¹¹⁹ (OSPAR).¹²⁰

Led by the FOEN, Switzerland is actively involved in protecting these transboundary water bodies. As a result, e.g. thanks to the great efforts in Swiss water protection over the past few decades, pollution of the Rhine with nutrients and other pollutants has been substantially reduced. For example, the discharge of toxic heavy metals such as mercury, cadmium and lead has declined by over 95 per cent in the last 20 years. All of the targets set by the ICPR for the quality of water 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.

¹¹⁸ www.cipais.org

¹¹⁹ www.ospar.org

¹²⁰ OECD 2007

6. Thematic part linked to priority areas of work under the Protocol

6.1. Water, sanitation and hygiene in institutional settings

1. In the table below, please provide information on the proportion of schools (primary and secondary) and health-care facilities that provide basic water, sanitation and hygiene (WASH) services.

<i>Institutional setting</i>	<i>Current value (specify year)</i>
<i>Schools</i>	
Basic sanitation service	-
Basic drinking-water service	-
Basic hygiene service	-
<i>Health-care facilities</i>	
Basic sanitation service	-
Basic drinking-water service	-
Basic hygiene service	-

2. Has the situation of WASH in schools been assessed in your country?

YES NO IN PROGRESS

3. Has the situation of WASH in health-care facilities been assessed in your country?

YES NO IN PROGRESS

The situation of schools and health care facilities have not been monitored so far in Switzerland

4. Do approved policies or programmes include actions (please tick all that apply):

- To improve WASH in schools
 To improve WASH in health-care facilities

5. If yes, please provide reference to main relevant national policy(ies) or programme(s).

6.2. Safe management of drinking-water supply

6. Is there a national policy or regulation in your country, which requires implementation of risk-based management, such as WHO water safety plans (WSPs), in drinking water supply?

YES NO IN PROGRESS

7. If yes, please provide reference to relevant national policy(ies) or regulatory documentation.

The legislation on Foodstuffs and Utility articles (s. point 2.7)

8. In the table below, please provide information on the percentage of the population serviced with drinking-water under a WSP.

<i>Percentage of population</i>	<i>Current value (specify year)</i>
Total	approx. 98% (2018), based on the datas provided under point 3.2

6.3. Equitable access to water and sanitation

9. Has the equity of access to safe drinking-water and sanitation been assessed?

YES NO IN PROGRESS

10. Do national policies or programmes include actions to improve equitable access to water and sanitation (please tick all that apply):

- To reduce geographical disparities
- To ensure access for vulnerable and marginalized groups
- To keep water and sanitation affordable for all

11. If yes, please provide reference to main relevant national policy(ies) and programme(s).

The Swiss situation has been assessed under points 3.3 (access to water) and 3.4 (access to sanitation). Specific targets are also described under points 2.3 and 2.4.

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This report is submitted on behalf of Switzerland in accordance with Articles 7 and 8 of the Protocol on Water and Health.

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