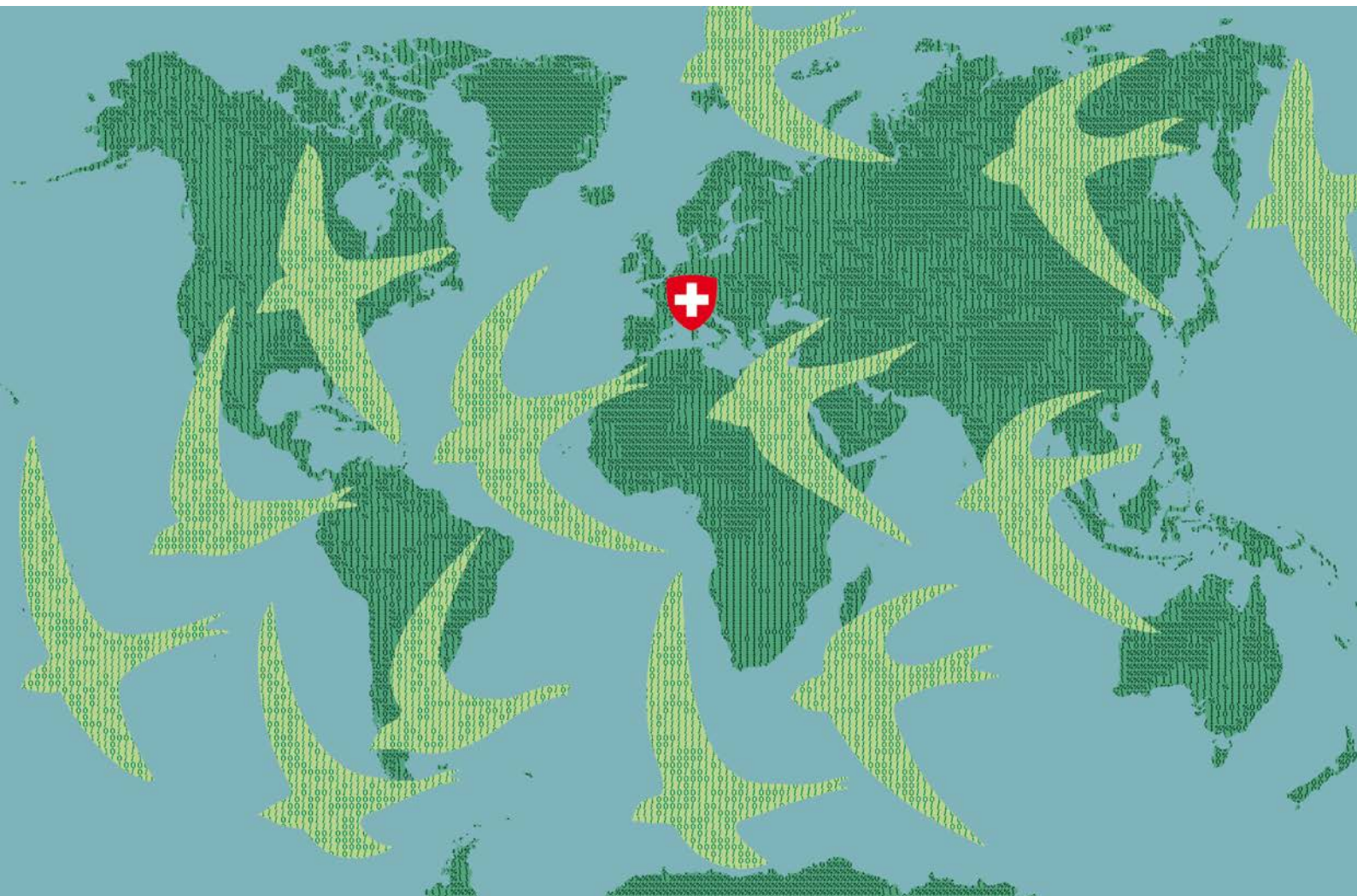


Switzerland's Fifth National Report under the Convention on Biological Diversity



Schweizerische Eidgenossenschaft
Confédération suisse
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Swiss Confederation

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Introduction

Swiss biodiversity is not yet in a satisfactory state. This has been evidenced in Switzerland's **Fourth National Report**. The finding applies at ecosystem level both to the overall territory and to the protected areas. The continued viability of many species – and, with them, genetic diversity – are at risk. Action is needed.¹

Since then, five milestone events for the development of Switzerland's biodiversity policy took place:

In 2010, the Swiss Academy of Sciences' Forum Biodiversity published a **study reviewing the trends in biodiversity since 1900**.² Overall, the study concludes that biodiversity loss has not been halted in Switzerland. The main pressures to be addressed as a matter of priority include the intensification of agricultural activities, especially in mountain regions; the extremely high pressure on inland water ecosystems; urban sprawl; the extension of tourism and leisure activities; and the ecosystem fragmentation related to previous deterioration. The projections for the year 2020 show that significant efforts at all levels are needed to achieve a general reversal of biodiversity loss.

A **national conference on biodiversity** was held in Villars-sur-Glâne (8/9 November 2010) to explore the strengthening of existing and completion of future instruments to conserve and promote biodiversity in Switzerland so as to ensure its effective conservation and sustainable use. A particular focus was on the synergies between the different instruments and the different policy areas. There were 300 participants from the scientific community and from administrations, as well as practitioners and politicians. They called, among other things, for the recognition that biodiversity is our life base, for improved and accessible knowledge, for an enhanced ecological infrastructure, and for better-quality economic instruments. Last but not least, they pointed out Switzerland's international responsibility for biodiversity conservation and the sustainable use of its elements. The participants adopted a declaration urging the federal authorities to include these recommendations into a national biodiversity strategy.³

Switzerland has signed the **Nagoya Protocol on access to genetic resources and the fair and equitable sharing of benefits arising from their utilization** on 11 May 2011 and the Swiss Parliament has approved the Protocol and its implementation through amendments of the Federal Act on the Protection of Nature and Cultural Heritage on 21 March 2014 (see chapter 2.3). Switzerland will be able to ratify the Nagoya Protocol after the end of a referendum period. The ratification procedure started in spring 2011 with a national conference on the utilization of genetic resources in Switzer-

¹ FOEN (ed.) 2010: Implementing the Biodiversity Convention. Abridged version of Switzerland's Fourth National Report. www.environment-switzerland.ch/ud-1028-e

² Lachat T., Pauli D., Gonseth Y., Klaus G., Scheidegger C., Vittoz P., Walter T. (Red.) 2010: Wandel der Biodiversität in der Schweiz seit 1900. Ist die Talsohle erreicht? Zürich, Bristol-Schriftenreihe 25; Haupt, Bern/Stuttgart/Wien.

³ Swiss Biodiversity Forum: SWIFCOB 10, La biodiversité en Suisse après 2010; www.biodiversity.ch; state: January 2014,

land.⁴ The conference aimed at providing information to stakeholders at all levels on the Nagoya Protocol and on existing approaches on ABS (e.g. the International Treaty) It brought forward the political discussion on ABS in general and the process of ratifying the Nagoya Protocol specifically.

“Biodiversity is rich and capable of reacting to change. Biodiversity and its ecosystem services are conserved in the long term”. This is the overall objective of the **Swiss Biodiversity Strategy (SBS)** adopted by the Federal Council on 25 April 2012.⁵ The SBS is the product of intensive engagement with the topic both within the federal administration and in cooperation with experts from the cantons, the private sector, and science and research. Representatives of the relevant interest groups were also invited to provide expert support for the process. The strategy builds on the Swiss tradition of a close relationship with nature, and on the achievements of recent years, as well as on the global Strategic Plan for Biodiversity 2011-2020, including its Aichi targets.

The development of an **Action Plan for the implementation of the Swiss Biodiversity Strategy** was started in 2012 (see chapter 2.1.2). The action plan will concretise ways and means to attain the strategic goals of the SBS through a series of measures specifically tailored to the individual areas of implementation and/or different actors and economic sectors. The action plan is being developed in cooperation with the partners who are affected by the proposed measures. The action plan will be available in 2014.

In 2013, parliament adopted the Swiss **Agricultural Policy for the years 2014-2017**, a comprehensive framework consisting of 25 revised ordinances. The revised ordinances entered into force on 1 January 2014 (see chapter 2.2.1). Biodiversity is one of the key objectives of the Swiss Agriculture's contribution System (Box 6).

Against the background of these five milestone events, Switzerland's Fifth National Report under the Convention on Biological Diversity depicts the state and trends of biodiversity in Switzerland (Part I), the further development of Switzerland's national biodiversity policy (Part II), and Switzerland's contribution towards the achievement of the global Strategic Plan for Biodiversity 2011-2020, including its Aichi targets (Part III).

The report is based on the Fourth National Report (4 NR),⁶ which comprises a comprehensive assessment of Switzerland's biodiversity and the related policy and planning instruments. Many data and information provided then are still valid and accurate. To avoid lengthy duplications, references to the fourth national report are included if adequate.

⁴ Swiss InformationSystem Biodiversity: Nagoya Protocol - Conference on the utilization of genetic resources in Switzerland; www.sib.admin.ch; state: January 2014.

⁵ Swiss Confederation 2012: Swiss Biodiversity Strategy. Download: www.bafu.admin.ch/ud-1060-e.

⁶ FOEN (ed.) 2010: Switzerland's Fourth National Report under the Convention on Biological Diversity, Bern, 148 pp. download: www.environment-switzerland.ch/ud-1029-e.

1 Part I: Biodiversity Status, Trends and Threats

Introduction

Millions of **species, subspecies, varieties and breeds** populate earth. As organisms interact with each other and their physical environment, they produce, acquire, or decompose biomass and the carbon-based or organic compounds associated with it. They also move minerals from water, sediment, and soil into and among organisms, and back again into the physical environment. Terrestrial plants also transport water from the soil into the atmosphere. These fundamental linkages among organisms and their physical and biological environment constitute an interacting and ever-changing system that is known as an **ecosystem**. In performing these interactions, species provide materials to humans in the form of food, fibre, building materials as well as genetic resources; and ecosystems contribute to the formation of soils and regulation of air, and water quality; thus contributing to human wellbeing, the so-called **ecosystem services**.⁷

Part I of this report provides information on how ecosystem services are addressed in Switzerland and highlights - where data are available - their importance for our livelihoods and the economy in a more general way. Further, an overview of the current state and trends of the three levels of biodiversity is provided and the main threats are identified.

1.1 Ecosystem Services

Baseline information in the Fourth National Report:

- Ecosystem services provided by agro-ecosystems, chapter 1.2.10, p. 20
Pest regulation, food production, pollination
- Ecosystem services provided by forests, chapter 1.3.12, p. 31
Recreation, water purification, protection against natural hazards, forest products
- Ecosystem services provided by inland waters, chapter 1.4.11, p. 42
Provision of drinking water, fishery, flood prevention, recreational activities, hydropower
- Ecosystem services in mountain areas, chapter 1.6.10, p. 54
Soil fertility, precipitations, water purification, protection against natural hazards

Biodiversity and the services provided by various ecosystems (forests, wetlands, grasslands etc.) are essential for human well-being. Today, it has become more and more understood and recognised, also by the broad public, that biodiversity and ecosystem services are the basis for societies' natural capital. A recent survey on the awareness of

⁷ TEEB : The Economics of Ecosystems and Biodiversity 2010: Mainstreaming the Economics of Nature: A synthesis of the approach, conclusions and recommendations of TEEB.

biodiversity among the Swiss population revealed,⁸ for instance, that 97% of the respondents mentioned “biodiversity as the basis of our livelihoods” as major reason for biodiversity conservation, whereas 85% of the respondents highlighted “the economic role of biodiversity” as an argument to protect biodiversity (Figure 1, for further information see chapter 3.1.3).

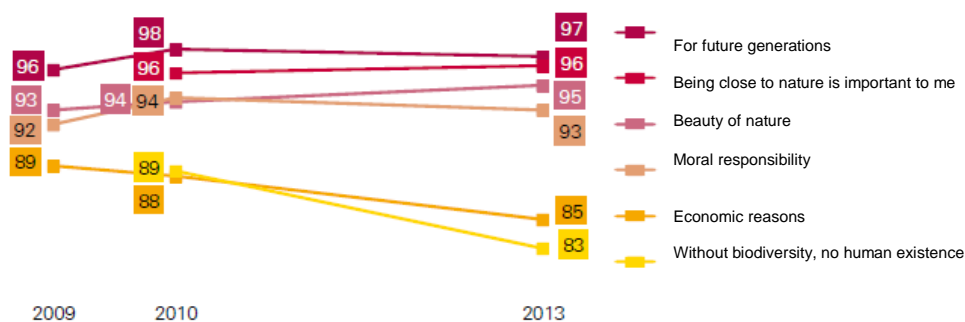


Figure 1: Trends in reasons to protect biodiversity⁹ (N = approx. 1000; see also chapter 3.1.3)

1.1.1 Final Ecosystem Goods and Services

On this background, Switzerland's environmental policy is evolving from a classical "environmental protection" approach towards a comprehensive resource policy. In support of this development, a new concept for the identification of “final” ecosystem services – ecosystem services that generate a direct effect on the population's welfare – was developed. The concept involves the listing and operationalization of relevant **Final Ecosystem Goods and Services** (FEGS) and the benefits they generate for the population in an inventory.¹⁰

For every FEGS the benefit it generates for the population is also formulated. These benefits indicate the contribution to welfare, that is to recreation, prevention, etc. In order to achieve a link to the product groups used in the FOEN, the benefits are assigned to the categories **Health, Security, Natural diversity** and **Production factors**. The resulting inventory with its 23 final ecosystem services is summarised in Box 1.

The FEGS that were developed here can be integrated with their respective indicators into the international classification systems of the Millennium Ecosystem Assessment¹¹ and the Common International Classification of Ecosystem Goods and Services (CICES,¹² Figure 2).

⁸ GfS 2013: Studie Biodiversität 2013; download: www.gfsbern.ch > Biodiversität 2013; visited: January 2014.

⁹ GfS 2013: Studie Biodiversität 2013; download: www.gfsbern.ch > Biodiversität 2013; visited: January 2014.

¹⁰ Staub C., Ott W., Heusi F., Klingler G., Jenny A., Häcki M. & Hauser A. 2011: Indicators for Ecosystem Goods and Services: Framework, methodology and recommendations for a welfare-related environmental reporting. Federal Office for the Environment, Bern. Environmental studies no. 1102: 17 S. Download: www.environment-switzerland.ch/uw-1102-e.

¹¹ MA [Millennium Ecosystem Assessment] 2005b: Ecosystems and Human Well-being: A framework for Assessment. Island Press, Washington, D.C.

¹² European Environmental Agency: Towards a Common International Classification of Ecosystem Services, www.cices.eu; visited January 2014.

The inventory of FEGS is completed by a first set of indicators (Box 2) related to i) health, ii) security, iii) natural diversity and, and iv) production factors. These indicators complement the existing economic and environment related indicators and must be further specified before being put to use.

Box 1: The Inventory of Final Ecosystem Goods and Services

The inventory deals as a matter of principle with only final ecosystem goods and services. These are ecosystem goods and services that are directly enjoyed, consumed or used by humans (Final Ecosystem Goods and Services, FEGS) and so make a direct contribution to welfare. The concentration on final services (in contrast to intermediary services which contribute to the final services) serves to avoid double counting.

Nr.	Final Ecosystem Goods and Services	Benefit	Service type according to MA (2005)
Health/wellbeing			
H1	Recreational services based on hunting, collecting and observation of species living in the wild	Recreation	Cultural services
H2	Recreational services based on urban green areas and open spaces as well as recreational areas both near place of residence and further away	Recreation	Cultural services
H3	Recreational services based on recreational spaces in the residential environment (gardens etc.)	Recreation	Cultural services
H4	The chance to develop a sense of place through attractive and characteristic landscapes (natural and cultural heritage)	Wellbeing	Cultural services
H5	Local microclimate regulation service through ecosystems	Wellbeing	Regulating services
H6	Healthy air	Prevention	Not included in this form (possibly regulating service)
H7	Quietness	Prevention	Not included in this form (possibly regulating service)
H8	A level of non-ionising radiation compatible with human health	Prevention	Not included in this form (possibly regulating service)
Security			
S1	Protection from avalanches, rock falls and debris flows through vegetation on steep slopes	Protection of humans, animals and material assets	Regulating services
S2	Protective service offered by areas that can be flooded or can retain water	Protection of humans, animals and material assets	Regulating services
S3	Carbon sequestration	Protection of humans, animals and material assets	Regulating services
Natural Diversity			
D1	Existence of natural diversity at the level of species, genes, ecosystems and landscapes	Existence of natural diversity (over and above its significance for all ecosystem services)	Only partially covered: cultural services

Production factors			
P1	Natural supply of ground and surface water usable as drinking and process water	Water supply	Provisioning services
P2	Natural supply of production support services: pollination and biological pest control	Contribution to agriculture and forestry / food industry	Regulating services
P3	Fertile soil for agricultural and forestry use	Contribution to agriculture and forestry / food industry	Basic services
P4	Forage crops and organic fertilisers for agricultural use	Contribution to agriculture / food industry	Provisioning services
P5	Timber increment for forestry use	Contribution to forestry	Provisioning services
P6	Wild animals and fish for commercial use	Contribution to fishing and hunting economy	Provisioning services
P7	Supply of valuable natural and cultivated landscapes for commercial use in tourism	Contribution to value creation in tourism	Provisioning services

Source: Staub C., Ott W., Heusi F., Klingler G., Jenny A., Häcki M. & Hauser A. 2011: Indicators for Ecosystem Goods and Services: Framework, methodology and recommendations for a welfare-related environmental reporting. Federal Office for the Environment, Bern. Environmental studies no. 1102: 17 S. Download: www.environment-switzerland.ch/uw-1102-e.

Interpretation assistance: for example, the FECS “Natural supply of ground and surface water usable as drinking and process water” (P1), which is assigned in the FOEN Inventory (red) to the “Factors of production”, is coded in the MA class (blue) “Provisioning services”. This class is also found in the CICES (yellow), although in a slightly altered form, with the subgroups food and drinking water, materials and energy. The FECS P1 can also be assigned to this CICES class.

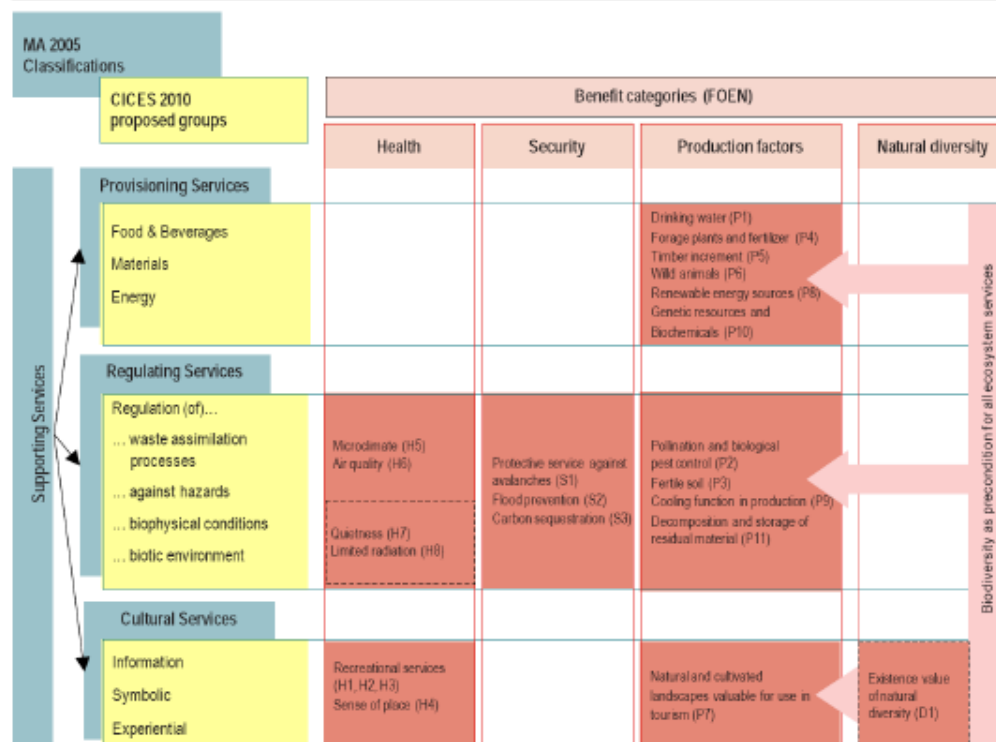


Figure 2: Relationship between the described classification and the services and benefits recognised in the Swiss Federal Office for the Environment (FOEN) and by the Classification of Ecosystem Goods and Services (CICES, after Staub et al., 2011)

Box 2: Proposed indicators for monitoring the evolution of the FECS

Health

H2: Recreational services based on urban green areas and open spaces as well as recreational areas both near place of residence and further away	I1: Availability of green spaces and water courses within 4 km of residential houses in Switzerland
	I2: Accessibility of recreational spaces near to home, for the Swiss resident population
	I3: Accessibility of areas free from infrastructure for the Swiss resident population
	I4: Accessibility of quiet areas for the Swiss resident population
	I5: Effective recreational use of forest areas: proportion of areas with a frequency of at least 100 persons per day on the test area (a circle with a radius of 100m)
H3: Recreational service through recreational spaces in the residential environment (gardens etc.)	I1: An area that can be used as a private garden or for sitting in, playing in and enjoying
H6: Healthy air	I1: Number of people who are exposed to "good air" (below the emissions limit) or to "bad air" (above the emissions limit) near their place of residence, in relation to pollution from fine particulate matter
	I2: Number of people who are exposed to "good air" (below the emissions limit) or to "bad air" (above the emissions limit) close to their place of residence, in relation to pollution from nitrogen dioxide
	I3: Number of people who are exposed to "good air" (below the emissions limit) or to "bad air" (above the emissions limit) close to their place of residence, in relation to pollution from ozone levels
	I4: Number of people who are exposed to "good air" (soot-free air) or "bad air" close to their place of residence in relation to pollution from soot
H7: Quietness	I1: Number of people who experience a quiet environment during the day (number of people with day-time noise pollution [from roads, railways and airports] $L_r \leq 55\text{dB}$)
	I2: Number of people who experience a quiet environment at night (number of people with night-time noise pollution [from roads, railways and airports] $L_r \leq 45\text{dB}$)

Security

S1: Protection from avalanches, rock falls and debris flows through vegetation on steep slopes	I1: Protective forests used for avalanche protection as km^2 or map
	I2: Protective forest used for protection against landslides (slope-type debris flows) as km^2 or map
	I3: Protective forest used for protection against rock falls or boulder slips as km^2 or map
	I4: Protected values through "Forest protection against avalanches" in CHF (enables scenario-defined risk calculation)
	I5: Protected values through "Forest protection against landslides" in CHF (enables scenario-defined risk calculation)
	I6: Protected values through "Forest protection against rock falls and boulder slips" in CHF (enables scenario-defined risk calculation)
S3: Carbon sequestration	I1: Alteration in the storage of greenhouse gases per year caused by a change in the economic use of forests expressed in tonnes of CO_2
	I2: Alteration in the storage of greenhouse gases per year, through changes in land use, measured in tonnes of CO_2 (negative values = emissions)
	I3: An index of the CO_2 storage for the individual forms of land use (forest, cultivated land, grass land, wetlands) [Basis: the sum of the index values for all forms of land use is set at 100 for 1990]

Natural Diversity	
D1: Existence of natural diversity at the level of species, genes, ecosystems and landscapes	I1-3: BDM Indicators Z3, Z7 and Z9: species diversity in Switzerland and the regions, species diversity in the countryside, species diversity in natural habitats These proposals should be seen as provisional: there is intensive discussion of indicators in connection with biodiversity strategy. Thus the feasibility of an indicator such as 'Changes to the number and extent of existing natural environments in Switzerland' should be tested
	Indicator of types of landscapes (based on a typology of landscapes in Switzerland / protected area statistics)
Production factors	
P1: Natural supply of ground and surface water usable as drinking and process water	I1: Water supply from untreated spring and ground water in millions m ³ I2: Percentage of untreated spring and ground water in the whole water supply system
P5: Timber increment for forestry use	I1: Annual timber increment in 1000 m ³ per year I2: Annual net timber increment in 1000 m ³ pro Jahr (timber increment minus usage and mortality) I3: Amount of timber used in 1000 m ³ per year (annual usage)
P7: Valuable natural and cultivated landscapes for commercial use in tourism	I1: Number of passenger journeys by the Swiss mountain railways I2: Supplementary indicator 2: number of passenger journeys by post vehicles (in tourist areas) and ships (on Swiss lakes)
Source: Staub C., Ott W., Heusi F., Klingler G., Jenny A., Häcki M. & Hauser A. 2011: Indicators for Ecosystem Goods and Services: Framework, methodology and recommendations for a welfare-related environmental reporting. Federal Office for the Environment, Bern. Environmental studies no. 1102: 17 p. Download: www.environment-switzerland.ch/uw-1102-e .	

1.1.2 The Economics of Ecosystems and Biodiversity

The approach of interlinking ecosystems to human well-being was further developed in order to include an economic dimension. In Potsdam, Germany, the environment ministers from the governments of the G8+5 countries decided to further refine the approach to explore inter-linkages between human well-being and biodiversity. They initiated a "process of analysing the global economic benefit of biological diversity, the costs of the loss of biodiversity and the failure to take protective measures versus the costs of effective conservation". From this, the global initiative on "The Economics of Ecosystems and Biodiversity (TEEB)" emerged, which focuses on drawing attention to the economic benefits of biodiversity, including the growing cost of biodiversity loss and ecosystem degradation.¹³

The TEEB recognises four groups of ecosystem services and associated benefits for human well-being:¹⁴

- **Provisioning services** describe the benefits in terms of the products obtained from ecosystems (e.g. food, raw materials for construction and fuel, fresh water and medicinal resources as input for the pharmaceutical industry).

¹³ The Economics of Ecosystems and Biodiversity (TEEB): <http://www.teebweb.org>; visited: January 2014.

¹⁴ TEEB 2010: The Economics of Ecosystems and Biodiversity: Mainstreaming the Economics of Nature: A synthesis of the approach, conclusions and recommendations of TEEB.

- **Regulating services** are described as the benefits obtained from the regulation of natural phenomena (e.g. the regulation of local climate and air quality, carbon sequestration, moderation of natural hazards such as floods or landslides, waste water treatment, erosion prevention, pollination and biological control).
- **Cultural services** include non-material benefits that people obtain from ecosystems (e.g. spiritual enrichment, intellectual development, traditional knowledge, recreation and aesthetic values, tourism).
- **Habitat services** highlight the importance of ecosystems to provide habitat for migratory species and to maintain the viability of gene-pools.

So far, the approach of assessing the benefits of ecosystems from an economic point of view has not been applied in a systematic way in Switzerland. However, individual studies on specific ecosystem services exist and data from the federal statistics give a first broad impression of the economic importance of biodiversity for our country. The data presented below are extruded from various studies, using different definitions and approaches. An aggregation of the data in order to summarize the economic benefits from ecosystems is not possible.

Provisioning services

Food: Most food is produced in agricultural ecosystems. On a surface of approximately 1 million ha, Swiss farmers produced goods of approximately CHF 10 billion (2011).¹⁵ This includes the value of all goods produced, including agricultural services (Figure 3). In 2010, by weight, the domestic production was approximately 56% of all food consumed in Switzerland. The amount of imported food was higher in 2010 than in 2000 and was almost equal to domestic production (Figure 4). Crop products made up the bulk of imports.¹⁶

Commercial fishing is practiced in all major Swiss lakes, predominantly in Lake Geneva, Lake Neuchâtel, Lake Constance, Lake Zurich, Lake Lucerne and Lake Biel. The annual catch of commercial fishery varies according to the years between 1'600 to 2'000 tonnes of fish (2000-2012).¹⁷ Additional 1'200 tonnes of fish are produced in the approximately 90 larger fish-farms and 420 tonnes are catches from recreational fishing (2009).¹⁸ According to estimations, fishery and aquaculture produced a total of 2'800 tons of fish in 2011 with a production value of CHF 36 million.¹⁹ However, the domestic fish production accounts for less than 10 per cent of the total 70'000 tonnes of fish consumed in Switzerland (2010, Figure 5).²⁰ Major efforts and public campaigns are con-

¹⁵ Bundesamt für Landwirtschaft 2012: Agrarbericht 2012, www.blw.admin.ch, visited February 2014

¹⁶ Federal Statistical Office 2013: Swiss Agriculture Pocket Statistics 2013, www.bfs.admin.ch, visited February 2014

¹⁷ Statistique Suisse: Pêche professionnelle, rendement; www.bfs.admin.ch > Thèmes > Agriculture, état janvier 2014

¹⁸ OFEV: Statistique: Piscicultures, www.environment-switzerland.ch; visited: January 2014.

¹⁹ Office fédéral de la statistique 2013: Agriculture et sylviculture - Panorama; www.bfs.admin.ch > Encyclopedie statistique de la Suisse; état janvier 2014.

²⁰ Statistique Suisse: Pêche professionnelle, rendement; www.bfs.admin.ch > Thèmes > Agriculture, état janvier 2014

ducted by NGOs and the private sector to increase the market share of sustainably produced seafood. Owing to these efforts, the market share of fish certified according to the provisions of the Marine Stewardship Council (MSC) increased from approximately 8 percent (2010/2011) to 12.6 percent (2012-2013).²¹

Non-wood forest products also contribute to food provisioning. The main categories of non-wood forest products used in Switzerland include forest honey, game, mushrooms, and chestnuts. An assessment estimated the economic value of the non-wood forest products to be CHF 83.4 million (Table 1).²²

The dietary habits of the Swiss population remained almost unchanged between the publication of the fifth and sixth national diet report. The trends in food consumption can be summarized as follows (Figure 6): The consumption of fruits, nuts and seeds decreased; the consumption of meat, meat products, milk, grain and potatoes remained constant, whereas the consumption of fish and legumes increased.²³

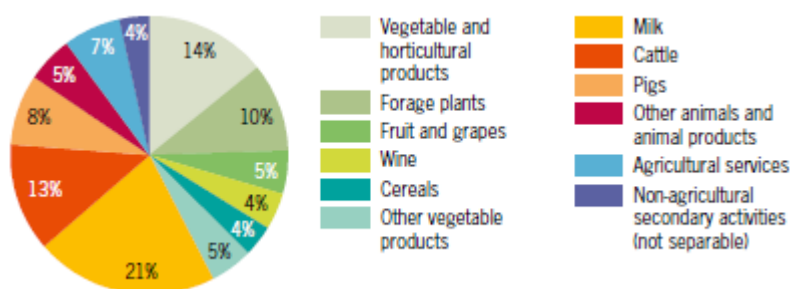


Figure 3: Composition of the agricultural industry output in 2012, total value approx. CHF 10 billion²⁴

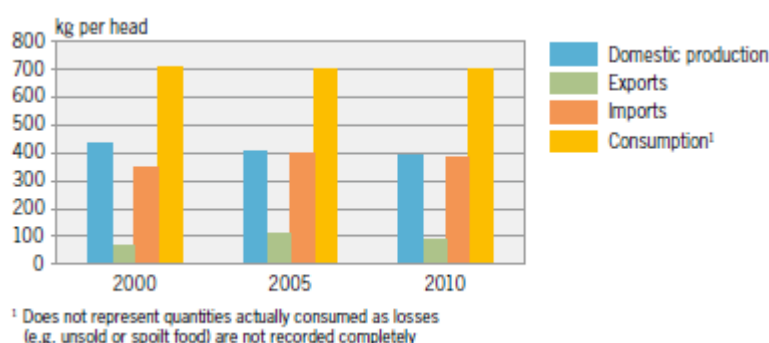


Figure 4: Domestic production/exports/ imports/consumption of foodstuffs in Switzerland²⁵

²¹ World Wildlife Fund: WWF Seafood Group; www.wwf.ch; visited January 2014)

²² Limacher S., Walker D. 2012: Nicht-Holz-Waldprodukte in der Schweiz. Aktualisierung der Daten und Weiterentwicklung der Erhebungsmethoden im Hinblick auf die nationale und internationale Berichterstattung. Bericht erstellt im Auftrag des Bundesamtes für Umwelt BAFU, Bern. WaldKultur, Vitznau.

²³ Keller U, Battaglia Richi E, Beer M, Darioli R, Meyer K, Renggli A, Römer-Lüthi C, Stoffel-Kurt N. 2012: Sechster Schweizerischer Ernährungsbericht. Bern: Bundesamt für Gesundheit.

²⁴ Federal Statistical Office 2013: Swiss Agriculture Pocket Statistics 2013, www.bfs.admin.ch, visited February 2014.

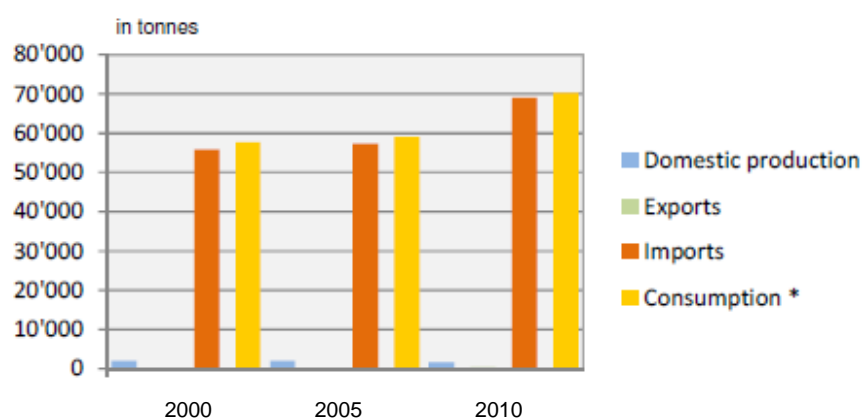


Figure 5: Domestic production, exports, imports and consumption of fish in Switzerland
* Consumption including marine fish, shellfish and crustaceans²⁶

Table 1: Overview of the quantity and economic value of non-wood forest products harvested in Switzerland²⁷

Product	Main species	Quantity (tonnes)	Value (CHF millions)
Forest honey	Forest honey	2'211	52
Game	Chamois, European roe deer, Red deer, Wild boar	1'816	19.5
Mushrooms	Cep, Chanterelle, morels*	254	11.4
Chestnuts	Sweet Chestnut	257	0.5
		Total	83.4

* Truffles are not taken into account, due to poor availability of data.

²⁵ Federal Statistical Office 2013: Swiss Agriculture Pocket Statistics 2013, www.bfs.admin.ch, visited February 2014.

²⁶ Own figure, based on data from: Bundesamt für Statistik: Produktion und Verbrauch von Fisch, www.bfs.admin.ch, visited February 2014.

²⁷ Limacher S., Walker D. 2012: Nicht-Holz-Waldprodukte in der Schweiz. Aktualisierung der Daten und Weiterentwicklung der Erhebungsmethoden im Hinblick auf die nationale und internationale Berichterstattung. Bericht erstellt im Auftrag des Bundesamtes für Umwelt BAFU, Bern. WaldKultur, Vitznau.

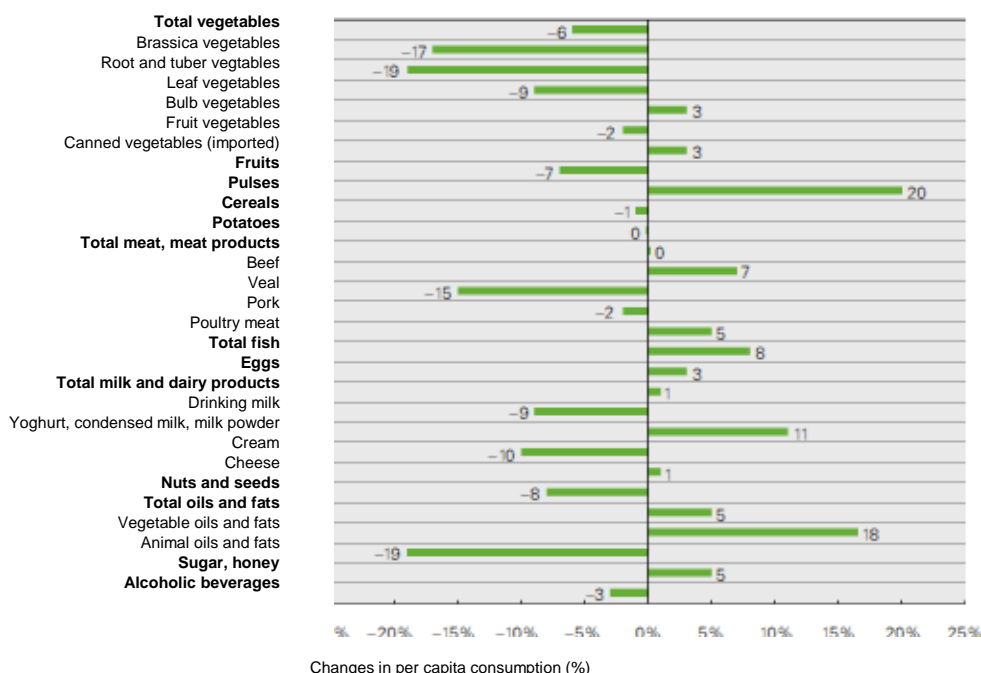


Figure 6: Change in per capita consumption of individual food groups per capita (2007/08 - 2001/02) ²⁸

Raw materials: In 2011, a total of 5.1 Mio. m³ of wood was harvested in Switzerland's forests, with 68% of it in certified forests (PEFC, FSC; see Figure 51). The output value of forestry in 2010 amounted to CHF 857 million (estimate) and thus 4.5% less than last year (Figure 7).²⁹

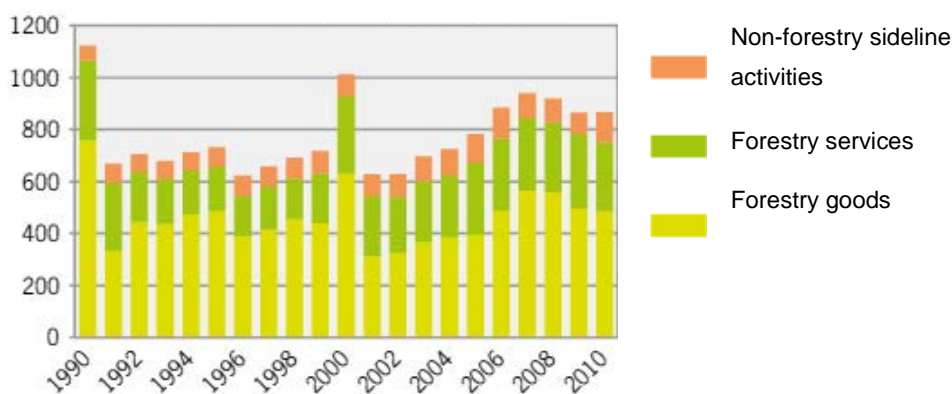


Figure 7: Output value of Swiss forestry (basic prices in CHF million)³⁰

²⁸ Keller U., Battaglia Richi E., Beer M., Darioli R., Meyer K., Renggli A., Römer-Lüthi C., Stoffel-Kurt N. 2012: Sechster Schweizerischer Ernährungsbericht. Bern: Bundesamt für Gesundheit

²⁹ OFEV (Ed.) 2012: Annuaire La forêt et le bois 2012. Office fédéral de l'environnement, Berne. Connaissance de l'environnement no 1224: 174 p. Download: www.bafu.admin.ch/uz-1224-f

³⁰ Federal Statistical Office: Forstwirtschaftliche Gesamtrechnung. www.bfs.admin.ch, visited October 2013

Fresh water: Water valued at CHF 2.6 billion is turned over annually with CHF 1.2 billion for water supplies. CHF 1.4 billion are spent on water production for the industry or for mineral water. Almost 900 million litres of bottled water worth around CHF 700 million are consumed per year in Switzerland. This represents 7% of the total water consumption for drinking and cooking (calculated according to the country's consumer price index (September 2006; 0.76 CHF / litre of mineral water).

Energy: In 2011, a total of 62'881 GWh of electricity was produced in Switzerland.³¹ Wood was used to produce approximately 7'786 GWh of energy (2011) predominantly used as heat and to a lesser extent in the form of electricity (344 GWh, 0.5% of total electricity production).³² Water is at the base of 55% of the electricity produced in Switzerland (2011: 33'795 GWh). Hydropower is Switzerland's primary source of energy. The revenue for the public authorities from hydropower is considerable. In the mountainous cantons, its share of total tax revenues may lie in double digits (e.g. Canton Uri about 20%).³³

Regulating Services

Carbon sequestration: Six categories of land-use can be discerned according to the IPCC: forests, cultivated areas, grasslands, wetlands, settlements and others.³⁴ In Switzerland, all land use categories are sources of CO₂, with exception of forests (Figure 8).³⁵ Since 1990, the Swiss forest is a net CO₂ sink. However, its capacity to act as a sink has decreased since the turn of the millennium due to an increased forest use and mortality.³⁶ If it is assumed that forest use will further increase until 2020 that will turn forests into a CO₂ source of 0.7 to 1.2 million tonnes of CO₂. However, the substitution effect will also increase to about 1.2 million tonnes of CO₂. Both effects together are expected to relieve Switzerland's CO₂ balance by 0 to 0.5 million tonnes of CO₂ in 2020.³⁷ The values of the land use categories representing CO₂ sources remain more or less stable.

Moderation of extreme events: In Switzerland storms cause damage amounting to approximately CHF 329 million every year (average for the years 1972-2011, taking inflation into account). Since 1972 the Swiss Federal Research Institute WSL has been systematically collecting (based on newspapers) and analysing this damage on behalf

³¹ Swiss Federal Office of Energy SFOE: Electricity statistics, www.bfe.admin.ch, visited March 2014.

³² OFEV (Ed.) 2012: Annuaire La forêt et le bois 2012. Office fédéral de l'environnement, Berne. Connaissance de l'environnement no 1224: 174 p. Download: www.bafu.admin.ch/uz-1224-f

³³ Bundesamt für Energie 2008: Strategie Wasserkraftnutzung Schweiz

³⁴ Penman J., Gytarsky M., Hiraishi T., Krug T., Kruger D., Pipatti R., Buendia L., Miwa K., Ngara T., Tanabe K. Wagner F. 2003: Good Practice Guidance for Land Use, Land-Use Change and Forestry, IPCC National Greenhouse Gas Inventories Programme. Institute for Global Environmental Strategies (IGES), Kanagawa.

³⁵ Perroud M., Bader S. 2013: Klimaänderung in der Schweiz. Indikatoren zu Ursachen, Auswirkungen, Massnahmen. Umwelt-Zustand Nr. 1308. Bundesamt für Umwelt, Bern, und Bundesamt für Meteorologie und Klimatologie, Zürich, 86 S

³⁶ OFEV (Ed.) 2012: Annuaire La forêt et le bois 2012. Office fédéral de l'environnement, Berne. Connaissance de l'environnement no 1224: 174 p. Download: www.bafu.admin.ch/uz-1224-f

³⁷ FOEN 2009: Faktenblatt zu CO₂-Leistungen von Wald und Holz bis 2020. Federal Office for the Environment, Abteilung Wald.

of the Federal Office for the Environment FOEN. Damage originating from naturally triggered floods, debris flows, landslides and (since 2002) rockfalls have been considered. Not considered was damage from avalanches, snow pressure, earthquakes, lightning, hail, windstorm and drought.

Figure 9 shows that all events since 1972 have caused damage amounting to more than CHF 13,000 million in total (taking inflation into account). These costs are dominated by a few major events. The event of 21/22 of August 2005, with damage amounting to nearly CHF 3'000 million in total, was the most costly flood in Switzerland since 1972.³⁸

In the light of this, the federal act on the protection of water was revised and a programme targeting the revitalisation of 4'000 km of watercourses was launched (chapter 1.2.4).³⁹

Protection forests: Almost half of Switzerland's forests protect people, settlements and infrastructure from natural hazards. An effective and sustainable protection can only be ensured if the funds for forest care are available to respond appropriately to future challenges, in particular the possible increase of disturbances caused by climate change. To secure this ecosystem service in the long run, the federal government invests CHF 60 million annually through its system of financial equalisation and division of tasks between the Confederation and the cantons (NFA).⁴⁰

Pollination: The mean market value of fruits and berries harvested in the years 1993 - 2003 was on average CHF 332 million per year. Thereof fruits and berries depending on honeybee pollination account for CHF 268 million.⁴¹

Cultural Services

Recreation and mental and physical health:

Nature conservation: Nature observation becomes increasingly popular. NGOs manage 30 nature protection centres throughout Switzerland. The centres offer excursions, courses and exhibitions with approximately 200'000 visitors per year making use of the opportunity to experience nature and deepen their knowledge.⁴²

Forests: The value of forests to society is huge. However, direct net revenues from leisure activities are low in most cases, because these are often unmarketable. Based on the travel cost method,⁴³ the forests' recreational benefits for the Swiss population

³⁸ Swiss Federal Institute for Forest, Snow and Landscape Research WSL: Swiss flood and landslide damage database, www.wsl.ch, visited February 2014.

³⁹ Gögge W. 2012: Revitalisierung Fließgewässer. Strategische Planung. Ein Modul der Vollzugshilfe Renaturierung der Gewässer. Bundesamt für Umwelt, Bern. Umwelt-Vollzug Nr. 1208: 42 S. Download: www.bafu.admin.ch/uv-1208-d

⁴⁰ BAFU (Hrsg.) 2012: Jahrbuch Wald und Holz 2012. Bundesamt für Umwelt, Bern. Umwelt-Zustand Nr. 1224: 174 S. Download: <http://www.bafu.admin.ch/uz-1224-d>

⁴¹ Fluri P., Schenk P., Frick R. 2004: Bienenhaltung in der Schweiz. ALP forum 8: 1–52.

⁴² SVS/BirdLife Schweiz 2013: Biodiversität und Ökosystemleistungen.

⁴³ Ott W., Baur M. 2005: Der monetäre Erholungswert des Waldes. Umwelt-Materialien Nr. 193, Bern, Bundesamt für Umwelt, Wald und Landschaft.

(over 18 years) accounts for approximately CHF 3.2 billion / year (only travel expenses) and CHF 10.5 billion / year (travel and subsistence).⁴⁴

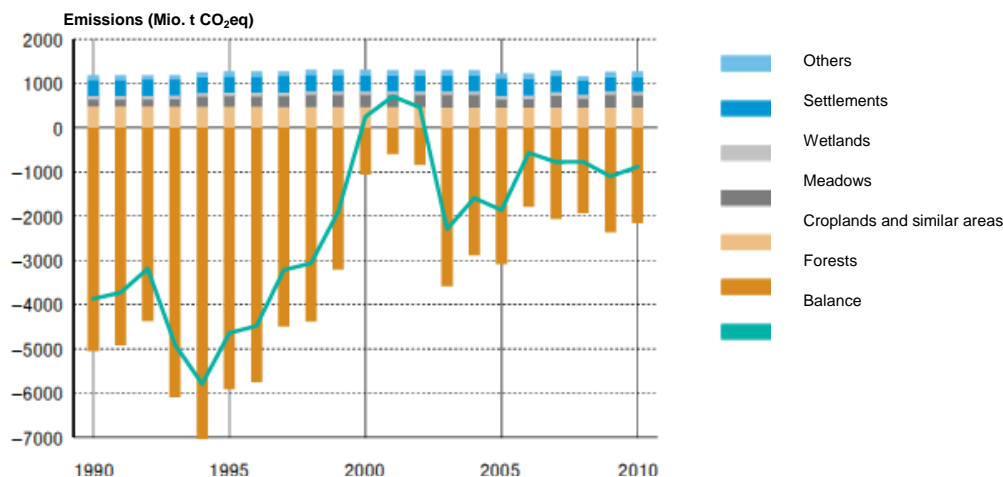


Figure 8: Annual changes in carbon stocks of six land use categories as a result of land use and land use changes from 1990 to 2010. Negative values indicate a sink, which represents an increase of carbon stocks⁴⁵

The low CO₂ sink in forests observed for the period 2000-2002 results from the storm "Lothar" which caused major damage to Swiss forests with an increased proportion of forced wood usage as a consequence.

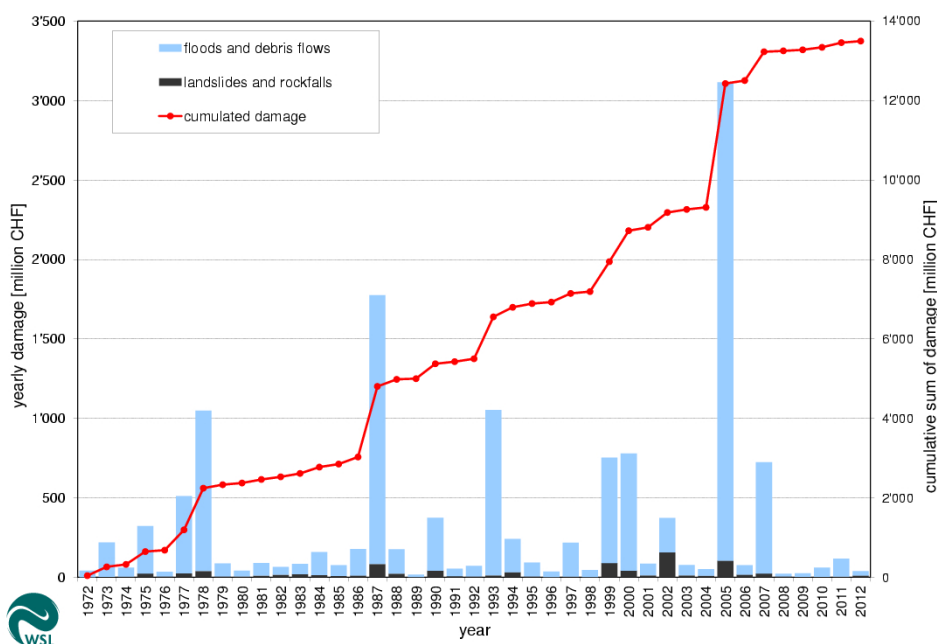


Figure 9: Development of annual and cumulative cost of damage caused by floods/inundation, debris flows, landslides and rockfalls in the period 1972–2012 (taking inflation into account)⁴⁶

⁴⁴ Bernasconi A., Schrott U. 2008: Freizeit und Erholung im Wald. Grundlagen, Instrumente, Beispiele. Umwelt-Wissen Nr. 0819. Bundesamt für Umwelt, Bern. 69 S. Download: www.umwelt-schweiz.ch/uw-0819-d

⁴⁵ Perroud M., Bader S. 2013: Klimaänderung in der Schweiz. Indikatoren zu Ursachen, Auswirkungen, Massnahmen. Umwelt-Zustand Nr. 1308. Bundesamt für Umwelt, Bern, und Bundesamt für Meteorologie und Klimatologie, Zürich, 86 S. Download: www.umwelt-schweiz.ch/uz-0728-d

Surface waters: Rivers and streams are important elements of an attractive landscape for about 90% of the population. A large majority of the population recovers at least once a month near or on rivers for hiking, walking, cycling or swimming.⁴⁷

Health: In a study, two-thirds of the people surveyed indicated to feel "much more relaxed" after visiting the forest (for an average of 90 minutes), nearly 30% said to be "a bit more relaxed" and only 5% noted no difference.⁴⁸

Tourism: Recreation, sport and tourism benefit from a diversified, beautiful landscape and an intact environment. Thus, the State Secretariat for Economic Affairs estimates the value of the landscape alone for Swiss tourism to around CHF 70 billion.⁴⁹

A recent study focusing on the Swiss National Park and the Biosfera Val Mustair revealed that these protected areas generated approximately 300 jobs and an estimated added value of CHF 23.5 million (2012).⁵⁰

Supporting Services

Supporting Services underpin almost all other services. Ecosystems provide living spaces for plants or animals; they also maintain a diversity of different breeds of plants and animals. It is therefore rather difficult to quantify the benefits from supporting services for human wellbeing, as they encompass the whole environment we are living in and are hardly tangible.

Crop Wild Relatives: 83% of the Swiss flora species can be considered as Crop Wild Relatives (CWR). Based on expert considerations, 143 species (5% of the Swiss flora) are estimated to be of particular importance constituting an increasingly important resource for improving agricultural production and for maintaining sustainable agroecosystems.⁵¹

⁴⁶ Swiss Federal Institute for Forest, Snow and Landscape Research WSL: Swiss flood and landslide damage database, www.wsl.ch, visited February 2014.

⁴⁷ Arnold M., Schwarzwälder B., Beer-Tóth K., Zbinden M., Baumgart K. 2009: Mehrwert naturnaher Wasserläufe. Untersuchung zur Zahlungsbereitschaft mit besonderer Berücksichtigung der Erschliessung für den Langsamverkehr. Umwelt-Wissen Nr. 0912. Bundesamt für Umwelt, Bern: 124 S.

⁴⁸ BAFU und WSL (Hrsg.) 2013: Die Schweizer Bevölkerung und ihr Wald. Bericht zur zweiten Bevölkerungsumfrage Waldmonitoring soziokulturell (WaMos 2). Bundesamt für Umwelt, Bern und Eidg. Forschungsanstalt für Wald, Schnee und Landschaft WSL, Birmensdorf. Umwelt-Wissen Nr. 1307: 92 S. Download: www.bafu.admin.ch/uw-1307-d

⁴⁹ FOEN: Thema Sport und Tourismus, www.bafu.admin.ch, visited February 2014

⁵⁰ Backhaus N., Buser Ch., Buttica M., Jorio D. & Speich M. 2013: Wirtschaftliche Auswirkungen des Sommertourismus im UNESCO Biosphärenreservat Val Müstair Parc Naziunal. Schriftenreihe Humangeographie 27, Zürich.

⁵¹ Häner, R., Schierscher, B., Kleijer, G., Rometsch, S. 2010: Mit Kulturpflanzen verwandte Wildarten erhalten. *Agrarforschung*, 16(6), 204–209.

1.2 Changes in Ecosystem Diversity

Baseline information in the Fourth National Report:

- Overview of ecosystems and habitats: chapter 1.1.1, p. 1ff
- Agricultural biodiversity: chapter 1.2, p. 11 ff.
Characteristics of the agricultural area, habitats in agro-ecosystems, protected areas in agro-ecosystems
- Forest biodiversity: chapter 1.3, p. 22 ff.
Characteristics of the Swiss forest area, habitats in forests, protected forest areas, pressure on forest habitats
- Inland waters biodiversity: chapter 1.4, p. 33 ff.
Characteristics of Switzerland's watercourses, inland water habitats, inland water protected areas, pressures on inland water ecosystems
- Dry and subhumid lands biodiversity: chapter 1.5, p. 43 ff.
Dryland habitats, drylands protected areas, Pressure on habitats
(5 NR: Addressed under agricultural biodiversity)
- Mountain biodiversity: chapter 1.6, p. 48 ff.
Mountain ecosystems and habitats, protected areas in mountain regions, pressures on mountain ecosystems
(5 NR: Addressed as a cross-cutting issue as 66% of Switzerland's territory is in mountain regions)

A thorough description of Switzerland's ecosystem diversity is included in the 4th National report. Following the adoption of the revised delineation of dry and sub humid lands (CBD COP decision X/35), Switzerland decided to treat its dry grasslands (4th National report: chapter 1.5) under the programme of work on agricultural biodiversity, as Switzerland's dry grassland do not really meet the delineation adopted by the COP.

1.2.1 Red List Assessments: Ecosystems, Habitats under Threat

A preliminary Red List of threatened ecosystems in Switzerland has been established according to the regional IUCN criteria. Thus, the preliminary Red List is compatible with the habitat classification of EUNIS, i.e. the European Nature Information System. The first expertise based on the data available dare conclude that 47% of all but one habitat types are threatened (Figure 10), predominantly waterbodies, wetlands and uncultivated open land of agro-ecosystems and settlements, additional 16% of the habitats are classified as near threatened (NT) and 37% of least concern (LC).

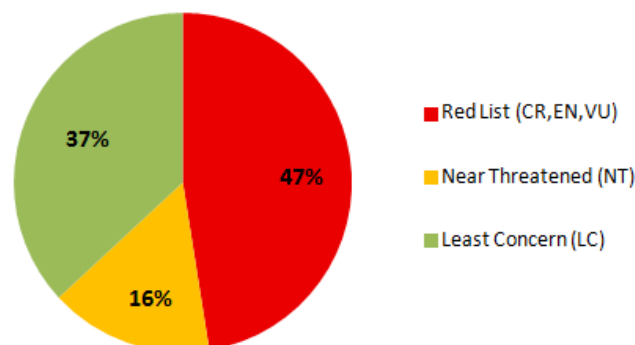


Figure 10: Red List of threatened habitats in Switzerland (161 types assessed)⁵²

For conservation purposes, Switzerland's responsibility for habitats was assessed in terms of the share of total surface area of a habitat in Switzerland when compared with Europe. This approach resulted in a first List of National Priority Habitats.⁵³ Habitats in need of priority conservation measures include high mountain rivers, uncultivated open land, wetlands and water bodies.

1.2.2 Agro-Ecosystems

The multifunctional tasks of agriculture have been anchored in the Federal Constitution since 1996. The tasks include a major contribution towards ensuring food supplies for the population, maintaining the landscape and helping to preserve social structures in rural areas.

State: Switzerland's Utilised Agricultural Area (UAA) amounts to 1'051'063 ha in the year 2012⁵⁴ and is thereby the most important form of land use in Switzerland. The topography and the climatic conditions make Switzerland a country predestined for grassland and pastoral farming. On the surfaces suitable for arable crops, mostly cereals are cultivated (Figure 11).

Major Trends: As described in Switzerland's' fourth national report, the used agricultural area (UAA) is dwindling (4 NR, chapter 1.2.1). Since 1996, a total of 32,000 ha, corresponding to 3% of the UAA, are no longer cultivated. On average, approximately 2000 ha per year are abandoned, which is slightly less than the surface of Lake Murten.⁵⁵ Two different patterns in loss of agricultural area can be discerned. At lower altitudes, intensively used cropland is sealed and lost predominantly for settlements, transport infrastructure and commercial / industrial buildings (Figure 12). In the mountain zone,

⁵² Delarze R., Bergamini A., Eggenberg S., Guntern J., Hofer G., Sager L., Steiger P., Stucki P. 2013: Liste des habitats prioritaires au niveau national et Liste rouge des habitats de Suisse. Rapport expertise sur mandat de l'Office fédéral de l'environnement (OFEV), Berne: 101 p. plus annexes (p. 102-340)

⁵³ Delarze R., Bergamini A., Eggenberg S., Guntern J., Hofer G., Sager L., Steiger P., Stucki P. 2013: Liste des habitats prioritaires au niveau national et Liste rouge des habitats de Suisse. Rapport expertise sur mandat de l'Office fédéral de l'environnement (OFEV), Berne: 101 p. plus annexes (p. 102-340)

⁵⁴ Federal Statistical Office 2013: Media release: Weniger Landwirtschaftsbetriebe, aber mehr Bio (6 August 2013)

⁵⁵ Federal Statistical Office: Strukturen - Landwirtschaftliche Nutzfläche. www.bfs.admin.ch, visited February 2014

however, re-growth of forests through natural succession processes is observed in alpine pastures⁵⁶ due to abandoned pasture practices. Thus, the decline in alpine pastures amounts to 2'400 ha a year.⁵⁷ Forest re-growth in alpine pastures can be a major loss for biodiversity in cases of High Nature Value grassland being converted to forests (4 NR, chapter 1.5).

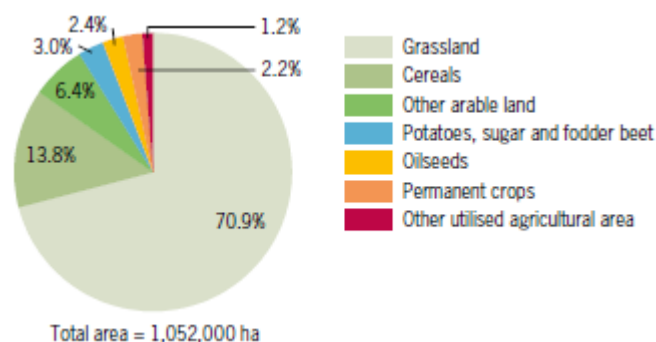


Figure 11: Use of utilised agricultural area (2011, excluding alpine areas)⁵⁸

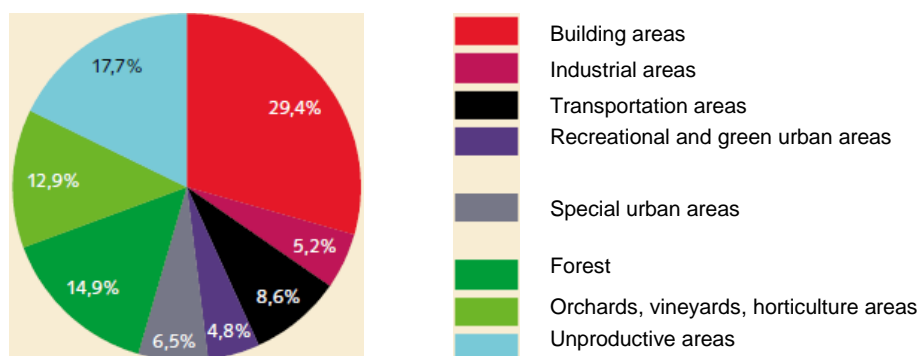


Figure 12: Disappearance of arable land over 24 years (1985 - 2009). Over this period, a total of 107'933 ha of arable land has disappeared⁵⁹

Measures: In 1993, the Confederation introduced ecological compensation in its agricultural policy as an instrument and incentive to counteract the depletion of agricultural landscapes and species decline (Box 6: The Swiss Agricultural Policy 2014 - 2017). In 2011 the ecological compensation area amounted to 130,000 ha with 80% of the ecological compensation being entitled for federal contributions (Figure 13).⁶⁰ The development of the compensation area shows that less intensively used meadows have declined since 1999, whereas extensively used meadows have increased.

⁵⁶ Alpine pastures do not account for the Used Agricultural Area (UAA)

⁵⁷ Lauber S., Schüpbach B., Koch B. 2013: Artenvielfalt im Sömmerungsgebiet. Hotspot 27: 14–16. Cited in: Bundesamt für Landwirtschaft: Agrarbericht 2013

⁵⁸ Federal Statistical Office 2013: Swiss Agriculture - Pocket Statistics 2013

⁵⁹ FSO 2013: Die Bodennutzung in der Schweiz. Resultate der Arealstatistik

⁶⁰ Federal Statistical Office: Auswirkungen auf die Umwelt - Ökologische Ausgleichsflächen. www.bfs.admin.ch, visited February 2014

In order to increase the ecological quality and the interlinking of compensation areas, an incentive was established in 2001 through the Ecological Quality Ordinance (EQO). Financial support is granted by the Confederation (80%) and the cantons (20%), for projects either targeting the improvement of ecological quality, or the interlinking of areas. An assessment of the incentive revealed that both project types are probably well suited to foster the conservation of biodiversity in agricultural landscapes; however, fine-tuning the financial contributions according to target species rather than surfaces, would help to improve the effectiveness of the instrument (see also Box 6: The Swiss Agricultural Policy 2014 - 2017).

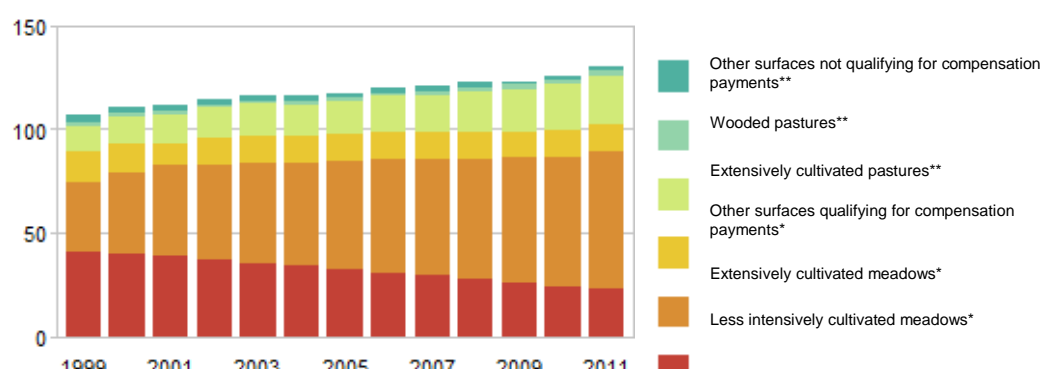


Figure 13: Ecological compensation areas (thousand ha)⁶¹

* qualifying for compensation

** not qualifying for compensation

Agricultural areas managed according to the provisions of organic farming steadily increased until 2006. After a moderate decline in the years 2007 to 2010, a further increase in area was observed, and in the year 2012, the organically farmed area exceeded 120'000 ha for the first time. Organically managed farms are predominantly found in mountainous regions, where pastoral farming is best represented and where conversion to organic farming requires less effort than in areas with intensive crop production (Figure 14).

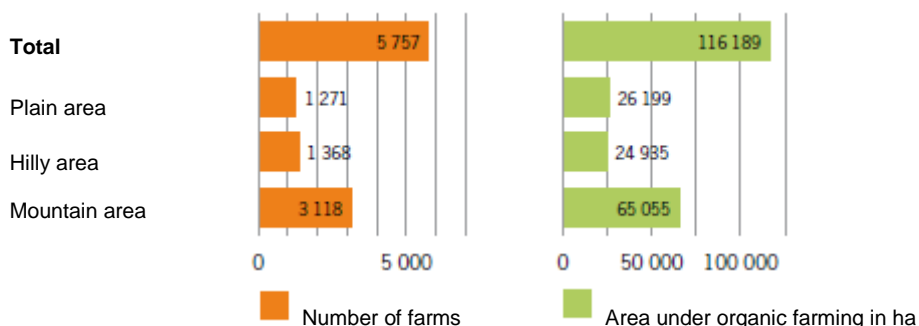


Figure 14: Agricultural areas managed according to the provisions of organic farming (2011)⁶²

⁶¹ Federal Statistical Office: Auswirkungen auf die Umwelt - Ökologische Ausgleichsflächen.
www.bfs.admin.ch, visited February 2014

In 2008, the Federal Office for the Environment FOEN and the Federal Office for Agriculture FOAG defined "*General environmental objectives for agriculture*" (4 NR, section 2.3.1)⁶³. The environmental objectives were further developed in the field of "species and habitats" by setting quantified and regionalised targets.⁶⁴

In order to measure the development of species- and habitat diversity in the agricultural landscape and to therewith assess the effectiveness of adopted measures, Agroscope has developed the ALL-EMA agri-environmental indicator system. The 'Agricultural Species and Habitats' agri-environmental indicator observes biodiversity on the ecological compensation land entitled to subsidy payments, as well as species and habitat diversity in the Swiss agricultural landscape in general. The assessment is repeated every five years in order to highlight long-term developments.⁶⁵

Conclusion: In conclusion, ecological compensation has a moderate beneficial effect on biodiversity; however, it could not stop the decline of species (e.g. birds, see Figure 15). It is hoped that the continuous efforts in the agricultural sector, together with the new agricultural policy 2014-2017, will have positive effects on biodiversity. Today, the loss of species goes hand in hand with the loss of ecologically valuable small structures which contribute to the characteristic appearance of the landscape, e.g. groves, hedges and copses, and their associated habitats.

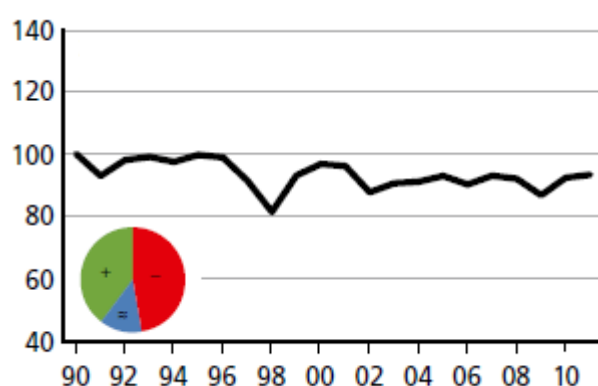


Figure 15: Swiss Bird Index – development of the population of 38 bird species relying on agricultural ecosystems⁶⁶

⁶² Office fédéral de la statistique 2013: Agriculture et sylviculture - Panorama; www.bfs.admin.ch > Encyclopedie statistique de la Suisse; état janvier 2014.

⁶³ OFEV et OFAG 2008: Objectifs environnementaux pour l'agriculture. A partir de bases légales existantes. Connaissance de l'environnement n° 0820. Office fédéral de l'environnement, Berne: 221 p.. Download: www.environnement-suisse.ch/uw-0820-f

⁶⁴ Walter T., Eggenberg S., Gonseth Y., Fivaz F., Hedinger C., Hofer G., Klieber-Kühne A., Richner N., Schneider K., Szerencsits E., Wolf S. 2013: Opérationnalisation des objectifs environnementaux pour l'agriculture : Domaine espèces cibles et caractéristiques, milieux naturels (OPAL). ART-Schriftenreihe. 18, 2013, 1-134

⁶⁵ Agroscope: CHF 160 Million for Biodiversity, www.agroscope.admin.ch, visited March 2014

⁶⁶ Keller V., Kéry M., Schmid H., Zbinden N. 2012: Swiss Bird Index SBI@: Update 2011. Faktenblatt. Schweizerische Vogelwarte Sempach.

1.2.3 Forest Ecosystems

State: In the nineteenth century, the Swiss forest had declined sharply due to excessive exploitation by industry. Swiss forested land reached its smallest area in the mid-nineteenth century at an estimated 0.7 million ha. Whole hillsides were cleared to make new fields and especially for firewood and timber. This led to many problems such as flooding and erosion. The legislature responded by passing the 1876 Police Act of forests, which included a prohibition of clear-cutting as a key element. Since then, the forest area has recovered, and today 31% (1.28 million ha; 12'786 km²) of the country's surface is covered with forests. Especially the Southern Alps are heavily wooded with over 51%, about double the size of the proportion of forest on the Swiss Plateau with 25%.⁶⁷

Major trends: Changes in forest area differ significantly by region and according to altitude (Figure 16). Whereas the forest area has hardly changed in the Jura and the Plateau since 1985, it has increased by about 9-18% in the southern Alps and the Alps (based on last National Forest Inventory NFI). Forest re-growth is observed especially at an altitude between 1000 m and the timber-line. At this altitude the forest already covers 61% of the surface. On the Plateau, however, the forest continues to face intense pressure due to increasing population and infrastructure development, that go hand in hand with the loss of important small-scale structures, such as hedgerows, copses, ponds and ditches. An outlook on the future development of the forested area reveals that the trends towards re-growth at higher altitude and increased pressures at lower altitude are set to continue.⁶⁸ The strict forest legislation in Switzerland does not allow a decrease in forest area and prescribes different options for compensation of forest losses.

Measures: The introduction of sustainability criteria to forest management in the nineteenth century and close to nature forestry principles in the first half of the twentieth century had significant impacts on forest biodiversity. In that time, sustainability was understood in a way that the amount of harvested wood may not exceed wood increment. In consequence, a clear distinction of areas used for agriculture or for forestry was introduced and timber forests were encouraged. This policy led to a strong reduction of surfaces with traditional forestry forms, such as wooded pastures, and an increase in wood stock especially spruce. Forest became dense and darker, leaving no space for light demanding species.⁶⁹

⁶⁷ Brändli, U.-B. (Red) 2010: Schweizerisches Landesforstinventar - Ergebnisse der dritten Erhebung 2004–2006 In: Birmensdorf & Bern: Eidgenössische Forschungsanstalt für Wald, Schnee und Landschaft WSL.

⁶⁸ Ernst Basler + Partner AG 2010: Entwicklung der Waldfläche: Einflussfaktoren und Szenarien. Im Auftrag des Bundesamtes für Umwelt (BAFU) Schlussbericht September 2010.

⁶⁹ Scheidegger C., Bergamini A., Bürgi M., Holderegger R., Lachat T., Schnyder N., Senn-Irlet B., Wermelinger B., Bollmann K. 2010: Waldwirtschaft. In: Lachat T., Pauli D., Gonseth Y., Klaus G., Scheidegger C., Vittoz P., Walter T. (Red.): Wandel der Biodiversität in der Schweiz seit 1900. Ist die Talsohle erreicht? Zürich, Bristol-Stiftung; Bern, Stuttgart, Wien, Haupt. 124-160.

Today, however, practices have changed. The wood stock of spruce has declined by 11% outside its natural habitat, i.e. at lower altitudes, during the last 11 years⁷⁰. Further, more than 90% of mature timber is established by natural seeding – a peak value in Europe. The forest surface that has not been managed during the last fifty years is growing as is the share of fallen and standing deadwood (average volume of 21.5 m³/ha with considerable regional differences⁷¹). These trends lead to a more natural composition of tree species and an increase of the structural diversity of forests, thus providing habitats for highly adapted species. Indeed, a positive trend is recorded for breeding birds relying on forests as a habitat.

The designation of forest reserves is making progress with 4.8% of the forest surface being protected. Further efforts are needed to achieve the national target of 10% of the Swiss forest surface being designated as protected areas, and to overcome the shortcomings described in chapter 3.1.2.

Conclusion: The trend recorded for different indicators of the ecological quality of forests ecosystems like structural diversity, volume of standing and lying deadwood, natural regeneration, as well as breeding birds is satisfying (Figure 17). On the other hand, a decline is still observed for many species (insects, mushrooms, lichens). This decline indicates that there is still additional need for further conservation measures, bearing in mind that any measures implemented in forest ecosystems need a long time towards achieving their full impact.⁷²

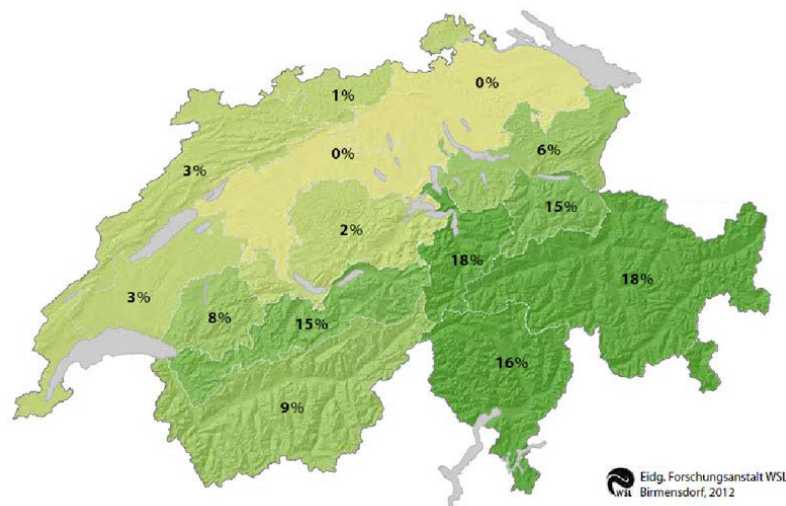


Figure 16: Development of the forested area between 1985 and 2006⁷³

⁷⁰ Brändli U.-B. (Red.) 2010: Schweizerisches Landesforstinventar - Ergebnisse der dritten Erhebung 2004–2006 In. Birmensdorf & Bern: Eidgenössische Forschungsanstalt für Wald, Schnee und Landschaft WSL.

⁷¹ Brändli U.-B. (Red.) 2010: Schweizerisches Landesforstinventar - Ergebnisse der dritten Erhebung 2004–2006 In. Birmensdorf & Bern: Eidgenössische Forschungsanstalt für Wald, Schnee und Landschaft WSL.

⁷² Scheidegger C., Bergamini A., Bürgi M., Holderegger R., Lachat T., Schnyder N., Senn-Irlet B., Wermelinger B., Bollmann K. 2010: Waldwirtschaft. In: Lachat T., Pauli D., Gonseth Y., Klaus G., Scheidegger C., Vittoz P., Walter, T. (Red.): Wandel der Biodiversität in der Schweiz seit 1900. Ist die Talsohle erreicht? Zürich, Bristol-Stiftung; Bern, Stuttgart, Wien, Haupt. 124-160.

⁷³ Brändli U.-B. (Red.) 2010: Schweizerisches Landesforstinventar - Ergebnisse der dritten Erhebung 2004–2006 In. Birmensdorf & Bern: Eidgenössische Forschungsanstalt für Wald, Schnee und Landschaft WSL.

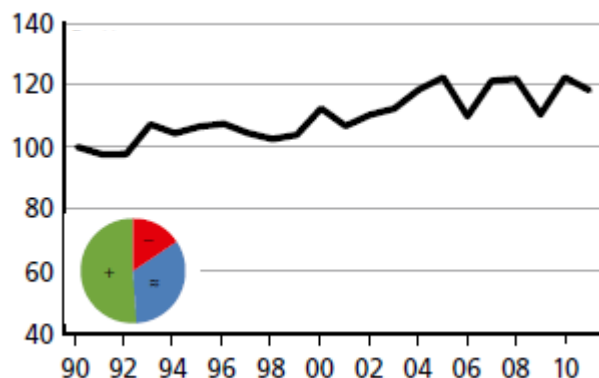


Figure 17: Swiss Bird Index: Development of populations of 57 bird species relying on the forest as habitat⁷⁴

1.2.4 Inland Water Ecosystems

State: Intensive land use in the past resulted in the loss of inland waters ecosystems and the large-scale alteration of the structure of surface waters. Numerous water-courses were channelled or straightened to provide for increasing land needs or to provide flood protection for settlements. Hence, the space originally provided for water-courses has been reduced to a single channel in many places and the natural dynamic was lost.

Today, it is estimated that 35'000km (or 54%) of Switzerland's watercourses are in an eco-morphologically natural or near-natural state, whereas for a total of 14'000 km, the condition is classified as insufficient. The latter are fragmented by approximately 101'000 artificial barriers higher than 50 cm, thus impacting the river's physical processes (e.g. bed load transport, discharge regime) and ecological functions (4 NR, chapter 1.4.7).

Major trends: An assessment of the loss of mires, bogs and alluvial zones was conducted, based on historical maps.⁷⁵ This assessment concluded that between 1900 and 2010, 82% of the surface area in Switzerland covered by mires and bogs was lost. The surface area of alluvial zones below 1800 m asl decreased by 36% in the same period. However, 55% of alluvial zones were already lost before 1900. The study notes, that not only did the surface area of mires, bogs and alluvial zones dramatically shrink, but also that the quality of those ecosystems was heavily impacted (Figure 19). During the time period of 1997/2001-2002/06, 26% of the mires and bogs of national importance (4NR, chapter 1.4.3) became dryer, 31% were impacted by bush encroachment and 23% by

⁷⁴ Keller V., Kéry M., Schmid H., Zbinden N. 2012: Swiss Bird Index SBI@: Update 2011. Faktenblatt. Schweizerische Vogelwarte Sempach.

⁷⁵ Lachat T., Blaser F., Bösch R., Bonnard L., Gimmi U., Grünig A., Roulier C., Sirena G., Stöcklin J., Volkart G. 2010: Verlust wertvoller Lebensräume. In: Lachat T., Pauli D., Gonseth Y., Klaus G., Scheidegger C., Vittoz P., Walter T. (Eds.): Wandel der Biodiversität in der Schweiz seit 1900. Ist die Talsohle erreicht? Haupt Bern, 22-63.

nutrient discharge from neighbouring agricultural lands as well as from nitrogen input from the atmosphere. Alluvial zones suffered predominantly from intensive land use in the past that resulted in large-scale alteration of the structure of rivers, and in the impoverishment of the landscape.

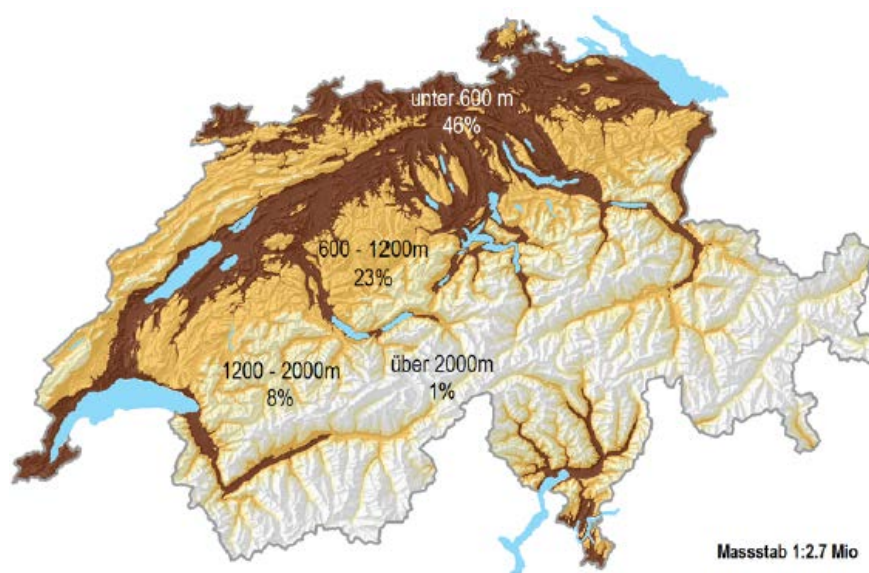


Figure 18: Percentage of rivers in an eco-morphological insufficient state, classified according to their elevation asl.⁷⁶

under 600 m asl.: brown; 600-1200 m asl.: beige; 1200-2000 m asl.: yellow; over 2000 m asl.: white

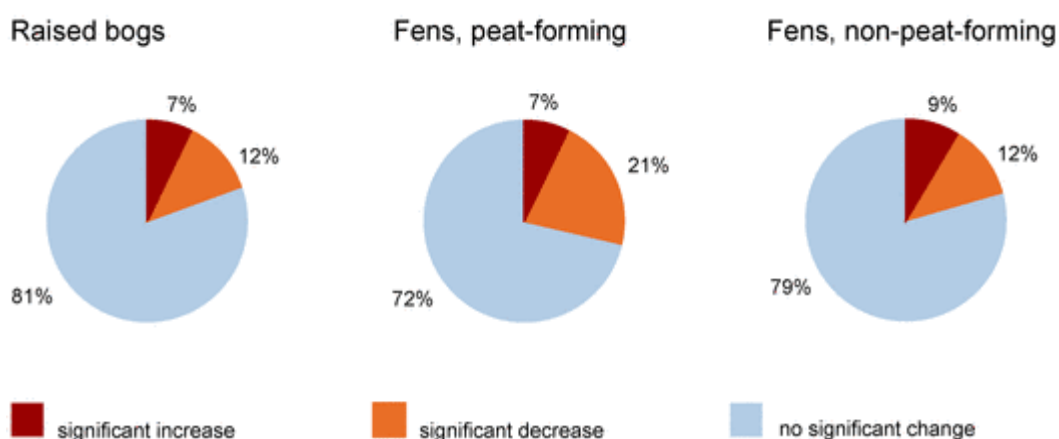


Figure 19: Overall mire index.⁷⁷ Changes of mire nature are measured by the so-called mire index. It reflects the share of typical mire species in the vegetation as well as their degrees of species cover. An increasing mire index equals an increase in mire nature.

Even though the sites concerned continue to be considered mires, these changes are alarming,

⁷⁶ Zeh Weissmann H., Könitzer C., Bertiller A. 2009: Strukturen der Fliessgewässer in der Schweiz. Zustand von Sohle, Ufer und Umland (Ökomorphologie); Ergebnisse der ökomorphologischen Kartierung. Stand: April 2009. Umwelt-Zustand Nr. 0926. Bundesamt für Umwelt, Bern. 100 S.

⁷⁷ Biodiversity Monitoring Switzerland: Indicator Z11 - Quality of valuable habitats. Download: www.biodiversitymonitoring.ch/en/data/indicators/z/z11.html

since more mires are losing in mire nature than gaining.

An issue of growing concern is the continuous transport of micropollutants into the aquatic environment, despite high development standards of urban water management infrastructure and effective legislation (Figure 20). Micropollutant is a collective term for organic trace compounds or heavy metals which occur in the aquatic environment in very low concentrations (billionths to millionths of a gram per litre). Even at low concentrations, micropollutants can inadvertently have the very effect on aquatic life that was intended for their actual application; e.g. herbicides applied to kill weeds prevent photosynthesis in algae, neurotoxic insecticides damage the nervous systems of aquatic organisms and endocrine substances affect fish reproduction. For example, in the worst case the widely available analgesic diclofenac can cause kidney damage in humans. The same effects are now being observed in trout. Flame retardants used in upholstery, electrical and electronic products, buildings etc. to prevent fire can disrupt reproduction in aquatic organisms. More subtle damage, such as behavioural problems (caused among other things by the disruption of olfactory orientation) or damage to the immune system of organisms, is also possible. The situation is made more complicated by the aggregation effect of similar substances and the effects of complex substance mixtures.

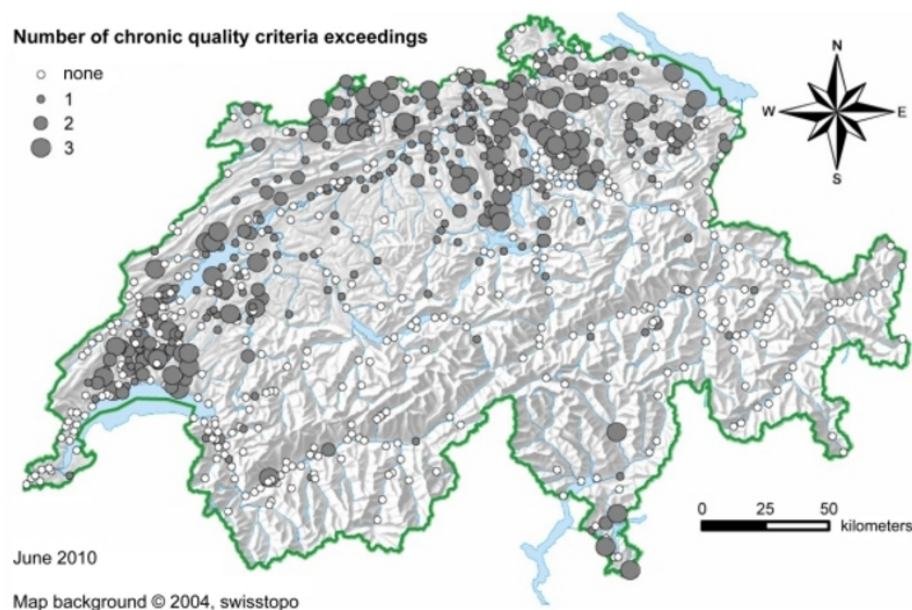


Figure 20: Number of quality criteria exceedings in receiving waters downstream of WWTP. Result of a simulation with six compounds⁷⁸

Measures: Switzerland has revised its legislative basis for the protection of surface waters in the Waters Protection Act and the associated ordinance (chapter 2.1.3). To meet the requirements of water protection legislation, the cantons must, by 2014, develop a long-term strategic plan for the restoration of watercourses. This strategic planning

⁷⁸ Federal Office for the Environment: Micropollutants in Swiss rivers and lakes, www.bafu.admin.ch, visited February 2014.

should identify those watercourses for which restoration measures will have the greatest benefit for nature and the landscape and which should be prioritised. The objective of strategic planning is the restoration of approximately 4'000 km of watercourses.⁷⁹ This ambitious objective shall be achieved within a period of 80 years. The first projects are already being implemented (Box 3). Around CHF 40 million per year is allocated to these restoration measures.

Further, agricultural areas located within the surface water areas must be managed as ecological compensation areas. CHF 20 million has been added to the agricultural budget for this purpose.

Measures are necessary at various levels to achieve a significant reduction in the discharge of micropollutants. Measures at source can prevent these substances entering the wastewater. Measures on licensing, production, use and disposal are appropriate for problematic substances. Selective restrictions on the use of these substances make sense in ecological and economic terms, but are impossible in some cases such as pharmaceuticals. In order to achieve a significant reduction of a broad spectrum of substances from municipal wastewater into the aquatic environment, an optimization of the existing wastewater treatment is required and was decided by the parliament in March 2014. Two processes have been shown in various national and international studies to be suitable for implementation on an industrial scale: Powdered activated carbon (PAC) treatment, and ozonation. These two processes were therefore selected for pilot trials.⁸⁰

The studies and pilot trials carried out have shown that the additional treatment processes at municipal wastewater treatment plants (WWTP) are an effective method for improving water quality in the aquatic environment. Since the relevance of the micropollutant problem largely depends on the watercourse affected, a targeted approach to upgrade municipal WWTP is required. Large WWTP (load reduction), selected WWTP on watercourses with a high wastewater percentage (protection of the ecosystems) and WWTP on watercourses which are important for supplies of drinking water (protection of drinking water resources) need to be upgraded. By upgrading around 100 of the total of more than 700 WWTP in Switzerland, around 50% of Swiss wastewater could be treated and the targets could be met.⁸¹

Conclusions: In the past, Switzerland has suffered heavy losses regarding inland water ecosystems, predominantly due to changes in land use. Many inland water and wetland areas, bearing a highly adapted species diversity, have been lost. The importance, however, to conserve the remaining areas – be it to secure ecosystem services or for the conservation of biodiversity – is rising. Indeed, Switzerland has a good legislative

⁷⁹ Göggel W. 2012: Revitalisierung Fließgewässer. Strategische Planung. Ein Modul der Vollzugshilfe Renaturierung der Gewässer. Bundesamt für Umwelt, Bern. Umwelt-Vollzug Nr. 1208: 42 S.

⁸⁰ FOEN 2012: Micropollutants in municipal wastewater - Processes for advanced removal in wastewater treatment plants. Summary of the publication: «Mikroverunreinigungen aus kommunalem Abwasser». Download: www.bafu.admin.ch/uw-1214-d

⁸¹ FOEN 2012: Micropollutants in municipal wastewater - Processes for advanced removal in wastewater treatment plants. Summary of the publication: «Mikroverunreinigungen aus kommunalem Abwasser». Download: www.bafu.admin.ch/uw-1214-d

basis for the protection of groundwater and surface waters in the Waters Protection Act and the associated ordinance. Efforts to conserve inland waters ecosystems e.g. encompass the establishment of protected areas (4NR, chapter 1.4.3), pollution reduction and the restoration of affected ecosystems.

Box 3: Restoring watercourses

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

On 1 January 2011, the amended Federal Act on the Protection of Water came into force (see chapter 2.3.1). It specifies that rivers and lakes in Switzerland must be close to nature, and defines measures and responsibilities, including the necessary delineation of adequate spaces and the strategic planning of revitalization by the cantons.



Figure 21: Thurauen: before (left) and after the first revitalization phase (right).

A study aiming at increasing the understanding of the added value of natural watercourses (flowing waters) was conducted. Based on the method of discrete choice experiments, the willingness to pay for a revitalisation project was explored for four specific rivers in Switzerland: the Dünner river, the Sorne river, the Broye river and the Glatt river. The study revealed that:⁸²

- Rivers and streams are important elements in an attractive landscape for about 90% of the population.
- A large majority of the respondents (66% to 87%) finds that the watercourses in their area are in a satisfactory condition, yet 73 to 80% consider that a remodelling would be worthwhile.
- The willingness to pay for a revitalisation project lies, for the example of the Dünner river, at 149 CHF per person and year, for the Sorne river at 82 CHF per year and for the Broye river at 71 CHF. At the Glatt river on the other hand there is no significant willingness to pay for a revitalisation project. Such a willingness to pay (to the amount of 52 CHF) only emerges with

⁸² Source: Arnold M., Schwarzwälder B., Beer-Tóth K., Zbinden M., Baumgart K. 2009: Mehrwert naturnaher Wasserläufe. Untersuchung zur Zahlungsbereitschaft mit besonderer Berücksichtigung der Erschliessung für den Langsamverkehr. Umwelt-Wissen Nr. 0912. Bundesamt für Umwelt, Bern: 124 S.

an additional enlargement of the river-bank, providing, among others things, benefits for leisure.

1.3 Species Diversity in Switzerland: Overview⁸³

Baseline information in the Fourth National Report:

- Overview of species diversity: chapter 1.1.2, p. 2 ff
- Species diversity in agro-ecosystems: chapter 1.2.3, p. 13 ff.
- Species diversity in forests: chapter 1.3.5, p. 24 ff.
- Species diversity in inland water ecosystems: chapter 1.4.4, p. 34 ff.
- Species diversity in drylands: chapter 1.5.3, p. 45 ff.
- Species diversity in mountain ecosystems: chapter 1.6.3, p. 48 ff.

1.3.1 Species Diversity: Status and Trends

Switzerland's Fourth National Report (chapter 1) provides a comprehensive characterisation of species biodiversity in different ecosystems, and a detailed overview of the development of species groups during the last decades. The trends can be summarized as follows:



















- The number of known species in Switzerland (not including unicellular or few-celled algae, slime moulds and protozoa) totals 45,890 (8,272 fungi and lichens; 5,275 algae, bryophytes and vascular plants; 32,343 animals). Experts estimate that Switzerland is home to another roughly 20,000 species (including 9,000 fungi and 8,000 insects).
- Between 1900 and 1990, drastic areal losses and dwindling populations of many once common species caused around one-third of all known species in Switzerland to become threatened, based on current knowledge. Many native species now exist in isolated and decimated populations or only a few individuals have survived.
- Since the 1990s, the decline in the populations of certain species has slowed. A positive development has occurred in a few isolated cases. Projections until 2020, however, show that a real change in trend is not possible given the current conditions. Even if the area of valuable habitats can be stabilised at the current level, the extinction of species is still a threat, since the populations of many rare species are very small and would barely be able to survive.⁸⁴

⁸³ Cordillot F., Klaus G. 2011: Threatened Species in Switzerland. Red List Synthesis Report, Status 2010. Federal Office for the Environment, Bern. State of the environment No.1120: 111 pp. Download: www.bafu.admin.ch/uz-1120-e

⁸⁴ Forum Biodiversité Suisse, Académie des sciences naturelles (eds) 2011: La biodiversité en Suisse: évolution, situation, action. Download: www.biodiversity.ch/f/publications/der_wandel_der_biodiversitaet/index.php

- Species diversity has decreased, especially in the Central Plateau region, to such an extent that it is questionable whether the ecosystem services are secure in the long term.
- The species composition in habitats is becoming increasingly similar (Table 2, as noted by Biodiversity Monitoring Switzerland). This is due not only to increasingly standardised management methods, but also to the nutrient input, which greatly benefits several already common species.

Table 2: The table shows the development of species community diversity nationwide and in individual biogeographical regions during the 2001–2012 surveying period. Downward arrows point to homogenization of species communities, while upward arrows are a sign of species communities having become more diverse. On the whole, analyses indicate that the diversity of vascular plant communities in Switzerland’s landscapes is declining. In contrast, the diversity of breeding bird species communities apparently tends to increase on a national scale, even though marked contrasts have been observed from one region to the next.⁸⁵

Biogeographical regions	Development of species community diversity		
	Vascular plant trends	Breeding bird trends	Butterfly trends
Nationwide			
Jura			
Central Plateau			
Northern Alps			
Central Alps			
Southern Alps			

© BDM (Z12 indicator. Data Source: BDM surveys. Status end 2012)

- With higher efforts in species assessments, knowledge on species is increasing. E.g. within the framework of an investigation on biodiversity in the vineyards south of the Alps, 19 species of invertebrates (spiders, cicada, beetles) which have never before been observed in Switzerland, were detected in 2013.⁸⁶ A representative assessment of the existing fish species in Alpine lakes revealed the presence of probably new and endemic fish species.⁸⁷
- The Weatherfish (*Misgurnus fossilis*) has been listed as extinct since 2011. However, the species disappeared earlier. New investigations have now revealed that

⁸⁵ Biodiversity Monitoring Switzerland: Indicator Z12: Diversity of Species Communities, download: www.biodiversitymonitoring.ch/en/data/indicators/z12.html, visited February 2014

⁸⁶ IBS - Infodienst Biodiversität Schweiz - Nachrichten aus der Biodiversitäts-Forschung: Dix-neuf nouvelles espèces d'invertébrés découvertes dans les vignobles du Tessin (8. Octobre 2013. biodiversity.ch/d/services/information_service_ibs/detail.php?id=908

⁸⁷ EAWAG aquatic research: Projet Lac - An assessment of the Swiss fish fauna, www.eawag.ch, visited February 2014

the populations in the Rhone valley are not in fact Weatherfish, but *Paramisgurnus dabryanus*, a similar looking Asian goby.⁸⁸

1.3.2 Red List Assessments: Species under Threat

Red Lists are currently available for 27 organism groups: these include 3 plant groups (vascular plants, bryophytes and stoneworts), 21 animal groups (all vertebrates and 15 invertebrate groups) and 3 fungus and lichen groups (macrofungi, epiphytic and terricolous lichens). Up to 2012, a quarter of the 45,890 known species have been evaluated for Red Lists (Figure 22).

Indigenous species						Known	Estimated
					Assessed	±	±
		Threatened	Near threatened	Not threatened			
Animals	Number	1283	381	1445	3109	32343	41000
	per cent	41.2 %	12.3 %	46.5 %	10 %	100 %	
Plants (vascular plants, bryophytes, stoneworts)	Number	1226	422	1924	3572	5275	6000
	per cent	34.3 %	11.8 %	53.9 %	68 %	100 %	
Lichens, fungi	Number	1232	250	2187	3669	8272	17000
	per cent	33.6 %	6.8 %	59.6 %	44 %	100 %	
Total	Number	3741	1053	5556	10350	45890	64000
	per cent	36.1 %	10.2 %	53.7 %	23 %	100 %	

Data source: Red Lists, FOEN; experts

Figure 22: Number of estimated, known, assessed and threatened species in Switzerland (not including unicellular or few-celled algae, slime moulds and protozoa. All known indigenous species with a sufficient evidence base have been assessed. Species assigned to an endangerment category (RE, CR, EN, VU) are designated as "Threatened"⁸⁹

Of the species evaluated, 36% are categorised as threatened (Figure 23): 3% of all evaluated species are considered extinct in Switzerland (RE, i.e. regionally extinct), 5% critically endangered (CR), 11% endangered (EN) and 17% vulnerable (VU). The amount of threatened species in Switzerland is high when compared with the state of species worldwide (Figure 24).

The highest proportion of extinct or critically endangered species in Switzerland is found in the aquatic organism groups (fish, macroalgae); in terms of absolute numbers, the pole position is held by insects, vascular plants (including some aquatic plants), lichens and bryophytes (Figure 25).

⁸⁸ Cordillot F., Klaus G. 2011: Threatened Species in Switzerland. Red List Synthesis Report, Status 2010. Federal Office for the Environment, Bern. State of the environment No.1120: 111 pp. Download: www.bafu.admin.ch/uz-1120-e

⁸⁹ Cordillot F., Klaus G. 2011: Threatened Species in Switzerland. Red List Synthesis Report, Status 2010. Federal Office for the Environment, Bern. State of the environment No.1120: 111 pp. Download: www.bafu.admin.ch/uz-1120-e

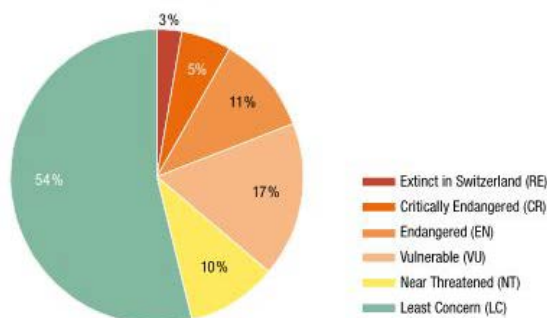


Figure 23: Proportion of threatened plant, animal and fungus species in Switzerland (Status 2010). Of 10'350 assessed species around 36 % are considered to be threatened, i.e. categories RE, CR, EN, VU⁹⁰

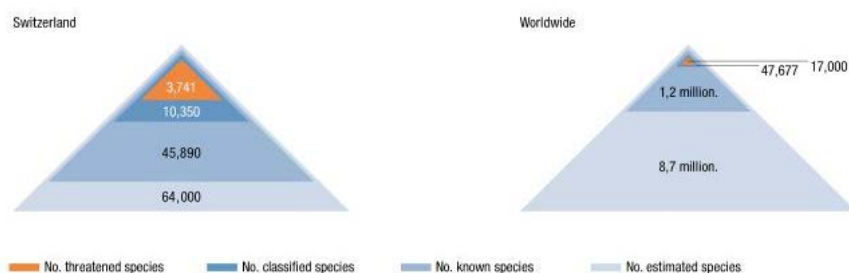


Figure 24: The state of species diversity in Switzerland and worldwide (Data Source: Red Lists, FOEN; Millennium Ecosystem Assessment 2005, Mora et al. 2011; IUCN)⁹¹

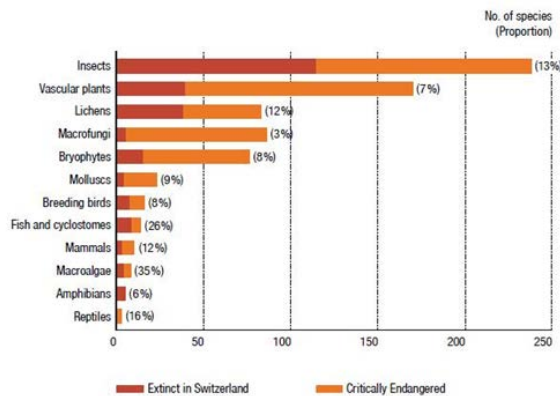


Figure 25: Species classified as extinct (RE) or critically endangered (CR) in Switzerland. Absolute numbers and percentages of species per organism group. All species from the extinct in Switzerland or critically endangered categories, represent 8% of all assessed species⁹²

⁹⁰ Cordillot F., Klaus G. 2011: Threatened Species in Switzerland. Red List Synthesis Report, Status 2010. Federal Office for the Environment, Bern. State of the environment No.1120: 111 pp. Download: www.bafu.admin.ch/uz-1120-e

⁹¹ Cordillot F., Klaus G. 2011: Threatened Species in Switzerland. Red List Synthesis Report, Status 2010. Federal Office for the Environment, Bern. State of the environment No.1120: 111 pp. Download: www.bafu.admin.ch/uz-1120-e

⁹² Cordillot F., Klaus G. 2011: Threatened Species in Switzerland. Red List Synthesis Report, Status 2010. Federal Office for the Environment, Bern. State of the environment No.1120: 111 pp. Download: www.bafu.admin.ch/uz-1120-e

When all organism groups are considered in combination, it emerges that most of the lost species were specialised ones that depended on watercourses and water bodies, wetlands and dry sites. These habitats have suffered considerable qualitative and quantitative decline over the past 150 years.⁹³ This is reflected by a varying proportion of threatened habitat types within macrohabitats (i.e. wetlands, water bodies, forests, agricultural land, settlements, and uncultivated open land): The highest proportion is found in inland waters ecosystems (Figure 26).

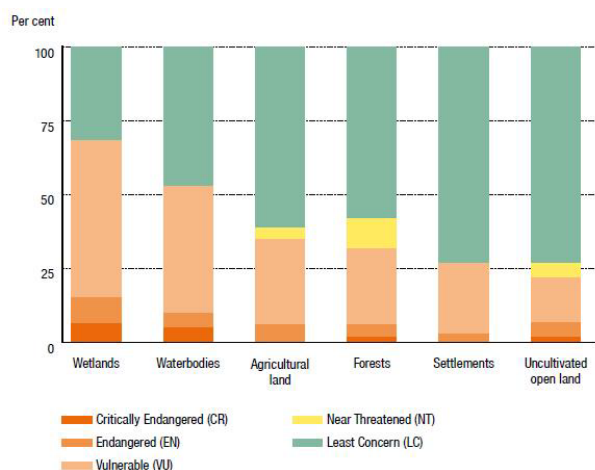


Figure 26: Proportion of threatened habitat types by macrohabitat. Multiple references are possible (e.g. semi-dry grassland both in agricultural areas and in uncultivated open land and settlement areas)⁹⁴

The most common causes for the decline of a species are, in decreasing order of importance: impairment or destruction of the habitat, alteration and disruption of the ecosystem's natural dynamics, and damage or disturbance to the species populations.

In Switzerland, detailed analysis has shown that, in recent decades, the intensification of agricultural production and the destruction of habitat structures have been by far the most significant causes of endangerment (Figure 27).

⁹³ Lachat T., Pauli D., Gonseth Y., Klaus G., Scheidegger C., Vittoz P., Walter T. (Red.) 2010: Wandel der Biodiversität in der Schweiz seit 1900. Ist die Talsohle erreicht? Zürich, Bristol-Schriftenreihe 25; Haupt, Bern/Stuttgart/Wien.

⁹⁴ Cordillot F., Klaus G. 2011: Threatened Species in Switzerland. Red List Synthesis Report, Status 2010. Federal Office for the Environment, Bern. State of the environment No.1120: 111 pp. Download: www.bafu.admin.ch/uz-1120-e

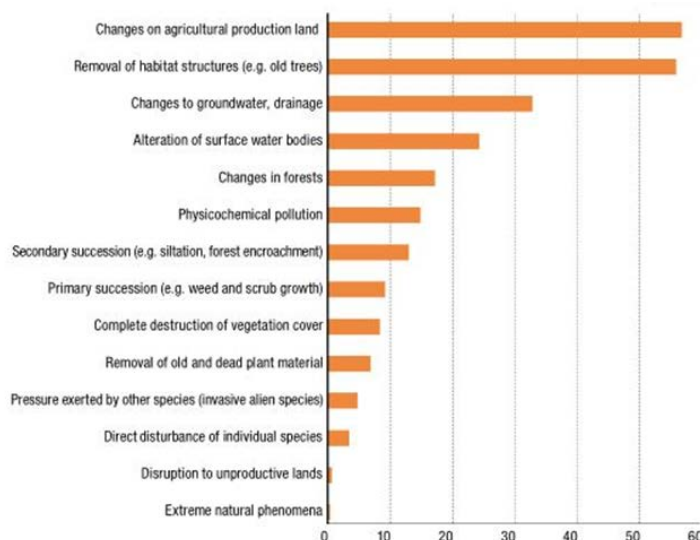


Figure 27: Differentiated analysis of causes of endangerment of Red List species. The analysis covered 633 fungi and lichens, 571 vascular plants and bryophytes, and 594 animals (vertebrates excluding fish, insects, land gastropods and bivalves) on the Red Lists. It included 47 subspecies. A species may be exposed to more than one negative influence⁹⁵

1.3.3 Endemic Species

The list of endemic animal species published in the Fourth National Report (Appendix II, p 113) has been thoroughly revised using the criteria established by Austria,⁹⁶ i.e. taxa with more than 75% of the records within Switzerland, were included into the list.

Some taxa (species and subspecies) were discarded due to new findings, but many more were added thus extending the list from initially 51 taxa to actually presumed 108 taxa. In conclusion, there are significantly more endemic taxa in Switzerland than was previously known. Insects account for the largest share (over 50%), followed by fishes (Salmoniformes), millipedes, molluscs (Clausiliidae, Hydrobiidae and Hygromiidae) and flowering plants.

There are true cavernicole species among Switzerland's endemics, e.g. small crustaceans, pseudo-scorpions, blind beetles. Most cavernicolous species are severely restricted, e.g. wholly to certain caves, or occur in generally similar cave systems of the same region. The cavernicolous species found in Switzerland are probably unique in the world.

⁹⁵ Cordillot F., Klaus G. 2011: Threatened Species in Switzerland. Red List Synthesis Report, Status 2010. Federal Office for the Environment, Bern. State of the environment No.1120: 111 pp. Download: www.bafu.admin.ch/uz-1120-e

⁹⁶ Rabitsch W., Essl F. 2008: Endemiten in Österreich - Selten und schützenswert. Umweltbundesamt Reports Band 0163, Wien, 22p.

1.3.4 Globally Threatened Species in Switzerland

116 taxa composed of 97 species and 19 subspecies have been confirmed by a preliminary assessment in 2011 as having over 50% of their global range restricted to Switzerland. Switzerland has a high responsibility for 57% of the 116 taxa, because they occur predominantly in Swiss habitats and are considered to be threatened or near threatened (Figure 28)!

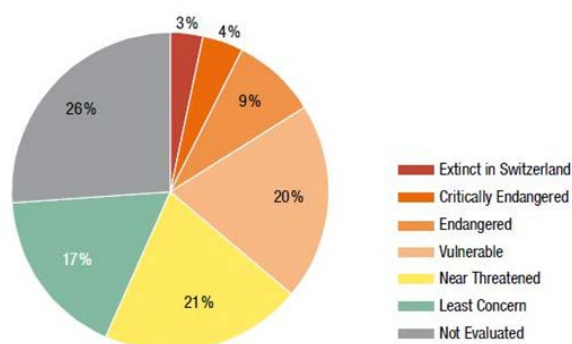


Figure 28: Threat of species predominantly found in Switzerland. Both endemic species and species with more than 50% of their range located in Switzerland⁹⁷

1.3.5 Ex-situ Conservation

Nature and species conservation as well as environmental education are among the key tasks of zoos and botanical gardens.

The six members of the Swiss Zoo Association (Zooschweiz: Basel, Goldau, Gossau, Kerzers, Langenberg, Zürich) collaborate with international partners in breeding programs or stud books for a total of 106 species. They are in charge of maintaining or coordinating the stud books and breeding programmes for the Galápagos tortoise, Hoopoe, Pileated gibbon, Indian rhinoceros, African wild ass, Pygmy hippopotamus, Vicuña, Lesser kudu, New World porcupines and Lowland paca. Various species bred in Swiss zoos were provided for release projects, e.g. Northern bald ibis, Black stork, Bearded vulture, Lion tamarin, Przewalski's horse, European bison, Arabian oryx and the European pond turtle.

The zoos also support field projects. Zoo Basel, for instance, supports the Orang National Park in northern India, and conservation projects for the Okapi in Kongo and the titi monkeys in Peru. The Zoo Zürich supports the Masoala National Park in Madagascar, the Kaeng Krachan National Park in Thailand, and the research station Kuno Wildlife Sanctuary in India. The Papiliorama Kerzers operates - with financial support from Walter Zoo Gossau - the Shipstern Reserve, the Honey Camp National Park and the

⁹⁷ Cordillot F., Klaus G. 2011: Threatened Species in Switzerland. Red List Synthesis Report, Status 2010. Federal Office for the Environment, Bern. State of the environment No.1120: 111 pp. Download: www.bafu.admin.ch/uz-1120-e

Freshwater Creek Forest Reserve in Belize totalling a surface area of 350 km². The Wildnispark Zürich coordinates the release project for the Przewalski's horse in Mongolia and the Natur- und Tierpark Goldau is an active promoter of the release programme for the Bearded Vulture.

Switzerland's botanical gardens and plant collections are organised within the association Hortus Botanicus Helveticus, which cooperates with partners abroad within the International Plant Exchange Network (IPEN). Many botanical gardens are more or less directly linked to universities and closely involved in scientific research, training and awareness raising activities, but also implement national and international projects. In general terms, the botanical gardens support the implementation of action plans for the conservation of plant species (4th national report, chapter 2.3.5). Further, for instance, Les Conservatoire et Jardin botaniques de la Ville de Genève (CJBG) published the African Plant Database that covers around 20% of the plants known today; and the Botanical Garden Bern is involved in restoring ecosystems in the Seeland, a Swiss area dominated by intensive agricultural use. An initiative for establishing a forest reserve in Ecuador was launched by the botanical Garden Basel.

There are various others ex-situ collections in Switzerland that contribute to the conservation of Swiss biodiversity. For instance, the Culture Collection of Switzerland (CCOS) stores a variety of microorganisms from different ecosystems in Switzerland and makes them available for further research and development. The national gene bank at Agroscope Changins-Wädenswil stores around 12'000 plant varieties that are important for food and agriculture (see chapter 1.4).

1.4 Genetic Diversity

Baseline information in the Fourth National Report:

- An overview of genetic diversity: chapter 1.1.3, p. 7 ff.
- Animal and plant genetic resources for food and agriculture: chapter 1.2.4, p. 15 ff.
- Genetic diversity of forest species: chapter 1.3.6, p. 25 ff.
- Genetic diversity of fish species: chapter 1.4.5, p. 35 ff.
- Genetic diversity in mountain ecosystems: chapter 1.6.4, p. 50

The survival and evolutionary opportunities of species and their populations also depend on their genetic diversity. Genetically uniform species face a higher risk of extinction since they are less able to react to the changing environmental conditions. For this reason, the depletion of genetic diversity can result in the extinction of species.

However, it does not take an entire species going extinct for diversity to be diminished: subspecies, breeds or varieties disappearing have the same effect. The risk for this to happen has increased in recent decades, as agriculture has been focusing on cultivating varieties for the sake of optimal relations between yield, health of plants and quality of products under Swiss environment circumstances, and needs of industry and consumers. Breeds and varieties proving to be less profitable, more susceptible to diseases, and/or not requested at the large scale market, have been ousted from productive livestock keeping and commercial growing. For this reason, special efforts are being made to preserve heirloom breeds and varieties and their specific genetic properties.⁹⁸

However, not much is known about the genetic diversity of wild species. Isolated knowledge does exist on the genetic diversity of reintroduced species like the ibex. The progressive fragmentation of habitats is increasingly leading to the isolation and genetic depletion of populations of wild species. The study and conservation of the genetic diversity of wild species should be given special attention in the context of species conservation.⁹⁹

Genetic diversity in the soil is especially valuable and has hardly been studied until now: more than one billion microorganisms, including bacteria, fungi, algae and single cell organisms, live in one gram of soil. Hundreds of thousands to millions of soil animals, such as worms, mites, woodlice and insect larvae, live underneath one square meter of soil. Many medicines, e.g. most antibiotics, are based on the genetic diversity of forms of life in soil.¹⁰⁰

Certain genetic resources used in Switzerland are acquired abroad. For this reason, it is important for industry, research and agriculture that genetic resources be conserved

⁹⁸ Biodiversity Monitoring Switzerland: Indicator Z1 - Number of Livestock Breeds and Plant Varieties, Status 2013. Download: www.biodiversitymonitoring.ch/en/data/indicators/z/z1.html

⁹⁹ Swiss Biodiversity Strategy 2012: In fulfilment of Measure 69 (Objective 13, Art. 14, Section 5) of the Legislature Plan 2007–2011: Development of a Strategy for the Conservation and Promotion of Biodiversity

¹⁰⁰ Swiss Biodiversity Strategy 2012: In fulfilment of Measure 69 (Objective 13, Art. 14, Section 5) of the Legislature Plan 2007–2011: Development of a Strategy for the Conservation and Promotion of Biodiversity

around the world and for access to these resources to be safeguarded abroad. The fair and equitable sharing of benefits arising from the use of genetic resources creates an important basis for this.

1.4.1 Genetic Diversity of Cultivated Plants

The status of conservation of varieties in cultivated plants is assessed within the framework of the National Plan of Action for the Conservation and Sustainable Use of Plant Genetic Resources for Food and Agriculture (NPA-PGRFA¹⁰¹), the national genebank maintained by Agroscope,¹⁰² and the Swiss National Database for the Conservation of plant genetic resources (BDN).¹⁰³ Currently, the fourth phase of the national action plan is being implemented with over 100 projects targeting both ex-situ and on-farm conservation of genetic resources.

The number of varieties of a species addressed within the NPA-PGRFA has further increased since the fourth national report and has reached 2017 varieties. However, the number of varieties existing in Switzerland is likely to be higher than the number indicated in Table 3. On the one hand, varieties that are often used commercially, originate or are maintained in other countries are not entered in the corresponding positive list of the Swiss National Database. For example, the FOAG's report on wine production in 2012 lists 201 different vine varieties, while the vine positive list holds only 135. On the other hand, it cannot be excluded—as a matter of fact, it must be assumed—that positive lists comprise several genetically identical varieties under different names, which will eventually be eliminated after verification. The potato positive list, for one, included 97 varieties in 2009. After verification and adjustment, that number dropped to 34 in 2013. The apple positive list currently includes 1172 varieties in 2013. However, another 1159 apple varieties are in consideration for the positive list and need to be examined.

Table 3: Number of species with accessions included in positive lists in 2013¹⁰⁴

Plant species	Number of varieties
Potatoes	34
Apples	1172
Pears	897
Vines	135
Barley	731
Rye	18
Spelt	285
Wheat	415

¹⁰¹ Office federal de l'agriculture OFAG: Ressources phylogénétiques, www.blw.admin.ch, visited March 2014

¹⁰² Agroscope: Plant Genetic Resources, www.agroscope.ch, visited March 2014

¹⁰³ Swiss National Database for the Conservation of plant genetic resources (BDN), www.bdn.ch, visited March 2014

¹⁰⁴ Biodiversity Monitoring Switzerland: Indicator Z1 - Number of Livestock Breeds and Plant Varieties, Status 2013. Download: www.biodiversitymonitoring.ch/en/data/indicators/z/z1.html

1.4.2 Genetic Diversity of Domesticated Animals

While only a small proportion of the breeds are originally from Switzerland, the country bears particular responsibility for these few breeds. The federal government has set up funding for programmes to promote livestock breeds that have been bred in Switzerland before 1949, and that are considered, by international criteria, to be endangered. Likewise, the government also contributes financially to programmes for Swiss breeds that, even though not acutely endangered at this time, have steadily been dwindling in numbers for several years. In certain cases, Switzerland's particular responsibility is restricted to just one section of a breed. True to its name, the Original Swiss Brown, for example, originates in Switzerland, but nowadays, it only accounts for a minor proportion of Brown Cattle. For this reason, only the Original Swiss Brown section can benefit from federal contributions for conservation programmes.

Until 1999, Switzerland's federal government, the cantons and the breeding organizations were jointly responsible for breeding matters. Since then, the breeding organizations are responsible for all breeding matters. Switzerland's federal government contributes financially to breeders' services offered by recognized breeders' organizations, regardless of breeds.

As a result of common effort, the number of breeds registered in herdbooks has been increasing (Figure 29). Conservation activities are complemented by the efforts of the Swiss NGO Pro Specie Rara, which also focuses on the preservation of rare breeds. Most sheep breeds originating in Switzerland are related by genotype, mainly differing by phenotype. Since the 1930s, many breeds have been merged due to their genetic and phenotypic similarities. The same can be said for goats, particularly the Chamois-coloured goat.

The increase in the number of cattle breeds from 19 to 36 must mainly be attributed to beef breeds.¹⁰⁵

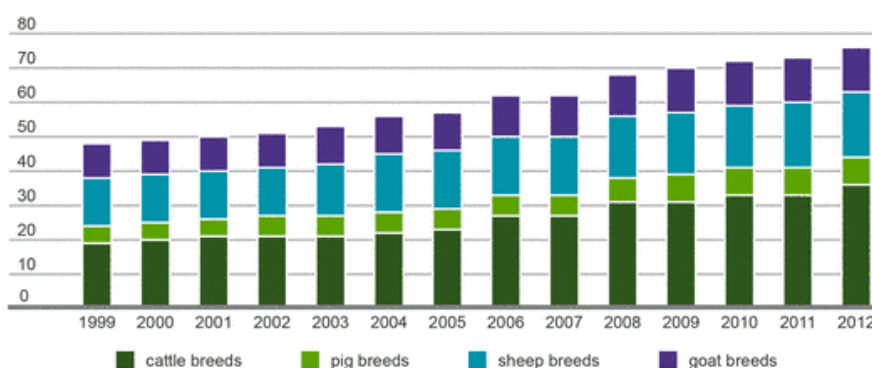


Figure 29: Number of cattle, pig, sheep and goat breeds registered in Swiss herdbooks¹⁰⁶

¹⁰⁵ Biodiversity Monitoring Switzerland: Indicator Z1 - Number of Livestock Breeds and Plant Varieties, Status 2013. Download: www.biodiversitymonitoring.ch/en/data/indicators/z1.html.

¹⁰⁶ Biodiversity Monitoring Switzerland: Indicator Z1 - Number of Livestock Breeds and Plant Varieties, Status 2013. Download: www.biodiversitymonitoring.ch/en/data/indicators/z1.html.

1.5 Threats to Biodiversity

Baseline information in the Fourth National Report:

- Agricultural biodiversity: p. 18 ff.
Invasive alien species in agro-ecosystems (chapter 1.2.7), agriculture and climate change (chapter 1.2.8), agriculture and pollution (chapter 1.2.9)
- Forest biodiversity: p. 27 ff.
Pressures on forest habitats (chapter 1.3.8), invasive alien species in forests (chapter 1.3.9), forest and climate change (chapter 1.3.10), threats to forest biodiversity from pollution (chapter 1.3.11)
- Inland waters biodiversity: p. 36 ff.
Pressure on inland water ecosystems (chapter 1.4.7), invasive alien species in inland water ecosystems (chapter 1.4.8), inland water ecosystems and climate change (chapter 1.4.9), threats to inland water ecosystems from pollution (chapter 1.4.10)
- Dry and subhumid Lands Biodiversity: p. 47 ff.
Pressure on habitats (chapter 1.5.5), invasive alien species in dry and subhumid lands (chapter 1.5.6), dryland ecosystems and climate change (chapter 1.5.7)
- Mountain biodiversity: p. 51 ff.
Pressures on mountain ecosystems (chapter 1.6.6), invasive alien species in mountain ecosystems (chapter 1.6.7), mountain ecosystems and climate change (chapter 1.6.8), threats to mountain ecosystems from pollution (chapter 1.6.9)

1.5.1 Land Use Change¹⁰⁷

Land and waterbodies are important life support system for humans, animals and plants. The construction of housing, roads and factories invariably results in a loss of important habitats and farmland. This is a process that is very difficult to reverse and therefore also affects future generations.

Change in land use between 1985 and 2009 affected no less than 15% of Switzerland's surface area. Particularly affected were the south flanks of the Alps (Ticino and Valais), along with the Geneva-Lausanne and Zurich metropolitan areas. The only large continuous areas that did not undergo variation are located in high Alpine regions (Bernese, Valais and Graubünden Alps). It should be said that, even though the general trend of increased land use persists, the pace of change has slowed down. This applies in particular to settlement and urban areas, which grew by 13 % between 1985 and 1997, but only by 9.2% between 1997 and 2009.

Between 1985 and 2009, the total settlement and urban area expanded by 23.4%, with its proportion of the total surface area in Switzerland rising from 6.0% to 7.5% (Figure 30). Correspondingly, settlement and urban areas per inhabitant increased by approximately

¹⁰⁷ Federal Statistical Office, 2013: Land use in Switzerland - Results of the Swiss land use statistics. 24 pp.
Download: www.bfs.admin.ch/bfs/portal/en/index/news/publikationen.Document.174115.pdf

20 m² to 407 m² (Figure 31). The major proportion of the increase concerned building areas. In keeping with the broad trends in settlement and urban areas, growth in the per-inhabitant variable was more marked between 1985 and 1997 than between 1997 and 2009. The rise in settlement and urban space per inhabitant stemmed from several sources. One was increased personal demand for larger living areas.

Likewise, a 3.1% increase in wooded areas occurred. In contrast, the total area of land devoted to agricultural use shrank by 5.4%. A minor reduction of 1.1% in the total unproductive area was also recorded.

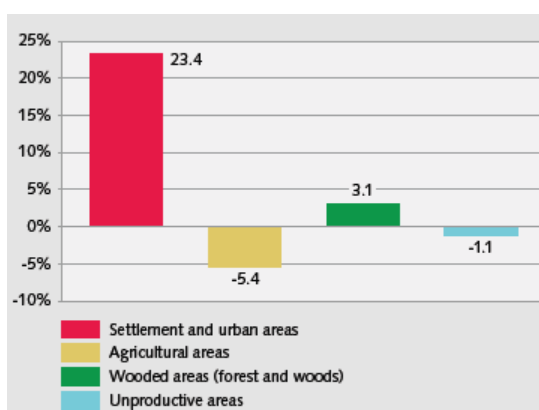
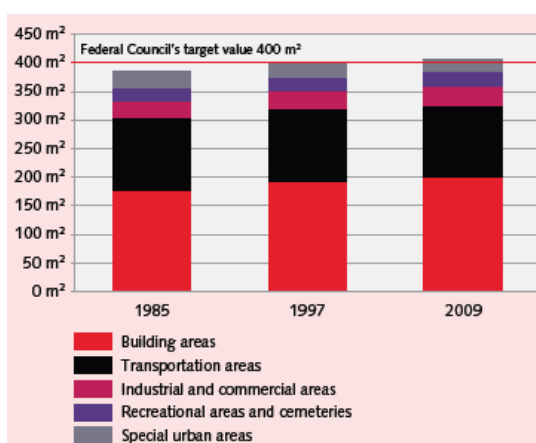


Figure 30: Main land use categories 1985-2009¹⁰⁸

The expansion of settlement and urban areas (Central Plateau, Alpine valleys, Jura and north flank of the Alps) took place almost exclusively to the detriment of agricultural areas at low and intermediate altitudes. Similarly, the increase in wooded area came predominantly at the expense of agricultural area. This change chiefly occurred at high altitudes. A noticeable portion of the expansion of wooded area happened at the expense of unproductive area.



¹⁰⁸ Federal Statistical Office, 2013: Land use in Switzerland. 24 pp. Download: www.bfs.admin.ch/bfs/portal/en/index/news/publikationen.Document.174115.pdf

Figure 31: Settlement and urban space per inhabitant 1985, 1997 and 2009¹⁰⁹

1.5.2 Pollution

Overview on Air Pollutants

The emission levels of most air pollutants have fallen during the past few years:¹¹⁰

- Since 1990, sulphur dioxide (SO₂) emissions have fallen by 80%.
- Particulate matter (PM10) emissions have decreased by 40%.
- Nitrogen oxide (NO_x) emissions have declined by 50%.

Despite of this facts, the atmospheric input of several compounds are still on a high level, generating adverse or detrimental effects on terrestrial and aquatic ecosystems.

Nitrogen oxide pollution: The atmospheric input of nitrogen compounds is a serious problem that affects large areas of Switzerland. High levels of nitrogen in the air cause widespread over-fertilisation of ecosystems, and are especially harmful for forests, meadows and grasslands, alpine pastures and moorlands. Numerous species that have adapted to low-nutrient habitats are thus at risk. 55% of semi-natural ecosystems are being adversely affected by a nitrogen load that exceeds the critical value.¹¹¹ For approx. 90% of the forests the critical loads for nitrogen are exceeded.

Nitrogen compound loads in sensitive ecosystems are still well above tolerance levels. Further measures are necessary, such as applying the "best available technology" standard to vehicles, industrial and agricultural equipment, and heat generators.

Ammonia: High concentrations of ammonia (NH₃) cause damage to vegetation and lead to acidification and over-fertilisation of soil, which is harmful to ecosystems. Ammonia is formed when storing farmyard manure/slurry and when applying it to fields. Agricultural livestock management is the principal source. Ammonia emissions have decreased only slightly since 1990 (Figure 32).¹¹²

Reduction of ammonia emissions is currently receiving major attention in the agricultural sector, and is to be realised by implementing, in the realm of agricultural policy, the air-related environmental goals for agriculture that have been established. (Assessment of the state: negative / Assessment of the trend: negative).

Water pollutants: Inputs of pollutants and nutrients into lakes have declined considerably with the expansion of wastewater treatment facilities and the use of new treat-

¹⁰⁹ Federal Statistical Office, 2013: Land use in Switzerland. 24 pp. Download:

www.bfs.admin.ch/bfs/portal/en/index/news/publikationen/Document.174115.pdf

¹¹⁰ Federal Office for the Environment: Status report on Air Quality; www.bafu.admin.ch, visited February 2014.

¹¹¹ Federal Office for the Environment: Status report on Air Quality; www.bafu.admin.ch, visited February 2014.

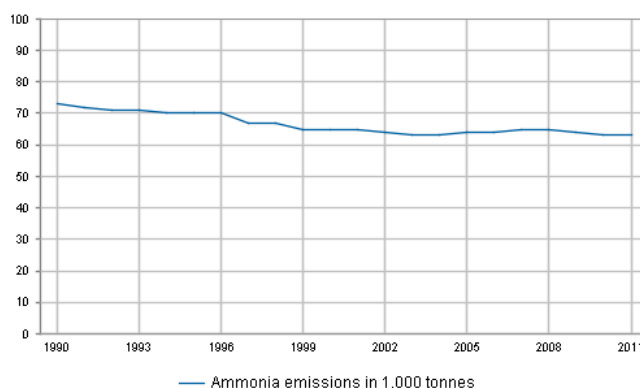
¹¹² Federal Office for the Environment: Environmental state, Indicators; www.bafu.admin.ch, visited February 2014.

ment processes. Phosphorus concentrations have declined markedly since the mid-1970s (Figure 33). However, phosphorus levels remain excessive in certain lakes exposed to inputs from intensive cattle farming or extensive cropping and substances such as pesticides and pharmaceutical residues (micropollutants) are having an increasing impact on water bodies (see chapter 1.2.4). Some of these organic trace elements can have adverse effects on aquatic ecosystems even at very low concentrations. An emerging topic is the microplastic pollution in lakes and rivers. Researchers have detected quantities to raise concern in Lake Geneva. The full extent of their consequences in lakes and rivers is now being investigated.¹¹³

The evidence of artificial pollutants in groundwater shows that, despite improvement in sewage treatment and measures to limit the use of certain substances - especially in agriculture - soil and groundwater ecosystems are not free from artificial contamination with chemical and pharmaceutical residues.

Soil nutrient values: Soils highly loaded with nutrients—particularly nitrogen, phosphorus, and potassium compounds—generally result in a homogenisation of the local plant communities and a decline in plant diversity. Due to their ability to benefit from an overly rich nutrient supply, a small number of species will grow rapidly, displacing weak competitors that prefer soils poor in nutrients.

The indicator "mean soil nutrient values" from Biodiversity Monitoring Switzerland (BDM)¹¹⁴ registers the nutrient supply in Switzerland's soils (Figure 34). Soil nutrient content is highest on arable land, followed by settlement areas. Areas subjected to extensive or no land use - such as alpine pastures or mountain areas - are characterized by lower soil nutrient content. Unsurprisingly, given the rather slow adaptation rate displayed by vegetation, mean soil nutrient values have hardly changed at all within a period of 5 years. An analysis of the changes that have occurred, however, reveals that mean soil nutrient values in forests have increased slightly but significantly. From a biodiversity point of view, low nutrient values are considered to be a good sign.



¹¹³ Faure F., Corbaz M., Baecher H., de Alencastro L. 2012: Pollution due to plastics and microplastics in Lake Geneva and in the Mediterranean Sea. Published in: Arch. Sci., vol. 65, p. 157-164. Download: <http://infoscience.epfl.ch/record/186320>.

¹¹⁴ Biodiversity Monitoring Switzerland, Indicator E6 - Nutrient supply in the soil, status 2013. Download: www.biodiversitymonitoring.ch/en/data/indicators/e/e6.html.

Figure 32: Ammonia emissions. Emissions are determined by multiplying the annual human activity rates by pollutant-specific emission factors. Data are gathered by means of surveys, modelling and calculations¹¹⁵

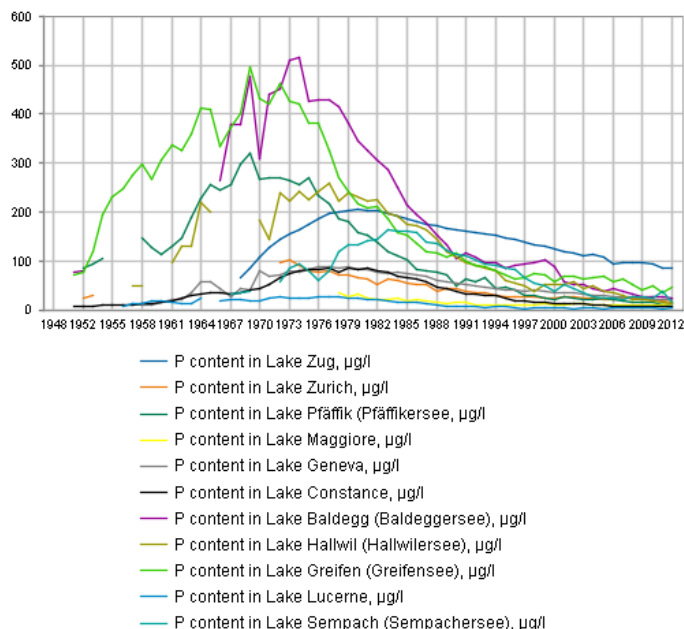


Figure 33: Phosphorus content in lakes (weighted annual average volume of depth profiles or spring circulation levels)¹¹⁶

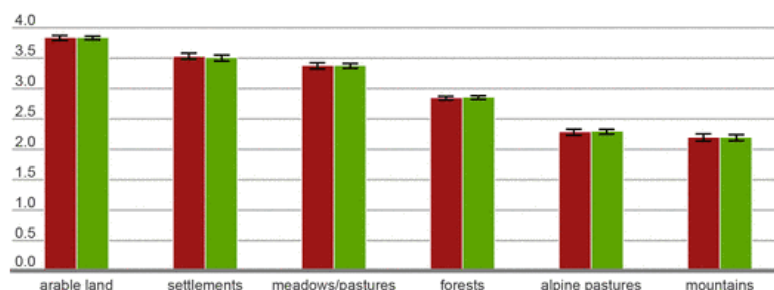


Figure 34: Changes in mean soil nutrient values in Switzerland by types of land use between 2003/07 and 2008/12. “Mountains” represent areas not used for alpine farming (such as scree plant communities, turf, and dwarf shrub heath) excluding glaciers and inaccessible rocks¹¹⁷

1.5.3 Climate Change

A significant rise in temperature is probably the most impressive indicator of climate change in recent decades in Switzerland. Over the entire measurement period from 1864 to 2011, this corresponds to a temperature increase of 1.7 °C. The temperature of

¹¹⁵ Federal Office for the Environment: Environmental state, Indicators; www.bafu.admin.ch, visited February 2014.

¹¹⁶ Federal Office for the Environment: Environmental state, Indicators; www.bafu.admin.ch, visited February 2014.

¹¹⁷ Biodiversity Monitoring Switzerland, Indicator E6 - Nutrient supply in the soil, status 2013. Download: www.biodiversitymonitoring.ch/en/data/indicators/e/e6.html.

the earth's surface in the northern hemisphere rose by 1.1 °C over the same period. It comes as no surprise to learn that 2011 will go down in Swiss history as the warmest year since records began in 1864 (Figure 35). This signal of climate change is also reflected in various climate indicators related to temperature, for example, the number of hotter years, very hot days, tropical nights, and also snow cover in the Central Plateau. As opposed to this, it is not possible to identify a clear trend in relation to precipitation.¹¹⁸

In recent decades, natural assets have modified in response to the changes in the climate and, in particular, the increase in air temperatures. The retreat of the glaciers and the melting of the permafrost frequently illustrate the direct impacts associated with this phenomenon, however the warming effects are being felt in many other environments. Lakes and rivers are heating up (Figure 36), their dynamics are changing and seasonal variations in plant and animal communities are observed.

The phenological spring stages have advanced for Switzerland's plant species. The Swiss spring index, an aggregate of data from various plant species and sites, shows that most plants developed very early over the past 25 years (Figure 38). Also, for a century, the presence of alpine plant species has been increasing on all alpine summits, due to colonisation by low altitude species (Figure 39). According to the forecasts, a milder climate should promote the extension of the distribution areas of some breeding bird species (e.g. the circl bunting). As a matter of fact, an increase in their populations has actually been observed since 1990 (SBI CC+, Figure 37).

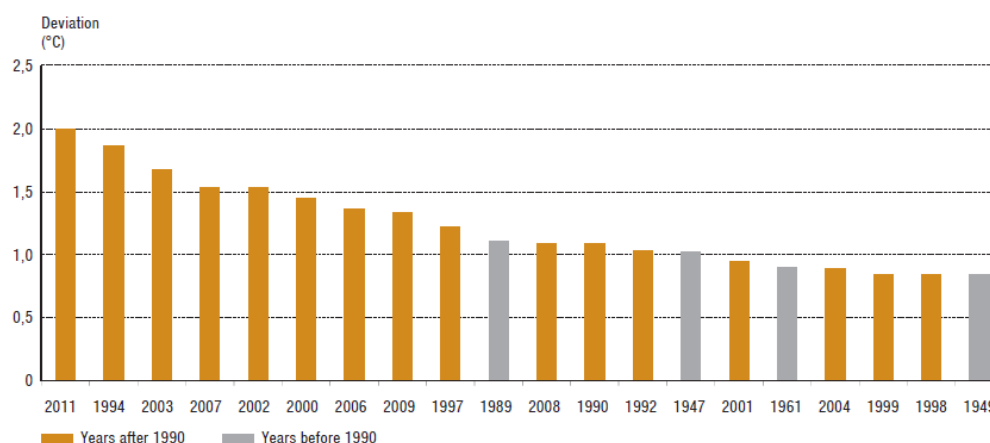


Figure 35: Ranking of the 20 warmest years since 1864. The bars show the deviation of the mean annual temperature from the reference value for 1961-1990 in °C¹¹⁹

¹¹⁸ Perroud M., Bader S. 2013: Klimaänderung in der Schweiz. Indikatoren zu Ursachen, Auswirkungen, Massnahmen. Umwelt-Zustand Nr. 1308. Bundesamt für Umwelt, Bern, und Bundesamt für Meteorologie und Klimatologie, Zürich, 86 S. English summary available: www.bafu.admin.ch/uz-1308-e.

¹¹⁹ Perroud M., Bader S. 2013: Klimaänderung in der Schweiz. Indikatoren zu Ursachen, Auswirkungen, Massnahmen. Umwelt-Zustand Nr. 1308. Bundesamt für Umwelt, Bern, und Bundesamt für Meteorologie und Klimatologie, Zürich, 86 S. English summary available: www.bafu.admin.ch/uz-1308-e.

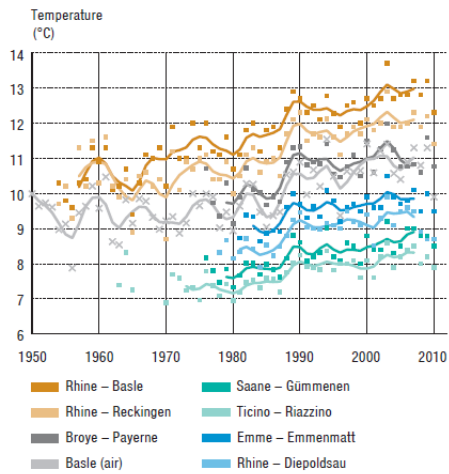


Figure 36: Temperature of water courses¹²⁰

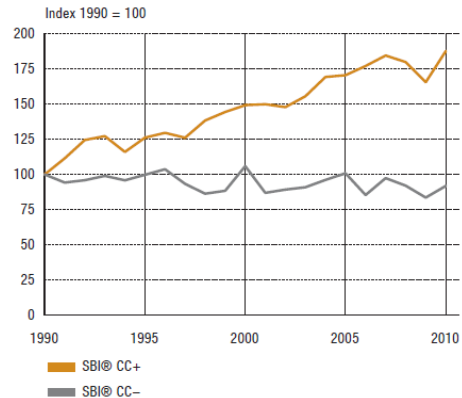


Figure 37: Population of two groups of bird species¹²¹

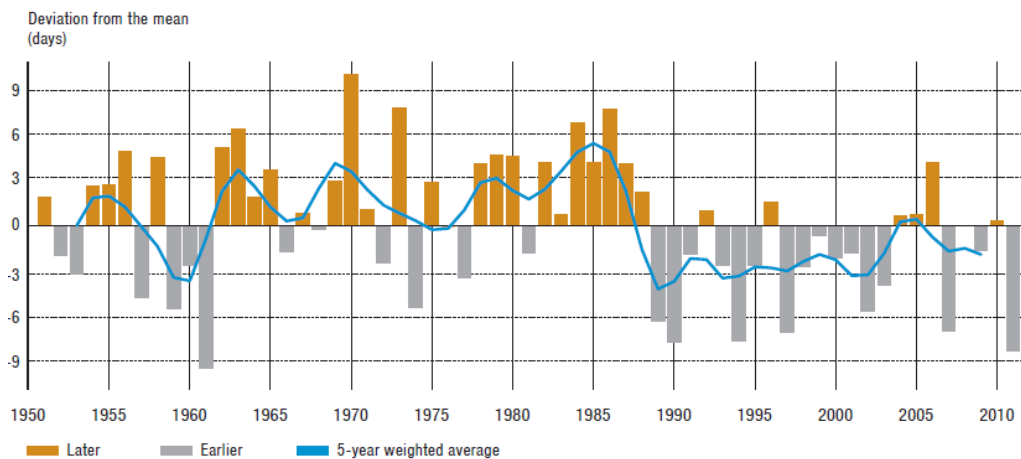


Figure 38: Mean deviation of various phenological spring phases compared to the long-term mean¹²²

¹²⁰ Perroud M., Bader S. 2013: Klimaänderung in der Schweiz. Indikatoren zu Ursachen, Auswirkungen, Massnahmen. Umwelt-Zustand Nr. 1308. Bundesamt für Umwelt, Bern, und Bundesamt für Meteorologie und Klimatologie, Zürich, 86 S. English summary available: www.bafu.admin.ch/uz-1308-e.

¹²¹ Perroud M., Bader S. 2013: Klimaänderung in der Schweiz. Indikatoren zu Ursachen, Auswirkungen, Massnahmen. Umwelt-Zustand Nr. 1308. Bundesamt für Umwelt, Bern, und Bundesamt für Meteorologie und Klimatologie, Zürich, 86 S. English summary available: www.bafu.admin.ch/uz-1308-e.

¹²² Perroud M., Bader S. 2013: Klimaänderung in der Schweiz. Indikatoren zu Ursachen, Auswirkungen, Massnahmen. Umwelt-Zustand Nr. 1308. Bundesamt für Umwelt, Bern, und Bundesamt für Meteorologie und Klimatologie, Zürich, 86 S. English summary available: www.bafu.admin.ch/uz-1308-e.

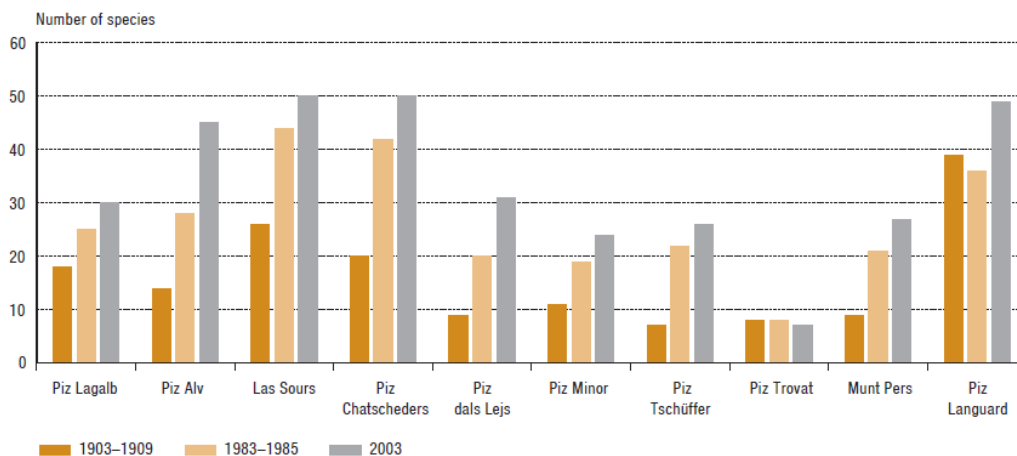


Figure 39: Number of floral species on 10 summits in the Bernina region (Source: Walther et al (2005)¹²³, cited in Perroud & Bader (2013)¹²⁴

1.5.4 Invasive Alien Species

Switzerland's fourth national report specifies the threats to biodiversity by invasive alien species according to agricultural ecosystems (4 NR, chapter 1.2.7), forest ecosystems (4 NR, chapter 1.3.9), inland waters ecosystems (4 NR, chapter 1.4.8), dry meadows and pastures (4 NR, chapter 1.5.6), and mountain ecosystems (4 NR, chapter 1.6.7). The threats posed by alien invasive species have since continued.

An inventory on alien species in Switzerland¹²⁵ lists about 800 established alien species. Information on 107 invasive alien species (IAS) is summarized in separately published fact sheets. They concern five mammals, four birds, one reptile, three amphibians, seven fish, four molluscs, sixteen insects, six crustaceans, three spiders, two "worms", seven fungi, one bacterium, and 48 plants.

With the revision of the Ordinance on the Handling of Organisms in the Environment (Release Ordinance RO; SR 814.911) in 2008, Switzerland created the legal basis for protecting people and the environment against harm done by invasive alien species. According to the Release Ordinance (RO, SR 814.911), the handling of alien organisms in the environment must be carried out in such a manner that it neither endangers human beings, animals or the environment, nor impairs biological diversity, nor the sustainable use thereof. (Art. 15, para. 2). In dealing with alien organisms in the environment, the principles of due diligence, self-control, and the obligation to inform and to instruct recipients have to be applied.

¹²³ Walther G.-R., Beissner S., Pott R. 2005: Climate change and high mountain vegetation shifts. In: G. Broll, B. Keplin B. (eds.), Mountain ecosystems, Studies in Treeline Ecology. Springer, Berlin, Heidelberg, 77–95.

¹²⁴ Perroud M., Bader S. 2013: Changements climatiques en Suisse. Indicateurs des causes, des effets et des mesures. Etat de l'environnement no 1308. Office fédéral de l'environnement, Berne, et Office fédéral de météorologie et de climatologie, Zurich, 86 p. English summary available: www.bafu.admin.ch/uz-1308-e.

¹²⁵ Wittenberg R. (Hrsg.) 2006: Gebietsfremde Arten in der Schweiz. Eine Übersicht über gebietsfremde Arten und ihre Bedrohung für die biologische Vielfalt und die Wirtschaft in der Schweiz. Bundesamt für Umwelt, Bern. Umwelt-Wissen Nr. 0629: 154 S.

In addition, the RO prohibits the use of certain invasive alien plants and of three animal species (Annex 2). These invasive alien organisms may not be handled directly in the environment, except in circumstances where measures to control them are in place. Plants: *Ambrosia artemisiifolia*, *Crassula helmsii*, *Elodea nuttallii*, *Heracleum mantegazzianum*, *Hydrocotyle ranunculoides*, *Impatiens glandulifera*, *Ludwigia* spp. (*L. grandiflora*, *L. peploides*), *Reynoutria* spp. (*Fallopia* spp., *Polygonum polystachyum*, *P. cuspidatum*), *Rhus typhina*, *Senecio inaequidens*, *Solidago* spp. (*S. canadensis*, *S. gigantea*, *S. nemoralis*; except the native *S. virgaurea*). Animals: *Harmonia axyridis*, *Trachemys scripta elegans*, *Rana catesbeiana*.

*Info flora*¹²⁶ - the national data and information centre on the Swiss flora - maintains a **Black List** of invasive alien plant species with adverse effects on biodiversity, public health or the economy; and a **Watch List** with those species that have the potential to cause damage (4 NR, chapter 2.3.4).

Through the revision of the Ordinance on Hunting and the Protection of Wild Mammals and Birds in 2012, the list of non-native mammals and birds that threaten biodiversity and whose import and keeping is prohibited or in need of authorization, has been made more easily adaptable (annex I and II instead of article in ordinance). This allows Switzerland to react more readily to any changes in the threat potential of non-native mammal or bird species.

Special measures, concepts, and strategies are applied additionally to invasive alien species, which are potentially harmful to people (e.g. Concept 2011 for the fight against the Asian Tiger Mosquito *Aedes albopictus*),¹²⁷ threaten native species (e.g. alien crayfish¹²⁸) or which have the potential to cause great economic losses. For instance in forestry, eradication strategies are developed for selected particularly harmful organisms that affect forests or tree cultures (i.e. *Anoplophora glabripennis*, *Dryocosmus kuriphilus*, and *Bursaphelenchus xylophilus*).¹²⁹

¹²⁶ Infoflora - the national data and information centre for the Swiss flora, www.infoflora.ch, visited February 2014.

¹²⁷ Bundesamt für Umwelt 2011: Konzept 2011 für die Bekämpfung der Tigermücke *Aedes Albopictus* und der von ihr übertragenen Krankheiten in der Schweiz.

¹²⁸ Stucki P., Zaugg B. 2011: Aktionsplan Flusskrebse Schweiz. Artenförderung von Edelkrebs, Dohlenkrebs und Steinkrebs. Bundesamt für Umwelt, Bern. Umwelt-Vollzug Nr. 1104: 61 S. Download: www.umwelt-schweiz.ch/uv-1104-d.

¹²⁹ Federal Office for the Environment: Particularly harmful organisms that affect forests, www.bafu.admin.ch, visited February 2014.

1.6 Impacts of Changes in Biodiversity for Ecosystem Services and the Socioeconomic and Cultural Implications of these Impacts

Intact landscapes play an important role in determining how people feel about themselves. The diversity of the natural terrain (geomorphology, topography), climatic conditions, and the types of habitats convey a sense of home. Switzerland is also characterized by its cultural diversity, which is reflected in land use and habitat structure. Today, we still find many elements and inherited structures that reveal the ideas and lifestyles of communities that once lived.¹³⁰ Biodiversity is the basis for economic activity in agriculture and forestry, industry, craft and services such as tourism. Loss of biodiversity jeopardizes its socioeconomic and cultural functions, which can be summarized as follows (chapter 1.1.1):

Biodiversity provides insurance against extreme events:

- Half of our forests protect people, settlements and infrastructure from natural hazards;
- Revitalised watercourses can contribute to limiting flood damages.

Biodiversity is an important economic factor:

- Goods and services produced by agriculture amount to CHF 10.9 billion;
- Fruits and berries accounting for CHF 268 million depend on pollination by honeybees;
- Production value of goods produced by fishery and aquaculture amounts to CHF 36 million;
- The output value of forestry amounts to CHF 857 million;
- Water valued at CHF 2.6 billion is turned over annually for water production and supply;
- 900 million litres of bottled water worth around CHF 700 million are consumed per year;
- Biodiversity offers jobs in agriculture (164'000 people), forestry (4'881 people), and the water sector (2'334 people). Many more jobs are related to biodiversity in up- and downstream processes, research, education, tourism etc.

Biodiversity is important for our mental and physical health:

- Forests' recreational benefits for the Swiss population account for approximately CHF 3.2 billion / year;
- The value of the Swiss landscape for tourism is estimated at around CHF 70 billion;
- Biodiversity is important for recreation: 200'000 people visit the 30 nature protection centres; rivers are an important element of an attractive landscape for 90% of the population; recreational angling is practiced by approximately 100'000 people.

¹³⁰ Federal Office for the Environment: Topic Landscape, www.bafu.admin.ch/, visited February 2014.

We rely on global biodiversity:

- The food imported for consumption in Switzerland increases and reached a share of 44% of total food consumed in our country;
- The vast majority of the fish consumed is imported;
- Genetic resources from abroad are utilized in research and industry;
- Many people go on holiday and enjoy biodiversity abroad;
- Swiss enterprises established abroad rely on ecosystem services and biodiversity in the respective countries.

An assessment among the Swiss population on biodiversity awareness revealed that in 2013, 37% of the population expected to be affected by biodiversity loss. Since the previous study in 2009, the perceived individual concern declined significantly (Figure 40), but if asked more specifically (Figure 41), a growing part of the population feels affected in terms of loss of quality of life (58% of respondents), impacts on health (54% of respondents), increased risk of natural disasters (44% of respondents), and economic consequences (29% of respondents).¹³¹

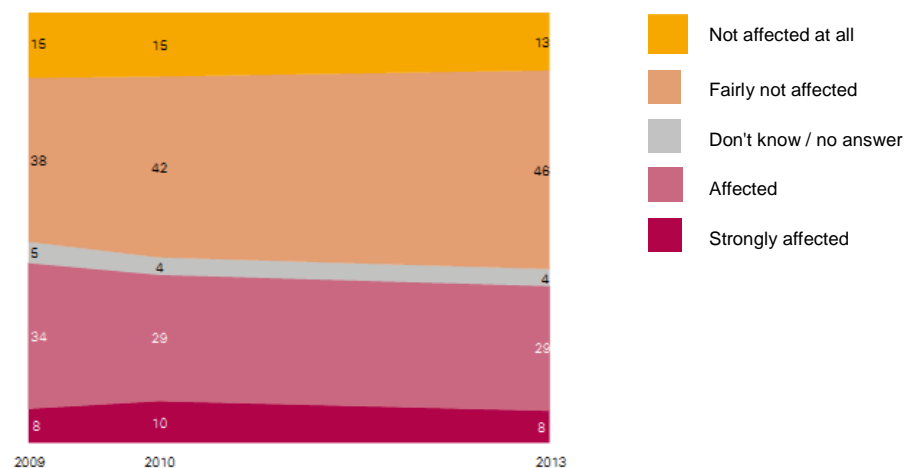


Figure 40: Trends in perceived individual concern regarding biodiversity loss¹³²
 (Do you feel personally strongly affected/fairly affected/ fairly unaffected/ not affected at all by the loss of biodiversity?)

For future assessments of the impact of change in biodiversity for ecosystem services and the socioeconomic and cultural implications of this impact, the Federal Office for the Environment (FOEN) has been developing foundations for welfare-related environmental indicators (chapter 1.1.1 and Box 2). A first set of indicators related to i) health, ii) security, iii) natural diversity, and iv) factors of production, will be further developed and specified in view of an operationalization of the inventory of Final Ecosystem Goods and Services (FECS).

¹³¹ GfS 2013: Studie Biodiversität 2013; download: www.gfsbern.ch > Biodiversität 2013; visited: January 2014.

¹³² GfS 2013: Studie Biodiversität 2013; download: www.gfsbern.ch > Biodiversität 2013; visited: January 2014.

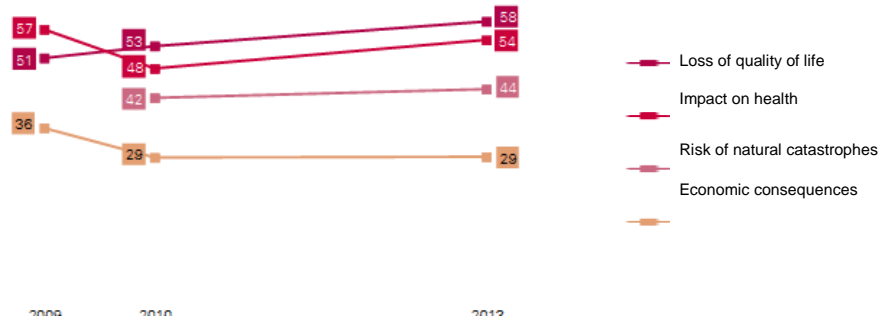


Figure 41: Trend in statements on the consequences of biodiversity loss (% of respondents who fully or mostly agree)¹³³

(I will now read out several statements about possible consequences of biodiversity loss for oneself. Please tell me in each case whether you fully agree, mostly agree, mostly disagree or strongly disagree:

Loss of quality of life, "Because of biodiversity loss, Switzerland loses in quality of life in my opinion."

Impact on health, "The impoverishment of biodiversity has negative effects on my health."

Risk of natural disasters, "Because of biodiversity loss, my personal risk of being affected by a natural disaster increases."

Economic consequences, "The depletion of biodiversity has negative economic consequences for me.")

¹³³ GfS 2013: Studie Biodiversität 2013; download: www.gfsbern.ch > Biodiversität 2013; visited: January 2014.

2 Part II: The National Biodiversity Strategy and its Action Plans (NBSAPs'), its Implementation, and the Mainstreaming of Biodiversity

Baseline information in the Fourth National Report:

- The implementation of the CBD - The general framework: chapter 1.2, p. 55 ff.
- The implementation of the CBD through the legal framework: chapter 2.2, p. 59 ff.
- National action plans and programmes: chapter 2.3, p. 63 ff.
Action plans and programmes on agricultural biodiversity (chapter 2.3.1), on forest biodiversity (chapter 2.3.2), on inland waters biodiversity (chapter 2.3.3), on species in general (chapter 2.3.4), on plant species (chapter 2.3.5), on animal species (chapter 2.3.6), on genetic resources (chapter 2.3.7), national monitoring programmes (chapter 2.3.9), national data (chapter 2.3.10)
- National approach regarding access to genetic resources and benefit sharing: chapter 2.3.8, p. 76 ff.
- National indicators: chapter 2.4, p. 82 & Appendix IV, p. 126
- Sectorial and cross-sectorial integration or mainstreaming of biodiversity considerations: chapter 3, p. 88 ff.

Chapter two of Switzerland's Fourth National Report and the Swiss Information-system Biodiversity SIB (see Box 4) provide a comprehensive overview on Switzerland's approach to the implementation of the Convention and depict the existing legislative, strategic, and programmatic basis (see also Box 7).

In order to avoid duplications with the fourth national report, the present chapter focuses on the further development of Switzerland's framework addressing the conservation and sustainable use of biodiversity, as well as on access to genetic resources, and the fair and equitable sharing of benefits arising from their utilization.

2.1 The Swiss Biodiversity Strategy and its Action Plan

On 18 September 2008, the Swiss parliament responded to the loss of biodiversity and the associated international developments by including the development of a Swiss Biodiversity Strategy in the legislature planning for 2007-2011. In the Federal Council decision of 1 July 2009, the Federal Department of the Environment, Transport, Energy and Communication (DETEC) was mandated with the development of the Swiss Biodiversity Strategy.

On 25 April 2012, the Federal Council adopted the **Swiss Biodiversity Strategy** (SBS), which was developed in light of the global Strategic Plan for Biodiversity and its Aichi Biodiversity Targets, with a special focus on mainstream-

ing biodiversity and on ecosystem conservation.¹³⁴ At the same time, the Federal Council mandated the Federal Office for the Environment (FOEN) with the elaboration, by 2014, of an **action plan**, in order to concretize the objectives of the Swiss Biodiversity Strategy by defining measures to ensure the long-term conservation and promotion of biodiversity in our country. The elaboration of the action plan is developed in a participatory process (chapter 2.1.2).

Box 4: The Swiss Information-system Biodiversity SIB

www.sib.admin.ch

The **Swiss Information-system Biodiversity (SIB)** is Switzerland's contribution to the global network of Clearing-House Mechanisms (CHM) under the Convention on Biological Diversity (CBD).

The documents introduced in the following chapters can be downloaded from the SIB as follows:

- **Swiss Information-system Biodiversity (SIB) > [Documentation](#):** national reports, biodiversity publications, project database "Biosecurity".

The SIB also provides further information on Switzerland's legal, strategic and programmatic framework in its section dedicated to the national implementation of the Convention:

- **Swiss Information-system Biodiversity (SIB) > [Convention on Biodiversity](#) > [National Implementation](#):** legal framework, national biodiversity strategy, strategies and action plans, mainstreaming biodiversity, national reports, national focal points, research database.

2.1.1 Objectives of the Swiss Biodiversity Strategy

In its decision of 1 July 2009, the Federal Council set the overall objective of the Swiss Biodiversity Strategy (SBS) as follows:¹³⁵

“Biodiversity is rich and capable of reacting to change. Biodiversity and its ecosystem services are conserved in the long term.”

¹³⁴ Swiss Confederation 2012: Swiss Biodiversity Strategy. Download: www.bafu.admin.ch/ud-1060-e.

¹³⁵ Swiss Confederation 2012: Swiss Biodiversity Strategy. Download: www.bafu.admin.ch/ud-1060-e.

In order to achieve this overall objective, the survival of native species in their natural ranges must be ensured; the genetic diversity of native wild species, utility breeds and cultivars must be conserved; Switzerland's ecosystems must remain functional and their services guaranteed; and Switzerland must contribute to the safeguarding of global biodiversity.

The elaboration of the Swiss Biodiversity Strategy was based on an intensive engagement with the topic both within the federal administration, and in cooperation with experts from the cantons, the private sector, the scientific community as well as representatives of the relevant interest groups. Ten mutually supportive strategic goals are the cornerstones of the SBS (Box 5). In accordance with the Federal Council's objective, these goals shall be pursued as a common set for the conservation and promotion of biodiversity.

2.1.2 Action Plan on the Implementation of the Swiss Biodiversity Strategy

At the same time as the Swiss Biodiversity Strategy was adopted, the Federal Council mandated the Federal Office for the Environment FOEN with the development of an action plan detailing the steps to achieve each strategic goal of the Swiss Biodiversity Strategy.

In a first phase (January – June 2013) the measures of the action plan were identified and developed in a participatory process with a broad range of concerned stakeholders: Federal ministries, cantonal authorities, municipalities, the scientific community, farmer organizations, NGOs, business organizations, and others. With the active collaboration of over 650 experts from all fields, a first set of 320 potential measures was identified. This broad set of measures was subsequently brought down to around 110 measures. The bottom-up approach adopted was important to support awareness raising and a common understanding among all stakeholders on the one hand, and to ensure that the final measures of the action plan will receive strong support from stakeholders at all levels on the other hand.

In the second phase which began in autumn 2013, measures are being further consolidated and refined and brought to a coherent structure. Financial and legal needs and implications will be assessed and further detailed.

Box 5: The ten strategic goals of the Swiss Biodiversity Strategy

1. Use biodiversity sustainably

By 2020, the use of natural resources and interventions involving them are sustainable, so that the conservation of ecosystems, and their services and of species and their genetic diversity, is ensured.

2. Develop ecological infrastructure

By 2020, an ecological infrastructure consisting of protected and connected areas is developed. The state of threatened habitats is improved.

3. Improve the conservation status of national priority species

By 2020, the conservation status of the populations of national priority species is improved, and their extinction prevented insofar as possible. The spread of invasive alien species with the potential to cause damage is contained.

4. Conserve and promote genetic diversity

By 2020, genetic impoverishment is decelerated and, if possible, halted. The conservation and sustainable use of genetic resources, including that of livestock and crops, is ensured.

5. Evaluate financial incentives

By 2020, the negative impacts of existing financial incentives on biodiversity are identified and avoided, if possible. Where appropriate, new positive incentives are created.

6. Record ecosystem services

By 2020, ecosystem services are recorded quantitatively. This enables their consideration in the measurement of welfare as complementary indicators to gross domestic product, and in regulatory impact assessments.

7. Generate and disseminate knowledge

By 2020, sufficient knowledge about biodiversity is available to society and provides the basis for the universal understanding of biodiversity as a central pillar of life, and for its consideration in relevant decision-making processes.

8. Promote biodiversity in settlement areas

By 2020, biodiversity in settlement areas is promoted so that settlement areas contribute to the connection of habitats, settlement-specific species are conserved, and the population is able to experience nature in the residential environment and in local recreational areas.

9. Strengthen international commitment

By 2020, Switzerland's commitment to the conservation of global biodiversity at international level is strengthened.

10. Monitor changes in biodiversity

By 2020, the monitoring of changes in ecosystems and in species and genetic diversity is ensured.

Source: Swiss Confederation 2012: Swiss Biodiversity Strategy. Download: www.bafu.admin.ch/ud-1060-e.

2.1.3 Legislative Amendments for Implementing the Swiss Biodiversity Strategy and its Action Plan

The contents of the biodiversity strategy are primarily based on existing legal provisions. These provisions have basically proven to be effective; however they will have to be adapted in places for the implementation of the strategy. The extent to which legislative amendments are required will be clarified in the context of the action plan. At the same time, as part of ongoing projects with impacts on the legislation, the extent to which the concerns of this strategy can be taken into account will be examined.

Potential legislative amendments are examined in the following areas:

- the designation and guaranteeing of sufficient areas for biodiversity and its inter-connection in the long term;
- the creation of a biodiversity-specific federal planning instrument (sectorial plan or concept) as a basis for the resolution of conflicts of interest and for the exploitation of synergies; this instrument should take particular account of issues concerning ecological connection;
- the obligation of the Confederation and cantons to ensure the functioning connection of protected areas through specific measures (e.g. correspondingly used corridors);
- the possibility for financial promotion of species for which habitat protection is insufficient.

2.1.4 Monitoring of the Implementation of the Swiss Biodiversity Strategy and its Action Plan

It will have to be ensured that the effectiveness of the implementation of the strategy can be monitored. To this end, an interim report shall be compiled by 2017 which will enable adaptations to be made to the implementation work if necessary. An overall evaluation of the implementation and effectiveness of the strategy shall be carried out after 2020. Both the interim report and the overall evaluation will be based on the monitoring of status and trends of biodiversity, according to goal 10 of the Swiss Biodiversity Strategy. The Federal Council and the partners involved in the implementation of the strategy shall be informed of the results of all evaluations.

2.2 Implementation of the CBD through the Legal Framework

The Swiss legal system is a dynamic entity, which is subject to changes according to current policies. Amendments to a new piece of legislation or for an existing act can be initiated by various actors, such as individual members of the electorate, interest groups, members of parliament, or sections of the administration, cantons or the Federal Council.

The FOEN published a Brief Guide to Swiss Environmental Law which provides an overview of the wide range of Swiss environmental legislation developed over the decades. A comprehensive view of national and relevant inter-

national legislation and the interdependencies between the two is presented.¹³⁶

Bringing in new legislation is a complex and at times protracted business. The process takes at least twelve months, but it can take longer. However, the number of new acts has significantly increased in recent years. On average, every week sees a new act come into force or an existing act amended.¹³⁷

2.2.1 Legislative Amendments Relevant for Biodiversity since Switzerland's last National Report

During the reporting period, the following acts and ordinances were amended or adopted:

Protection of Nature and Cultural Heritage

- **Ordinance on the Protection of Dry Meadows and Pastures of National Importance** ([SR 451.37](#)). Entered into force for Switzerland on 13 January 2010: The ordinance complements the Federal Act on Protection of Nature and Cultural Heritage ([SR 451](#)) which aims at protecting native animal and plant species, biotopes and habitats of high ecological value, as well as landscapes. The ordinance includes an inventory of dry grasslands of national importance.
- Amendments of the **Ordinance on the Protection of Dry Meadows and Pastures of National Importance** ([SR 451.37](#)). Entered into force for Switzerland on 1 February 2012 and on 1 January 2014. About 30 objects were adjusted or deleted from the inventory, because they were situated in final construction zones before the ordinance entered into force. As compensation, equivalent areas were added to the inventory.
- **Federal Act on the Circulation of Species of Fauna and Protected Flora BGCITES** ([SR 453](#)). Entered into force for Switzerland on 1 October 2013. With the new federal law, the 1973 Convention on International Trade in Endangered Species of Wild Fauna and Flora CITES is implemented in a formal law and the related ordinance (Ordinance on the Circulation of Species of Fauna and Protected Flora VCITES).

Agriculture

- **Agricultural Policy 2014-2017**: The Agricultural Policy is a comprehensive framework consisting of 25 revised ordinances. This framework was adopted by parliament in spring 2013 and was set into force by the Federal Council in October 2013 (Box 6).

¹³⁶ Swiss Environmental Law (2013): A brief guide. Federal Office for the Environment, Bern: 36 pp. Download: www.bafu.admin.ch/ud-1072-e.

¹³⁷ The Swiss Confederation – a brief guide 2013. Download: www.bk.admin.ch/dokumentation/02070/index.html?lang=en.

- Revisions of the **Ordinance on Plant Protection** ([RS 916.20](#)) Entered into force for Switzerland on 1 January 2011, 2012 and 2013. The plant protection ordinance is intended to prevent spread and dissemination of harmful organisms. With the revision, the import of particularly dangerous harmful organisms and products (e.g. packaging materials from raw wood) is regulated.

Forestry – Hunting – Fishery

- Amendments of the **Federal Act on Forests** ([SR 921.0](#)). Entered into force for Switzerland on 1 July 2012. Amendments of the provisions for the obligation to replace forests that have been cleared, and the determination of forest area beyond construction zones. Cantonal authorities may determine - within the framework defined by the Federal Council - how to handle areas newly colonised by forest.
- Amendments of the **Ordinance on Forest** ([SR 921.01](#)). Entered into force for Switzerland on 1 July 2013: Amendments of the implementing provisions for the obligation to replace forests that have been cleared, and supplementation with provisions on the establishment of forest structures and facilities in the forest.
- Revisions of the **Ordinance on Hunting and Protection of Wild Mammals and Birds** ([SR 922.01](#)). Entered into force for Switzerland on 15 July 2012 and on 1 January 2014. The ordinance refers to the act on hunting ([SR 922.0](#)) and concerns the protection of wild mammals and birds. The revision includes the extension of the possibilities for particular regulation of wildlife causing major damage or serious threats, the support of herding dogs and of measures for the protection of bee colonies, the preventive provision against the release of problematic, non-native mammal and bird species and the improvement of the protection of wildlife from disturbance by recreational activities.

Protection of the Ecological Balance

- Revisions of the **Federal Act on the Protection of Waters** ([SR 814.20](#)). Entered into force on 1 January 2011, on 1 August 2013 and on 1 January 2014. The revised Waters Protection Act contains provisions for the artificial reinforcement and correction of watercourses, for the rehabilitation of waters, for space provided for waters, and to ensure appropriate residual flow. The revision also includes amendments of the ordinances to the Federal Act on Fishing, on River Engineering, and on Energy.

Box 6: The Swiss Agricultural Policy 2014 - 2017

Strengthening innovation within the agri-food sector, further improving its competitiveness, and fostering public services, are at the core of the Agricultural Policy 2014-2017 (AP 14-17).

The Federal Council developed this agricultural policy according to four main pillars:

1. Safeguarding a competitive food production and ensuring food supply;
2. Effective use of resources and promotion of sustainable consumption;
3. Strengthen vitality and attractiveness of rural areas; and
4. Promotion of innovation and entrepreneurship in the agriculture and forestry sector.

An important element of the AP 14-17 is the further development of the direct payment system (see chapter 1.2.2), targeting a sustainable and effective use of resources. The new system provides direct payments for seven categories of services:

- Cultural landscape contributions for maintaining an open cultural landscape;
- Food supply contributions to ensure food supply for the population;
- Biodiversity contributions to conserve and promote biodiversity;
- Landscape quality contributions for the preservation, promotion and development of diverse cultural landscapes;
- Production system contributions to promote forms of production that are particularly environmentally friendly (e.g. organic and integrated production);
- Resource efficiency contributions for the sustainable use of natural resources; and
- Transition contributions, ensuring that the development of the agricultural policy is socially sustainable.

The reform of the direct payments system included a review of the existing incentive measures for agriculture. Measures impacting biodiversity were removed to some extent. For instance, direct payments for husbandry were phased out. These payments were an incentive for farmers to increase husbandry, leading to an excess of manure on the one hand, and an increase in feed imports on the other.

Within the AP 14-17, the existing moratorium for putting into circulation genetically modified plants and parts of plants, genetically modified seeds and other plant propagation material, and genetically modified animals for agricultural, horticultural or silvicultural purposes, was extended until 2017.

For further information: Federal Office for Agriculture: Agricultural Policy 2014 - 2017 (Politique agricole 2014-2017); www.blw.admin.ch; visited January 2014.

Non-human Gene Technology

- Revision of the **Ordinance on Handling Organisms in Contained Systems** ([SR 814.912](#)). Entered into force for Switzerland on the 1st of June 2012. With the revision of the Containment Ordinance (ContainO), the protection of biological diversity and its sustainable use is included in the objectives. In addition, the ordinance has been extended to certain non-resident organisms for which specific safety requirements are defined.

Convention processes

- **EUROBATS - Agreement on the Conservation of Populations of European Bats** ([SR 0.451.461](#)). The agreement entered into force for Switzerland on 27 July 2013. EUROBATS was set up under the Convention on the Conservation of Migratory Species of Wild Animals (CMS), which recognises that endangered migratory species can be properly protected only if activities are carried out over the entire migratory range of the species. Further information: [Swiss Information-system Biodiversity SIB: Eurobats](#)
- **Memorandum of Understanding Concerning Conservation Measures for the Aquatic Warbler** (*Acrocephalus paludicola*). Signed for Switzerland on 22 November 2011. Further information: [Swiss Information-system Biodiversity SIB: MOU Aquatic Warbler](#)
- **International Tropical Timber Agreement (ITTA)**. ([SR 0.921.11](#)). Entered into force for Switzerland on 7 December 2011. The objectives of the agreement emphasize the importance of sustainable forest management and predictable funding for the international timber trade. Further information: [Swiss Information System Biodiversity SIB: ITTA](#)
- Switzerland has ratified the UNECE **Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters**, usually known as the Aarhus Convention. For Switzerland, the Convention will enter into force on 1 June 2014.

2.3 The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (Nagoya Protocol)

The Nagoya Protocol was adopted in October 2010 at the 10th meeting of the Parties to the CBD. It constitutes a new international legal framework for the utilization of genetic resources and associated traditional knowledge. The Protocol shall secure the implementation of the Convention's third objective, i.e. the fair and equitable sharing of the benefits arising out of the utilization of genetic resources, and therewith contribute to the conservation of global biodiversity and the sustainable use of its components.

The Protocol includes provisions regulating access to genetic resources, the fair and equitable sharing of benefits arising out of their utilisation, as well as compliance measures. A user of genetic resources seeking access to a genetic resource in another country (e.g. to a medical plant to conduct research on substances or for the making of pharmaceuticals), shall comply with access and benefit-sharing (ABS) provisions of the country providing the resource. Further, a contract shall be drawn up which gives access to the provider of a genetic resource, to a fair and equitable participation in the benefits arising from the utilisation of this resource (e.g. assets, technologies, knowledge, etc.). Moreover, the Nagoya Protocol also includes provisions with regard to traditional knowledge of indigenous and local communities associated with genetic resources.

The ratification procedure

Switzerland signed the Nagoya Protocol on 11 May 2011 in New York. The Federal Office for the Environment, in consultation with other relevant offices, stakeholders and the public elaborated a ratification message to the parliament, including draft legal ABS-measures in the Federal Act on the Protection of Nature and Cultural Heritage. The Federal Council adopted the ratification message with the draft legal ABS-measures on the approval of the Nagoya Protocol as on 10 April 2013. The Swiss parliament approved the Nagoya Protocol and its implementation in the Federal Act on the Protection of Nature and Cultural Heritage on 21 March 2014. The decision is subject to an optional referendum.

2.3.1 The Implementation of Access and Benefit-sharing and of the Nagoya Protocol in Switzerland

Since the adoption of the Bonn Guidelines on Access and Benefit-Sharing (ABS) Switzerland is working towards the implementation of the third objective of the CBD in order to support the conservation of biological diversity and the sustainable use of its components globally. Switzerland supported the development of a number of voluntary approaches to this end, such as the ABS-Management Tool,¹³⁸ the ABS Good Practices and an awareness-raising programme for academic research,¹³⁹ the accession of the major Swiss botanical gardens to the International Plant Exchange Network, ABS-standards in the Culture Collection of Switzerland, etc. Switzerland also ratified and implemented the International Treaty on Plant Genetic Resources for Food and

¹³⁸ ABS Management Tool - Best Practice Standard and Handbook for Implementing Genetic Resource Access and Benefit-Sharing activities, 2012. Download: www.sib.admin.ch/en/nagoya-protocol/abs-management-tool/index.html

¹³⁹ Swiss Academy of Sciences: Access to Genetic Resources and Benefit Sharing & Non-Commercial Academic Research, <http://abs.scnat.ch/>, visited March 2014

Agriculture¹⁴⁰ and introduced a disclosure of source requirement for patents inventions directly based on genetic resources or on traditional knowledge in the Swiss Patent Act (PatA, SR. 232.14).¹⁴¹

The measures introduced after the adoption of the Bonn Guidelines will continue to play an important role in implementing ABS in Switzerland. However, the implementation of the Nagoya Protocol in Switzerland required further legislative, enforcement and other measures. These must, first, ensure compliance with domestic regulatory requirements on ABS of other parties, as well as benefit sharing; second, ensure collection of information about the utilised genetic resources or the associated traditional knowledge, and provide information about the applicable ABS regulatory requirements; third, enable the regulation of ABS for domestic genetic resources; and fourth, strengthen international cooperation and collaboration in matters related to ABS.

Main features of the necessary amendments to of the Federal Act on the Protection of Nature and Cultural Heritage:

In Switzerland, genetic resources and associated traditional knowledge are utilised in research as well as in several economic sectors. Consequently, the obligations of the Nagoya Protocol affect diverse areas of regulation. To cover them through universal provisions rather than having to legislate in all relevant areas, the Federal Act on the Protection of Nature and Cultural Heritage (NCHA) has been amended by adding a new Section 3c, dealing with the issue of genetic resources. With the amendment of the NCHA, Switzerland introduced three regulatory improvements.

The first is a due **diligence requirement**. It ensures that whoever utilises genetic resources or associated traditional knowledge, or whoever benefits directly from their utilisation (as defined by the Nagoya Protocol), complies with the domestic regulatory requirements of other Parties to the Protocol, and establishes mutually agreed terms for the fair and equitable sharing of the benefits.

The second is a **notification requirement**. It says that compliance with the due diligence requirement shall be notified to a centralized checkpoint at the Federal Office for the Environment (FOEN) before market authorisation of products developed on the basis of utilised genetic resources or, if such authorisation is not required, before the commercialisation of the same. Moreover, Switzerland will designate further “checkpoints” to supervise compliance with the notification requirement.

¹⁴⁰ Swiss InformationSystem Biodiversity SIB: International Treaty on Plant Genetic Resources for Food and Agriculture ITPGRFA, www.sib.admin.ch, visited March 2014.

¹⁴¹ An English translation provided for information purposes is available here: http://www.admin.ch/ch/e/rs/c232_14.html

The third is the introduction of the **opportunity for regulating access to and benefit sharing of Switzerland's own genetic resources**, and for supporting the conservation and sustainable use of these resources.

The due diligence and the notification requirements also apply to the utilization of traditional knowledge associated with genetic resources, as long as this knowledge is not yet freely available to the public. However they will only apply to access to genetic resources in other Nagoya Protocol countries that took place after the entry into force of these new requirements. Finally there has also been an amendment of the enforcement measures and penalties.

Further information: Swiss Information System Biodiversity (SIB) > Nagoya Protocol > [Ratification of the Nagoya Protocol](#)

2.4 National Action Plans and Programmes

The action plans and programmes listed in Switzerland's Fourth National Report are still valid, whereas the Swiss National Forest Programme was further developed (see chapter 2.4.3) and approved by the Federal Council in 2011. During the reporting period, the following action plans and programmes were adopted:

2.4.1 Overarching Strategies and Action Plans on Cross Cutting issues

*Adaptation to climate change in Switzerland: goals, challenges and action areas*¹⁴²

On 2 March 2012 the Federal Council adopted the first part of its strategy of "adaptation to climate change in Switzerland".

With this adaptation strategy, the Federal Council sets the framework for a coordinated approach to adaptation to climate change at the federal level.

The adaptation strategy consists of two parts. The first part includes goals, challenges and areas of action in adapting to climate change. The aim of the adaptation strategy is to allow Switzerland to take advantage of the opportunities of climate change, to minimize risks, and to increase the adaptability of natural and socioeconomic systems. The second part consists of an action plan which is currently being elaborated in a participatory way.

*Action Plan Green Economy*¹⁴³

The Federal Council adopted a report on green economy in March 2013, which includes an action plan. The outline of the action plan highlights that

¹⁴² FOEN (ed.) 2012: Adaptation to climate change in Switzerland. Goals, challenges and fields of action. First part of the Federal Council's strategy. Adopted on 2 March 2012. Federal Office for the Environment, Bern: 64 p. Download: www.bafu.admin.ch/ud-1055-e

¹⁴³ OFEV: Plan d'action Economie verte 2013, <http://www.bafu.admin.ch>, status February 2014

existing policies (such as energy, climate, and land use planning policy) already make very important contributions to the reduction of environmental pollution, but also that the efficiency of the use of resources still needs to be significantly increased, particularly regarding raw materials and consumer products.

*Sustainable Development Strategy 2012-2015*¹⁴⁴

Ever since 1997, the Federal Council has set out its sustainable development policies in a formal Sustainable Development Strategy. The new strategy, which was adopted by the Federal Council as part of the Report on Legislative Planning for 2011-2015, defines areas of focus for the next four years, e.g. protecting the climate and managing natural hazards, ensuring sustainable spatial planning, using natural resources sustainably and taking responsibility for global developmental and environmental challenges. These areas are further determined in the revised action plan.

Furthermore, the strategy represents an important contribution on the part of Switzerland to the UN Conference on Sustainable Development (Rio+20), which took place in Brazil in June 2012. In the interest of continuity, the five guidelines have been taken from the preceding strategy for 2008-2011.

*Forest Policy 2020. Visions, goals and measures for sustainable forest management in Switzerland*¹⁴⁵

The Swiss Confederation's Forest Policy 2020 formulates provisions for the optimal coordination of the ecological, economic and social demands on forests. It ensures sustainable forest management and creates favourable conditions for an efficient and innovative forestry and wood industry. The Forest Policy 2020 was approved by the Federal Council in 2011 and defines a total of eleven policy objectives. These concern wood harvesting potential, climate change, protective forest, biodiversity, forest area, the economic efficiency of the forestry sector, forest soil (including drinking water and tree vitality), protection against harmful organisms, the forest-wildlife balance, the leisure and recreational use of forests, and education and research (including knowledge transfer). The Forest Policy 2020 formulates several strategic guidelines and various measures for each objective. The primary responsibility for these measures lies with the federal authorities; however, the role of the cantons and other actors is also addressed (forest owners, managers, forestry experts, associations etc.). Finally, the legal and financial impacts of the Forest Policy 2020 are also presented.

Under the Forest Policy 2020, a practical guideline is under development for approval by FOEN, planned for 2014/15. This guideline further specifies the

¹⁴⁴ ARE: Sustainable Development Strategy 2012-2015, <http://www.aren.admin.ch>, status February 2014

¹⁴⁵ FOEN (ed.) 2013: Forest Policy 2020. Visions, objectives and measures for the sustainable management of forests in Switzerland. Federal Office for the Environment, Bern: 66 p.
Download: www.bafu.admin.ch/ud-1067-e

implementation of the objectives for conservation and enhancing forest biodiversity in the framework of the Forest Policy 2020 as well as of the action plan of the Swiss Biodiversity Strategy.

*Landscape Strategy FOEN*¹⁴⁶

With its Landscape Strategy, the Federal Office for the Environment FOEN serves as centre of excellence for the national landscape policy, illustrating the strategic goals of an integrated landscape policy. The actual strategy is to update the strategic agenda of the Swiss Landscape Concept and the Concept 2020 (see 4th National Report, chapter 2.3).

Four main directions are defined: I) sustainable and landscape-friendly design of the federal government's activities, II) support of valuable landscapes, III) support of a coherent landscape policy provided by responsible governmental and administrative units, and IV) securing and improving the landscape services.

*Strategy for the energetic use of biomass in Switzerland*¹⁴⁷

In accordance with the superior biomass strategy, the biomass energy strategy defines the most important principles and goals for the energetic utilisation of biomass in Switzerland and points out fields of action and instruments for implementation.

From a biodiversity point of view, the following two objectives are of particular importance: The use of biomass for energy production shall avoid negative impacts on food production and biodiversity, and the use of biomass for energy production should lead to an improved environmental performance when compared to the use conventional technologies.

2.4.2 Action Plans and Programmes on Agricultural Biodiversity

*Climate strategy for agriculture*¹⁴⁸

The goal of the strategy is the reduction of greenhouse gas emissions from agriculture, of at least one-third compared to 1990, by 2050. To achieve this goal, measures are defined, regarding animal production, use of fertilizers, soil management, energy efficiency, energy production, erosion, drought, and harmful organisms (FOAG, 2011).

¹⁴⁶ OFEV : Stratégie paysage de l'OFEV. Berne, octobre 2011. Version française relue/adaptée 19 décembre 2012. Office fédéral de l'environnement, Berne. 25 p. Download: <http://www.bafu.admin.ch>

¹⁴⁷ OFEN (ed.) 2010: Stratégie énergétique suisse en matière de biomasse. Stratégie pour l'utilisation énergétique de la biomasse en Suisse. Version 2.0, du 28.09.2010. Office fédéral de l'énergie, Berne. 24 p. Download: <http://www.bfe.admin.ch>

¹⁴⁸ OFAG (ed.) 2011: Stratégie Climat pour l'agriculture. Protection du climat et adaptation au changement climatique pour une agriculture et une économie alimentaire suisses durables. Version 31. mai 2011. Office fédéral de l'agriculture, Berne. 48 p. Download: <http://www.blw.admin.ch>

2.4.4 Action Plans and Programmes on Forest Biodiversity

*Concept on handling biotic threats to forests*¹⁴⁹

With the participation of relevant stakeholders and with external technical support, the integrating concept on handling biotic threats to forests was developed according to a study commissioned by the FOEN and the FOAG.

The goal of the strategy is to protect forests against the introduction of particularly dangerous and harmful organisms. The infestation and spread of harmful organisms shall not exceed the accepted measure in terms of forest services. The strategy adopts a threefold approach, including i) measures to prevent the introduction and spread of harmful organisms, ii) measures to contain the spread of harmful organisms and, iii) measures for setting a conducive framework (i.e. legal framework, international cooperation and research, coordination, instruments supporting implementation, education and awareness raising).

2.4.5 Action Plans and Programmes on Inland Waters Biodiversity

*Concept for the avoidance of the use of peat*¹⁵⁰

In Switzerland, peat extraction has been banned since 1987, but each year, up to 150,000 tonnes of peat are imported. The Federal Council wants to ban the use and import of peat and therefore adopted a concept in December 2012, which proposes a two step approach. In a first phase, it is foreseen to reduce the use of peat in Switzerland through the implementation of voluntary measures, including the strengthening of research activities if appropriate. If the use of peat cannot be banned during the first phase, the second phase will explore the introduction of trade policy measures such as a ban or restrictions on imports.

2.4.6 National Species Action Plans, Programmes and Priorities

*Swiss List of National Priority Species*¹⁵¹

The Swiss List of National Priority Species comprises 3606 species from 21 different groups of organisms, including vertebrates, invertebrates, plants, fungi and lichens. Priorities for conservation have been determined by experts, based on the degree to which the species is threatened and the responsibility Switzerland has for this particular species at an international level.

¹⁴⁹ IC Infraconsult AG (ed.) 2011: Plan de gestion des menaces biotiques sur les forêts. Etude mandatée par l'Office fédéral de l'environnement OFEV et par l'Office fédéral de l'agriculture OFAG, Berne. 58 p. Download: <http://www.bafu.admin.ch>

¹⁵⁰ Rapport du Conseil fédéral en réponse au postulat 10.3377 Diener Lenz « Plan d'abandon de la tourbe » 2012.

¹⁵¹ OFEV 2011 (ed.): Liste des espèces prioritaires au niveau national. Espèces prioritaires pour la conservation au niveau national, état 2010. Office fédéral de l'environnement, Berne. L'environnement pratique n° 1103: 132 p. Download: www.bafu.admin.ch/uv-1103-f

*Species Conservation Plan*¹⁵²

The Swiss Species Conservation Plan defines a national strategy for the conservation of native species by defining objectives, principles and twenty measures. The conservation plan provides the basis for the elaboration of measures for the action plan for the implementation of the Swiss Biodiversity Strategy (see chapter 2.1.2).

The Swiss Species Conservation Plan addresses native and wild species of plants, animals and fungi. It assumes that all species must be preserved in their natural range. The Swiss List of National Priority Species (see above) specifies those species in need of priority conservation activities. Further, the species conservation plan also assumes that widespread species shall not become scarce. This risk is addressed by indicating how species requirements are to be taken into consideration within other sectorial policies.

The Red List Programme

A report compiling and assessing the existing Swiss red lists of endangered plants, animals and fungi was published by the FOEN (see chapter 1.3.2). During the reporting period, the following red lists were published or updated:

*Red List mayflies, stoneflies and caddisflies*¹⁵³

43% of mayflies, 40% of stoneflies and 51% of caddisflies found in Switzerland are included in the Red Lists of threatened species on the basis of the International Union for the Conservation of Nature (IUCN) criteria. These represent a total of 47% of the 499 evaluated species, for which sufficient data are available; a further 15% (71 species) are near threatened. The most severely threatened species are those found in rivers located on plains (river straightening, altered water flow dynamics, water quality) and, in part, also in small lakes and ponds and in meadow creeks (pollutant contamination, unnatural conditions).

*Red List of threatened Characeae*¹⁵⁴

The red list of threatened Characeae 2010 is the first list of endangered macroalgae published in Switzerland. It contains a list of all Characeae identified on Swiss territory, classified by category of threat according to the IUCN criteria. Of 25 species identified in Switzerland to date, four species are re-

¹⁵² OFEV (ed.) 2012: Plan de conservation des espèces en Suisse. Office fédéral de l'environnement OFEV, Berne. 64 p. Download : www.bafu.admin.ch/conservation-especes

¹⁵³ Lubini V., Knispel S., Sartori M., Vicentini H., Wagner A. 2012: Listes rouges Ephémères, Plécoptères, Trichoptères. Espèces menacées en Suisse, état 2010. Office fédéral de l'environnement, Berne, et Centre Suisse de Cartographie de la Faune, Neuchâtel. L'environnement pratique n° 1212: 111 p. Download: www.bafu.admin.ch/uv-1212-f

¹⁵⁴ Auderset Joye D., Schwarzer A. 2012: Liste rouge characées. Espèces menacées en Suisse, état 2010. Office fédéral de l'environnement, Berne, et Laboratoire d'Ecologie et de Biologie Aquatique de l'Université de Genève. L'environnement pratique n° 1213: 72 p. Download: www.bafu.admin.ch/uv-1213-f

gionally extinct (RE), four are critically endangered (CR), six are endangered (EN), and six are vulnerable (VU). More than 87% of Switzerland's stonewort species with sufficient data were included on the red list, 17% are extinct in Switzerland, and 70% are species at extinction risk and listed in categories CR to VU.

*Red List Breeding Birds*¹⁵⁵

The Red List of threatened breeding birds was revised after ten years, following the guidelines of the International Union for Conservation of Nature (IUCN). It replaces the list of threatened breeding birds in Switzerland published in 2001 by Keller et al., which was also established on the basis of the IUCN criteria. Of the 199 species assessed, the percentage considered threatened has remained stable at about 40%. Almost a quarter of the species was reclassified.

Action Plans for the Conservation of Animal Species

*Swiss Action Plan for the crayfish*¹⁵⁶

The plan for the three crayfish species *Astacus astacus*, *Austropotamobius pallipes* and *Austropotamobius torrentium* describes the framework (i.e. the aims, strategies, measures, protagonists and their roles, etc.) for the conservation of the three native species in Switzerland. Beside conservation measures targeting native species, the action plan also includes measures for controlling the expansion of non-native crayfish species living in the wild.

*Swiss Action Plan for the Common Sandpiper*¹⁵⁷

The action plan describes the national framework for the protection and conservation of this species. The present action plan lists the aims, strategies and measures needed to preserve and favour the common sandpiper, i.e. through habitat improvement and interconnection, or by minimising disturbances. It also describes the underlying organisational and financial principles.

¹⁵⁵ Keller V., Gerber A., Schmid H., Volet B., Zbinden N. 2010: Liste rouge oiseaux nicheurs. Espèces menacées en Suisse, état 2010. Office fédéral de l'environnement, Berne, et Station ornithologique suisse, Sempach. L'environnement pratique n° 1019. 53 p. Download: www.environnement-suisse.ch/uv-1019-f

¹⁵⁶ Stucki P., Zaugg B. 2011: Plan d'action écrevisses Suisse. Programme de conservation de l'écrevisse à pattes rouges, de l'écrevisse à pattes blanches et de l'écrevisse des torrent. Office fédéral de l'environnement, Berne. L'environnement pratique n° 1104: 61 p. Download: www.environnement-suisse.ch/uv-1104-f

¹⁵⁷ Schmid H., Bonnard L., Hausammann A., Sierro A. 2010: Aktionsplan Flussuferläufer Schweiz. Artenförderung Vögel Schweiz. Bundesamt für Umwelt, Schweizerische Vogelwarte, Schweizer Vogelschutz SVS/BirdLife Schweiz, Bern, Sempach und Zürich. Umwelt-Vollzug Nr. 1028: 72 S. Download: www.umwelt-schweiz.ch/uv-1028-d

*Swiss Action Plan for the White Stork*¹⁵⁸

The action plan describes the framework (aims, strategies, measures, protagonists and their roles, etc.) for the protection and conservation of this species in Switzerland. This means preserving and restoring appropriate habitats, creating and connecting new ones, so that the Swiss white stork population can reach 300 breeding pairs (estimated potential) by 2024.

*Swiss Action Plan for the Hoopoe*¹⁵⁹

The action plan describes the national framework (i.e. the aims, strategies, measures, protagonists and their roles etc.) for the protection and conservation of the hoopoe. The goals of the action plan are to stop the decline of the population, to preserve existing habitats and to connect them to a network of new ones, such as richly structured open landscapes and woodlands with a rich supply of large insects and nesting holes.

*Wolf Management Plan (update)*¹⁶⁰

In collaboration with the cantons and concerned stakeholders the FOEN has developed the Wolf Concept which came into force on 21 July 2004 (see 4th National Report, chapter 2.3.6).

Considering the experiences of the first years, the implementation guidelines have been revised, renamed to „wolf plan“, and supplemented with new annexes in 2008. In 2010, annex 6 was revised: It sets new rules for the financing of measures to protect flocks, so that available funds are used as efficiently as possible. Switzerland is currently revising the wolf plan in order to permit regulation of the wolf population under certain circumstances.

*Living with the beaver - Future coexistence with the beaver in Switzerland*¹⁶¹

Two hundred years after its disappearance, the species has again become well established in Switzerland. A large proportion of the watercourses potentially favourable for colonisation are already occupied. With the population increase and higher beaver densities, human-beaver conflicts are potentially increasing too. The report proposes adapted measures for national beaver

¹⁵⁸ Kestenholz M., Biber O., Enggist P., Salathé T. 2010: Plan d'action Cigogne blanche Suisse. Programme de conservation des oiseaux en Suisse. Office fédéral de l'environnement (OFEV), Station ornitho-logique suisse, Association suisse pour la protection des oiseaux ASPO/BirdLife Suisse, Cigogne Suisse, Berne, Sempach, Zurich, Kleindietwil. L'environnement pratique n° 1029: 62 p. Download: www.environnement-suisse.ch/uv-1029-f

¹⁵⁹ Mühlethaler E., Schaad M. 2010: Plan d'action Huppe fasciée Suisse. Programme de conservation des oiseaux en Suisse. Office fédéral de l'environnement OFEV, Station ornithologique suisse, Association Suisse pour la Protection des Oiseaux AS-PO/BirdLife Suisse, Berne, Sempach et Zurich. L'environnement pratique n° 1030: 65 p. Download: www.environnement-suisse.ch/uv-1030-f

¹⁶⁰ Office fédéral de l'environnement OFEV: Gestion du loup, www.bafu.admin.ch, visited March 2014

¹⁶¹ Office fédéral de l'environnement OFEV: Castor, www.bafu.admin.ch, visited March 2014

management and conservation, complementing the "Management plan for the beaver, 2004" (see 4th National Report, chapter 2.3.6).

Switzerland is currently revising the beaver management plan in response to increased conflicts and in order to permit regulation of the beaver population under certain circumstances, e.g. given a considerable threat to settlements or constructions and facilities of public interest despite damage prevention and temporary regulation having been implemented.

*Enforcement aid Forest and Ungulates*¹⁶²

The enforcement aid defines principles for sustainable management in the area of forest and ungulates, and a five-step approach to be taken to forest-ungulates problems. A damage and concept threshold is defined for the impact of ungulates on forest regeneration. If this threshold is exceeded, corresponding measures must be taken. The regulation of ungulate populations is a basic precondition for further measures such as habitat improvement and the reduction of noise-related habitat impacts. Forest ungulates concepts and their implementation constitute the central element of forest ungulates conflict resolution. The enforcement aid is primarily aimed at the cantonal forestry and hunting authorities, however its target group also includes practitioners working on the ground, such as forest wardens, gamekeepers and hunters.

*Guidelines for the application of the Forest and Ungulates Enforcement Aid*¹⁶³

This publication provides basic guidelines for the application of the Forest and Ungulates Enforcement Aid (see above) and collates current knowledge on the topic of forest and ungulates in Switzerland. It has a section containing basic scientific information on the interaction between forest and ungulates, forest dynamics and wildlife biology. The methods section presents and discusses methods for the surveying and assessment of the impact of ungulates on forest regeneration, the surveying of ungulate populations and for habitat improvement, and the reduction of disturbance in wildlife habitats. The final section contains accounts of practical experience in the area of forest and wildlife.

¹⁶² Office fédéral de l'environnement OFEV (éd.) 2010: Aide à l'exécution Forêt et gibier. Gestion intégrée du chevreuil, du chamois, du cerf élaphe et de leur habitat. L'environnement pratique n° 1012. 24 p. Download: www.environnement-suisse.ch/uv-1012-f

¹⁶³ Office fédéral de l'environnement OFEV 2010: Forêt et gibier – Notions de base pratiques. Bases scientifiques et méthodologiques de la gestion intégrée du chevreuil, du chamois, du cerf élaphe et de leur habitat. Connaissance de l'environnement n° 1013. Berne. 232 p. Download: www.environnement-suisse.ch/uv-1012-f

Action Plans on Invasive Alien Species

*Draft implementation guide for the management of risks due to the Asian Capricorn (Anoplophora glabripennis)*¹⁶⁴

The FOEN proposes the draft implementation guide to support cantonal and federal authorities and managers to contain risks from the Asian Capricorn, which can cause heavy damage to deciduous trees. The effectiveness of the draft guide will be reviewed after two years and the guide further developed as appropriate.

The draft guide proposes preventive measures, such as strengthening the control of imports, control of priority host plants in nurseries, the creation of an information platform, increased awareness raising activities and international cooperation. Further, the draft guide enumerates measures to be implemented after having detected an infestation, e.g. information exchange, delimitation of the infested zone and establishment of buffer zones, felling of trees, preventing and other measures. The draft guide also includes measures regarding diagnostics, restoration measures, and an urgency plan.

*Concept 2011 for the fight against the Asian Tiger Mosquito (Aedes albopictus) in Switzerland and the diseases it transmits*¹⁶⁵

The concept and action plan elaborated by the Federal Office for the Environment FOEN, along with the Federal Office of Public Health FOPH and experts from canton Ticino aims at supporting cantonal authorities in combating the Asian Tiger Mosquito - both the affected and potentially affected areas.

So far, no impact on biodiversity caused by the Tiger Mosquito has been recorded in Europe; however, there is a risk that the mosquito could transmit human diseases. To avoid transmissions, preventing of the spread of the mosquito is key. Measures adopted include among others, the establishment of a mosquito identification service, the monitoring and elimination of breeding areas, identification of conflicts of interest, and the provision of technical equipment. These measures targeting the containment of the Tiger Mosquito are accompanied by measures related to public health and to collaboration among stakeholders.

The **action plan for the crayfish** and the **concept on handling biotic threats to forests** mentioned earlier, include measures against the spread of invasive alien species.

A national strategy on invasive alien species is presently in elaboration in collaboration with other federal offices concerned by the issue of invasive

¹⁶⁴ Service phytosanitaire fédéral SPF 2013: Manuel de gestion du risque dû au Capricorne asiatique. Download: www.bafu.admin.ch/uv-1314-f

¹⁶⁵ Office fédéral de l'environnement OFEV, Office fédéral de la santé publique OFSP 2011: Le Concept 2011 sur la lutte contre le moustique tigre (Aedes Albopictus) et les maladies qu'il transmet en Suisse, 44 p. Download: www.sib.admin.ch/uploads/media/23531_01.pdf

alien species, representatives of cantonal authorities and private institutions and organisations.

Box 7: Selected Strategies and Programmes for the Conservation and Sustainable Use of Biodiversity

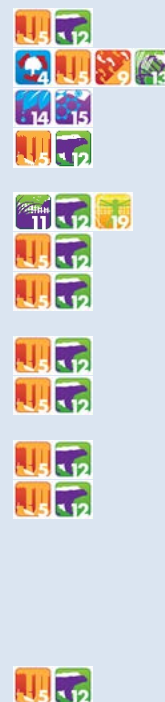
Instruments Promoting the Ecosystem Approach

- Sustainable development strategy and its action plan (4 NR, p. 63; update 5NR)
- Swiss Landscape Concept (4 NR, p. 63)
- Landscape 2020 (4 NR, p.64)
- National ecological network - Réseau écologique national, REN (4 NR, p. 64)
- Parks of national importance (4 NR, p. 65)
- Integrated Water Resources Management (IWRM) Plans (4 NR, p. 69)
- Agricultural policy 2014-2017 (5 NR)



Species Action Plans

- Swiss List of National Priority Species (5 NR)
- Species Conservation Plan (5 NR)
- For the vitality of our fish: A programme in ten points (4 NR, p. 69)
- The Red List programme (4 NR, p. 70, 5 NR)
- Data sheets for the conservation of mosses (4 NR, p. 72)
- Data sheets for the conservation of flowering plants and ferns (4 NR, p. 71)
- Swiss species recovery programme for birds (4 NR, p. 72)
- Management plans for large carnivores (4 NR, p. 73; update in 5 NR)
- Management plan for the beaver (4 NR, update in 5 NR)
- Action and management plans for aquatic fauna (crayfish, common nase (*Chondrostoma nasus*), European bullhead (*Cottus gobio*), grayling (*Thymallus thymallus*), asper (*Zingel asper*), spirlin (*Alburnoides bipunctatus*), souffia (*Leuciscus souffia*), and lamprey (*Lampetra fluviatilis*) (4 NR, 5 NR)
- Action and management plans for birds (Common Sandpiper, White Stork, Hoopoe, 5NR)



Genetic Resources

- National Plan of Action for the Conservation and Sustainable Use of Plant Genetic Resources for Food and Agriculture (NPA-PGRFA, 4 NR, p. 74)
- Swiss National Database for the Conservation of Plant Genetic Resources (4 NR, p. 75)
- Concept for the conservation of livestock breeds



(4 NR, p. 75)	
- Production and use of wild flower seed (4 NR, p. 75)	
- ABS Management Tool (ABS-MT): Update 2012 (5 NR)	
- Swiss Academy of Sciences: Access to Genetic Resources and Benefit Sharing & Non-Commercial Academic Research	
Mainstreaming biodiversity in agricultural ecosystems	
- Ecological compensation/PEP and Natural Resource Programme (4 NR, p. 65)	
- Master plan for arable land (4 NR, p. 66)	
- General environmental objectives for agriculture (4 NR, p. 66)	
- Strategy for the production, conversion and use of biomass in Switzerland (4 NR, p. 67)	
- Climate strategy for agriculture (5 NR)	
Mainstreaming biodiversity in forest ecosystems	
- Forest policy 2020 (5 NR)	
	
- Concept of handling biotic threats for forests (5 NR)	
Mainstreaming biodiversity in inland waters ecosystems	
- Concept for the avoidance of the use of peat (5 NR)	
- Guiding principles for Swiss watercourses (4 NR, p. 68)	
- For the vitality of our fish: A programme in ten points (4 NR, p. 69)	
Mainstreaming biodiversity in sectorial policies	
- Adaptation to climate change in Switzerland: goals, challenges and action areas (5 NR)	
- Action plan Green Economy (5 NR)	
- Strategy for the energetic use of biomass in Switzerland (5 NR)	
- A general overview on the integration of biodiversity considerations into sectorial and cross-sectorial policies is provided in chapter III of Switzerland's Fourth National Report (4 NR)	
Biodiversity monitoring and data	
- National monitoring programmes are introduced in chapter 2.3.9 of Switzerland's Fourth National Report (4 NR)	
- Publicly available data on species diversity, landscapes and georeferenced data are introduced in chapter 2.3.10 of Switzerland's Fourth National Report (4 NR)	

3 Part III: Progress towards the 2015 and 2020 Aichi Biodiversity Targets

Even though the elaboration of the action plan to implement the Swiss Biodiversity Strategy is in progress (see chapter 2.1.2), the priority activities identified so far are not taken into account for the present assessment of the progress towards the implementation of the global Strategic Plan. Further, along with the development of the national action plan, important work regarding the monitoring of the implementation of Switzerland's biodiversity strategy is being conducted.

Against this background, part III of the report highlights successes, partially achieved goals and challenges in implementing the global Strategic Plan, and provides a preliminary assessment towards the Aichi targets as well as information on Switzerland's contribution towards the achievement of the Millennium Development Goals.

3.1 Progress towards the Implementation of the Strategic Plan: Successes, Partially Achieved Objectives and Challenges

3.1.1 Environmental Protection Organisations' Collective Right of Appeal

Environmental protection organisations' collective right of appeal - a success-story of Switzerland's environmental policy - is established as an instrument promoting the implementation of environmental legislation. Art. 12 of the Federal Act on the Protection of Nature and Cultural Heritage (NCHA) grants the right to appeal to non-profit organisations, active throughout Switzerland since at least ten years and concerned with nature protection, cultural heritage protection, monument preservation or related objectives. Similar provisions exist for putting into circulation genetically modified organisms (art 28 GTG) and the planning, construction or modification of installations for which an environmental impact assessment is required (art 55, USG). This right of appeal is applicable only in clearly defined areas, and only to projects subject to an environmental impact assessment (EIA) and to federal projects. Thus, the right to appeal is denied in the case of a significant proportion of projects that could have adverse environmental impacts.¹⁶⁶

Environmental protection organisations' collective right of appeal is usually applied by organisations to examine an administration decision. Only after such an appeal is made, can a court verify if a decision concerning a project which affects nature conservation is in accordance with the law or not.

¹⁶⁶ OECD 2007: Environmental Performance Reviews: Switzerland 2007

A review of environmental protection organisations' right of appeal concluded that:¹⁶⁷

- Environmental organisations make use of the instrument in a cautious and successful way (see Table 4). The right of appeal is there with a cost-effective measure strengthening the implementation of environmental legislation.
- The right to appeal has a preventative effect on projects as environmental aspects are anticipated to avoid lengthy objection procedures. From an environmental point of view, the right to appeal improves the quality of projects.
- The right to appeal promotes consensus by facilitating dialogue between stakeholders.
- The right to appeal is an important instrument promoting public participation and awareness. Indeed, the right to appeal requires a high degree of involvement and volunteer work among the members of the environmental protection organisations.

The right to appeal is an instrument supporting the implementation of all goals of the Conventions' Strategic Plan 2011 – 2020.

Table 4: Annual statistics of completed appeals by environmental protection organisations¹⁶⁸

	Number of Appeals by Environmental Protection Organisations									
	2008		2009		2010		2011		2012	
Appeals:	No.	%	No.	%	No.	%	No.	%	No.	%
Approved	26	50	38	50.7	31	49.2	30	42.5	43	53
Partially approved	6	11.5	8	10.7	6	9.5	9	12.5	8	9.9
Rejected or not treated	6	11.5	14	18.7	14	22.2	18	25.5	18	22.2
Withdrawn after conclusion of an agreement	7	13.5	4	5.3	3	4.8	4	5.5	2	2.5
Withdrawn without conclusion of an agreement	0	0	1	1.3	2	3.2	5	7	2	2.5
Becoming irrelevant ¹	7	13.5	10	13.3	7	11.1	5	7	8	9.9
Total	52	100	75	100	63	100	71	100	81	100

¹ e.g. because of abandonment of the project

¹⁶⁷ Steiger, U. 2000: Quels sont les effets du droit de recours des organisations de protection de l'environnement ? Bern: Office fédéral de l'environnement, des forêts et du paysage.

¹⁶⁸ OFEV: Evaluation et statistiques du droit de recours des organisations, www.bafu.admin.ch, visited October 2013

3.1.2 Forest Reserves

Forest reserves cover an area of 58,000 ha, which corresponds to 4.8% of the Swiss forest area (2012, see also 4 NR, chapter 1.3.4). Thus, the aim of 10% of the forest area having reserve status by 2030 is partially achieved and seems realistic. However, regional differences are quite large (Figure 42) and forest reserves today are not necessarily designated where most threatened forest habitat types and species occur. Total area, density and the average size of the reserves vary considerably between the 14 economic regions of the Swiss National Forest Inventory.

So far, 17 forest reserves of large size (> 500 ha) have been designated, in which the widespread typical forest formations can develop naturally. The objective of establishing 30 forest reserves of large size by 2030 is more than half achieved and seems realistic. Existing forest reserves of large size are concentrated in 7 economic regions. The need of establishing additional ones is recognised for the the Jura mountains (2 economic regions, 0 reserves of large size) and the Swiss Plateau (3 economic regions, 2 reserves of large size). In Jura mountains and on the Swiss Plateau, small reserves dominate – especially on the Swiss Plateau, where more than 90% of the reserves are smaller than 20 ha.¹⁶⁹

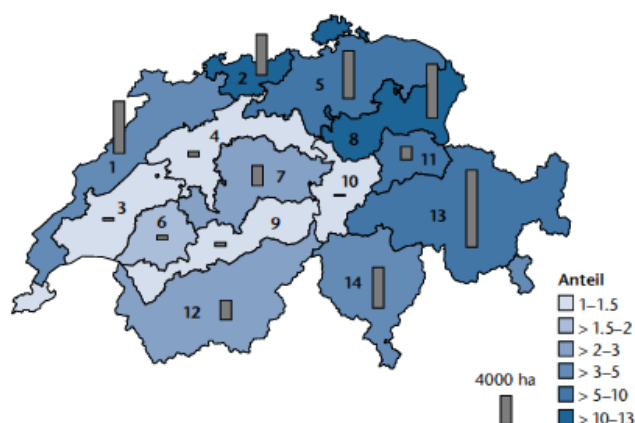


Figure 42: Share of forest reserves in % of the forest area and the total forest reserve area (columns) per economic region (including forest areas in the Swiss National Park)¹⁷⁰

Considering the regionally very different overall status of forests, gaps in the forest reserve network shall be filled in a targeted manner along the following priority activities: 1. Increase in reserve coverage in the deficit regions; 2. Creation of large size natural forest reserves for widespread forest communities; 3. improving the representation of national priority species and forest

¹⁶⁹ Impuls Thun AG 2013: Waldreservate Schweiz. Projekt Auswertung und Interpretation. Schlussbericht. 18. Dezember 2013. Im Auftrag des BAFU.

¹⁷⁰ Bolliger M, Imesch N, R.Schnidrig 2012: Forest reserve policy of Switzerland: stock-taking and prospects from the point of view of the Swiss confederation (essay). Schweiz Z Forstwes 163, 6: 199-209.

communities in the reserve network, and assuring their ecological connectivity.

3.1.3 Awareness and Attitudes towards Biodiversity

The Federal Office for the Environment FOEN, the Swiss Association for the Protection of Birds SVS/BirdLife Switzerland, the Swiss Biodiversity Forum, and the Swiss Ornithological Institute commissioned surveys of the Swiss population regarding perception of, awareness of and attitudes towards biodiversity. The surveys were conducted by the GFS Research Institute Berne in the years 2009, 2010 and 2013.¹⁷¹

The main findings of the latest survey (2013) can be summarised as follows:¹⁷²

- The awareness of the term “biodiversity” increased from 48% (2009) up to 65% (2010) and 67% (2013) of the people questioned (Figure 44). The awareness-raising activities conducted during the international year of biodiversity in 2010 yield a sustainable impact.
- The general public understood biodiversity mostly as a species focused concept or as “nature” in general, which is consistent with “Diversity of Life”, a heading often used for communication purposes (Figure 43).
- A majority of respondents (57%) feels good or very good, 40% fairly informed regarding biodiversity. 34% of respondents would like more information about biodiversity - especially younger people aged up to 39 years.
- Since 2009, the perception that biodiversity in Switzerland is in a good state has grown. Around three-quarters of the respondents believe that the state of biodiversity in Switzerland is good to very good. The perception of biodiversity being in an insufficient state stagnates at a low level.
- Only 37% of the respondents feel personally affected by biodiversity loss when asked on a general level. This value has decreased since 2009. However, if the respondents are asked specific questions, an increasing majority feels affected by biodiversity loss in their quality of life and health (see also chapter 1.6).
- The need to conserve biodiversity is undeniable. Reasons for biodiversity conservation include the (moral) obligation to future generations, the intrinsic value of biodiversity, and biodiversity as the very base of our livelihoods (Figure 1).

¹⁷¹ Further information: An initial survey was conducted in 2005. This survey, however, is based on a different methodology with results not being comparable to those of the surveys conducted in 2009, 2010 and 2013.

¹⁷² GfS 2013: Studie Biodiversität 2013; download: www.gfsbern.ch > Biodiversität 2013; visited: January 2014.

- The willingness to become personally engaged in the conservation of biodiversity remains high, but slightly decreased compared with 2010. As recorded in the earlier surveys, the wording “Nature” results in a slightly higher willingness (3%) to engage as compared to the wording “biodiversity”. This can be attributed to the comparatively new terminology of “biodiversity”.
- The willingness of respondents to engage is highest for gardening and recreational activities for the benefit of biodiversity. Consideration of biodiversity is less pronounced when shopping and even weaker regarding political commitments, and memberships or donations to biodiversity conservation organisations.

3.1.4 Space Requirements for the Conservation of Biodiversity in Switzerland

As described in the fourth national report (chapter 3.1) and summarized in the present one (chapter 1.5.1), land use change is a major threat to biodiversity in Switzerland. The construction of housings, the development of transport infrastructure and intensive agricultural practices have a serious impact on the quantity and the quality of habitats and their biodiversity, thus jeopardizing the perpetuity of ecosystem services.

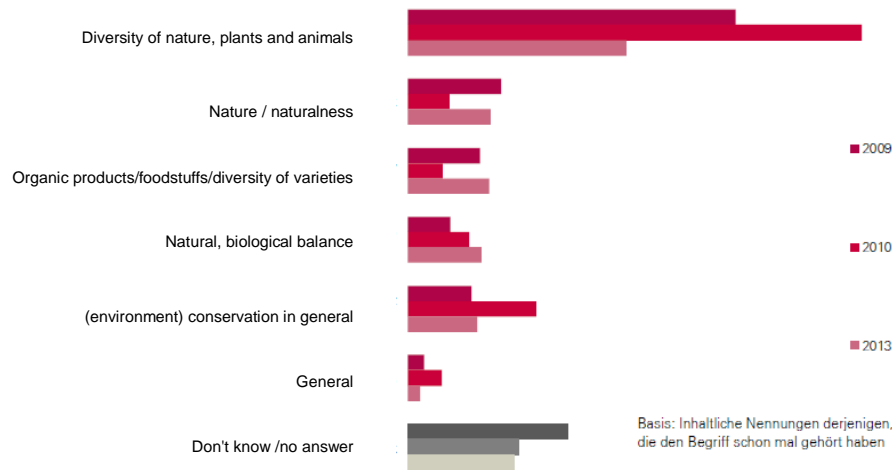


Figure 43: Trends in describing the term biodiversity¹⁷³
 (How would you explain the term biodiversity in simple words?)

The huge losses observed in some ecosystems between 1900 and 2010 (e.g. mires and bogs: -82%, Figure 48) raise questions regarding whether the remaining areas are sufficient to conserve biodiversity in the long term, and regarding the space requirements to do so. The Swiss Biodiversity Forum of the Swiss Academy of Science took up the challenge of answering those complex questions based upon a comprehensive review of literature and an

¹⁷³ GfS 2013: Studie Biodiversität 2013; download: www.gfsbern.ch > Biodiversität 2013; visited: January 2014.

expert survey with some 200 respondents. The study - which does not necessarily reflect the opinion of the federal administration - concluded that the space requirements for the conservation of many ecosystems' biodiversity and ecosystem services in the long run, is significantly higher than their surface areas remaining today. The quality, quantity and interconnection of many habitats are insufficient to safeguard biodiversity and ecosystem services in the long term. The study considers a third of Switzerland's surface being necessary to effectively conserve biodiversity and ecosystem services. On this surface, biodiversity conservation and the promotion of ecosystem services should be the primary objective, with further uses being possible as long as in line with this. The study recommends focusing on the conservation of remaining valuable ecosystems as a matter of priority, but highlights, that this will not be sufficient, and stresses the need for rehabilitation and restoration measures.¹⁷⁴

¹⁷⁴ Guntern J., Lachat T., Pauli D., Fischer M. 2013: Flächenbedarf für die Erhaltung der Biodiversität und der Ökosystemleistungen in der Schweiz. Forum Biodiversité Suisse de l'Académie suisse des sciences naturelles (SCNAT), Berne. Download: www.biodiversity.ch/d/publications/flaechenbedarf_der_biodiversitaet

3.2 Assessment of Progress towards Aichi Targets

3.2.1 Aichi Goal A: Address the Underlying Causes of Biodiversity Loss



Biodiversity awareness

By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.

Relevant CBD indicators (decision XI/3)

- Trends in awareness and attitudes to biodiversity
- Trends in public engagement with biodiversity
- Trends in communication programmes and actions promoting social corporate responsibility

Goal of the Swiss Biodiversity Strategy:

- By 2020, sufficient knowledge about biodiversity is available to society and provides the basis for the universal understanding of biodiversity as a central pillar of life, and for its consideration in relevant decision-making processes.

National indicators:

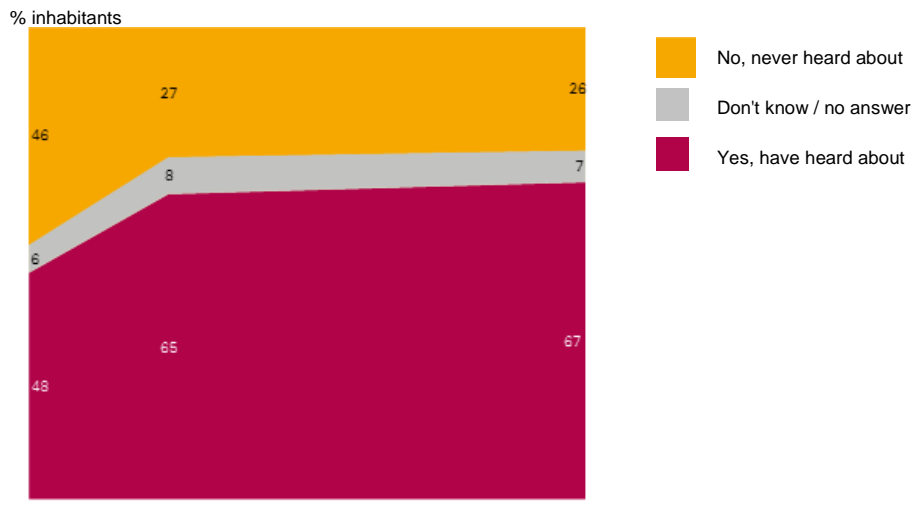


Figure 44: Trend in awareness for the term biodiversity: "In general: Have you ever heard or read about the term 'biodiversity', or is this not the case?" (N = approx. 1'000, Source: GfS 2013)

The indicator shows that the awareness of the term "biodiversity" is increasing in the Swiss population since a first survey conducted in 2009 (Figure 44).

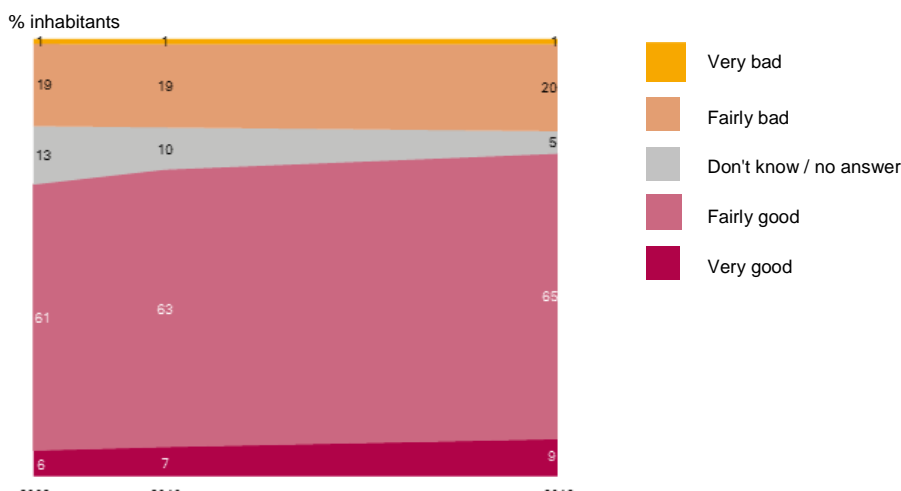


Figure 45: Trend in awareness of the state of biodiversity in Switzerland: "In your opinion, is biodiversity in Switzerland in a very good, fairly good, fairly bad or very bad condition?" (N= approx. 1'000, Source: GfS 2013)

In surveys on the awareness and attitudes of the Swiss population towards biodiversity, a large majority of the respondents estimates Switzerland's biodiversity to be in a fairly or very good state (Figure 45), contrasting with scientific findings such as the Red Lists (Figure 56).

Assessment

As concluded by surveys on the awareness and attitude of the Swiss population towards biodiversity, the Swiss population is increasingly aware of the term biodiversity (Figure 44, 2009: 48%, 2013: 67%). 83% (2013) of the population is aware that there is no human existence without biodiversity (Figure 1). Ecosystem services and biodiversity are generally recognised as the very base of our livelihoods with 83% (2013) of respondents mentioning, among others, economic reasons for the conservation of biodiversity (Figure 1). According to the study GfS (2013), the need to conserve biodiversity, be it for future generations, based on a moral responsibility, or simply for the beauty of nature, is acknowledged (chapter 3.1.3).

In contrast to scientific findings (see chapters 1.2, 1.1 and 1.5), an increasing share of the Swiss population estimates biodiversity to be in a rather or very good state (2009: 67%, 2013: 74%; Figure 45). Further, the share of people feeling affected by biodiversity loss is decreasing (2009: 41%, 2013: 37%; see chapter 1.6, Figure 45) as is the willingness to engage for nature conservation (chapter 3.1.3).

In conclusion, the awareness of the Swiss population for the term biodiversity is increasing; however, significant additional efforts - such as a coordinated awareness raising strategy - are needed to communicate the state of Switzerland's biodiversity and the implications of biodiversity losses.



Integration of biodiversity values

By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.

Relevant CBD indicators (decision XI/3)

- *Trends in number of countries incorporating natural resource, biodiversity, and ecosystem service values into national accounting systems (B)*
- *Trends in number of countries that have assessed values of biodiversity, in accordance with the Convention (C)*
- *Trends in guidelines and applications of economic appraisal tools (C)*
- *Trends in integration of biodiversity and ecosystem service values into sectorial and development policies (C)*
- *Trends in policies considering biodiversity and ecosystem service in environmental impact assessment and strategic environmental assessment (C)*

Objective of the Swiss Biodiversity Strategy:

- By 2020, ecosystem services are recorded quantitatively. This enables their consideration in the measurement of welfare as complementary indicators to gross domestic product and in regulatory impact assessments.

No national indicator

Assessment

Switzerland has a comprehensive strategic and programmatic framework ensuring that biodiversity is integrated in national and local planning processes (4 NR chapter II, 5 NR chapter 2.4 and Box 7). This can be understood as a clear recognition of the intrinsic value of biodiversity or the value in terms of ecosystem services delivered by biodiversity such as the provisioning, regulating, cultural and habitat services depicted in chapter 1.1.2).

However, when addressing the value of biodiversity in monetary terms, the underlying data become scarce and are restricted to singular studies (see chapter 1.1.2). Today, biodiversity is incorporated as a cross-cutting issue into national accounting only in terms of costs.

The inventory of Final Ecosystem Goods and Services (FEGS, chapter 1.1.1, Box 1, Box 2) is a promising approach to integrating biodiversity values in national accounting as well as in planning processes such as environmental impact assessment and strategic environmental assessment.

In conclusion, biodiversity values are acknowledged in terms of policy instruments, but an economic valuation of biodiversity and ecosystem services is nearly entirely lacking. In order to significantly progress towards this Aichi target, significant efforts to further develop existing processes (e.g. FEGS) as well as to promote the development of additional instruments (e.g. national TEEB study) are needed.



Incentives

By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.

Relevant CBD indicators (decision XI/3)

- *Trends in the number and value of incentives, including subsidies, harmful to biodiversity, removed, reformed or phased out (B)*
- *Trends in identification, assessment and establishment and strengthening of incentives that reward positive contribution to biodiversity and ecosystem services and penalize adverse impacts (C)*

Goals of the Swiss Biodiversity Strategy:

- By 2020, the negative impacts of existing financial incentives on biodiversity are identified and avoided, if possible. Where appropriate, new positive incentives are created.
- By 2020, ecosystem services are recorded quantitatively. This enables their consideration in the measurement of welfare as complementary indicators to the gross domestic product and in regulatory impact assessments.

No national indicator

Assessment

Financial incentives are provided and regularly reviewed according to the Federal Act on Financial Aid and Compensations (1990, SR 616.1). The last review of compliance (2008) listed a total of 230 financial aids and compensations. Even though a comprehensive study looking at the pressures on biodiversity and their causes, at all levels, has still not been undertaken, there is a common understanding that some of them impact biodiversity. For instance, the Federal Council acknowledges that the current tax and incentive system may affect climate, air and noise as well as soil and biodiversity. The Federal Council highlights that measures have been decided or are planned, e.g. regarding federal taxes, value added tax, mineral oil tax, international air transport, agricultural policy etc. Further, the Federal Council takes the view that a sectorial approach to incentives having negative impacts is more effective than an overarching framework.¹⁷⁵

In support of the elaboration of the action plan for the implementation of the Swiss Biodiversity Strategy, the FOEN commissioned a study on existing financial incentives (i.e. subsidies) having negative impacts on biodiversity.

¹⁷⁵ Bericht des Bundesrates zur Abschreibung der Motion 06.3190 (Studer Heiner) vom 8. Mai 2006 - Ökologisierung des Steuer- und Subventionssystems.

The study¹⁷⁶ - which does neither necessarily reflect the opinion of the Federal Council nor comprise proposals to reform incentives - identified a set of incentives with potentially negative effects on biodiversity at the national level and recommended further work on specific issues such as the support of touristic infrastructure.

Some progress in phasing out or reforming incentives harmful to biodiversity was achieved in the agricultural sector, but the effect on biodiversity of certain direct payments is still unclear. The reform of incentives is a gradual process that started with anchoring the multifunctional role of agriculture in the constitution (art. 104, 1996), and which influenced the development of the agricultural policy 2014-2017. For instance, direct payments for husbandry were phased out. These payments were an incentive for farmers to increase husbandry, leading to an excess of manure on the one hand and an increase in feed imports on the other (Box 6).

In conclusion, there may be incentive measures existing in Switzerland which have negative effects on biodiversity, despite a legally anchored control mechanism. Successes have been achieved in the development of agricultural policy. Currently, incentives potentially harmful to biodiversity are explored within the process for the elaboration of the action plan for the implementation of the Swiss Biodiversity Strategy.



Use of natural resources

By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.

Relevant CBD indicators (decision XI/3)

Trends in pressures from unsustainable agriculture, forestry, fisheries and aquaculture

- *Trends in population and extinction risk of utilized species, including species in trade (A) (also used by CITES)*
- *Trends in ecological footprint and/or related concepts (C) (decision VIII/15)*
- *Ecological limits assessed in terms of sustainable production and consumption (C)*

Trends in pressures from habitat conversion, pollution, invasive species, climate change, overexploitation and underlying drivers

- *Trends in biodiversity of cities (C) (decision X/22)*

Trends in integration of biodiversity, ecosystem services and benefits sharing into planning, policy formulation and implementation and incentives

- *Trends in extent to which biodiversity and ecosystem service values are incorporated into organizational accounting and reporting (B)*

¹⁷⁶ Ecoplan 2013: Finanzielle Anreize bezüglich Biodiversität optimieren. Studie im Auftrag des BAFU.

Goals of the Swiss Biodiversity Strategy:

- By 2020, the use of natural resources and interventions involving them are sustainable so that the conservation of ecosystems and their services and of species and their genetic diversity is ensured.
- By 2020, biodiversity in settlement areas is promoted so that settlement areas contribute to the connection of habitats, settlement-specific species are conserved and the population is able to experience nature in the residential environment and in local recreational areas

National indicator:

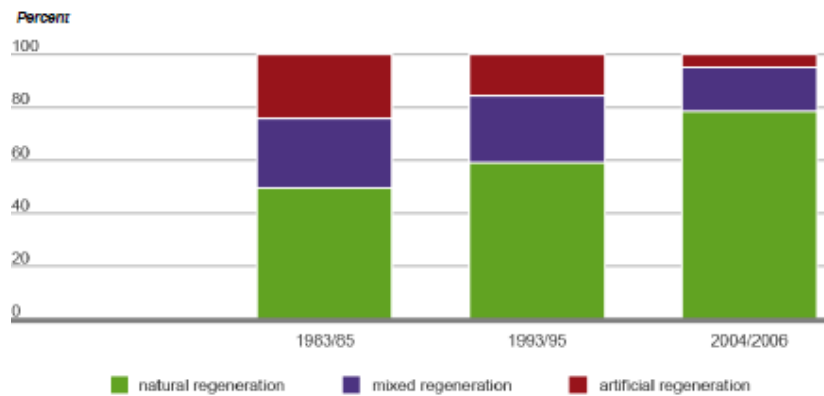


Figure 46: Young woodland in Switzerland classified by regeneration type¹⁷⁷

Genetic diversity among young trees is higher in naturally regenerated forests than in stands planted using seedlings supplied by nurseries. Naturally regenerated forests are better adapted to site-specific conditions and are usually more diverse. The share of naturally regenerated young woodland has increased considerably. In the surveying periods of 1983/85, 1993/95, and 2004/06, the share of artificial regeneration in Switzerland's overall young woodland area was 21-27%, 12-20%, and 3-7% respectively. While natural regeneration only reached a roughly 50% share in the 1983/85 surveying period, that share increased to roughly 60% in 1993/95 and to just under 80% in 2004/06. Between 1983/85 and 2004/06, the area of artificially regenerated young woodland shrank by roughly 140 square kilometers (54 sq mi).

The share of young woodland in the overall forest stand slightly declined (from 5.9% to 5.3%) between 1983/85 and 2004/06. In the 2004/06 surveying period, roughly 684 square kilometres (264 sq mi) of Switzerland's forests consisted of young woodland.

¹⁷⁷ BDM (E9 indicator). Data source: Swiss National Forest Inventory NFI, special analyses of the surveys taken in 1983/85, 1993/95 and 2004/06. Swiss Federal Institute for Forest, Snow and Landscape Research WSL, Birmensdorf. Status: 2009, visited March 2014.



Figure 47: Switzerland's ecological footprint in comparison to global biocapacity¹⁷⁸

The ecological footprint measures the consumption of natural resources by the number of global hectares that would be required to regenerate these resources. To calculate a population's ecological footprint, the quantity of natural resources consumed by that population is compared to the amount of natural regeneration capacity required to compensate for this consumption.

The imbalance between Switzerland's ecological footprint and its biocapacity has existed for several decades and continues to grow (Figure 47). This lifestyle is only possible through the import of natural resources and the depletion of global goods (such as the atmosphere). However, this lifestyle is not sustainable, because Switzerland consumes almost three times the amount of natural resources that are available per capita worldwide (1.8 gha).¹⁷⁹

Assessment

Sustainability is a fundamental principle anchored in the Federal Constitution (art. 73, SR 101, 1999) and guiding Switzerland's actions (4 Nr, chapter 2.1.2). Therefore sustainability is reflected in Switzerland's legal framework as well as in the strategic and programmatic programmes.

Significant progress was achieved in the conservation of utilized species. As described in chapters 1.4.1 and 1.4.2, a strong legislative and programmatic framework is in place for the conservation and the in-situ as well as ex-situ promotion of cultivated plants and domesticated animals. The number of registered varieties of utilized plant species is growing (Table 3), as is the number of breeds registered in Swiss herdbooks (Figure 29). The risk of one of these varieties or breeds becoming extinct has obtained a significantly downward trend.

¹⁷⁸ Global Footprint Network: Country Trends: Switzerland; www.footprintnetwork.org, visited April 2014.

¹⁷⁹ Federal Statistical Office: Analyses - Switzerland's ecological footprint; www.bfs.admin.ch, visited February 2014.

In forestry, it is a matter of principle to interfere as little as possible with the propagation of trees. Trees regenerate naturally on 80% of the forested area (Figure 46, 4 NR chapter 1.3.6), thus securing the propagation of regional tree genotypes.

Switzerland's ecological footprint, however, is more than three times larger than its biocapacity (Figure 47). Carbon emissions account for 65% of the ecological footprint, making it the most significant factor overall. It has also grown substantially more than any other factor of the ecological footprint. Another major factor is our use of arable land, forests and pastures, which accounts for 32% of the total ecological footprint. Whether the decrease of the ecological footprint recorded for 2008 is a starting point of a new trend or simply down to annual fluctuations, will have to be confirmed by future assessment of the ecological footprint.

In conclusion, major progress has been achieved in sustainable use of cultivated plants, domestic animals as well as the various tree species. Switzerland's ecological footprint, however, indicates that Switzerland consumes many more natural resources than available on its territory.

3.2.2 Aichi Goal B: Reduce the direct Pressures on Biodiversity and Promote Sustainable Use



Loss of habitats

By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.

Relevant CBD indicators (decision XI/3)

Trends in extent, condition and vulnerability of ecosystems, biomes and habitats

- *Extinction risk trends of habitat dependent species in each major habitat type (A)*
- *Trends in extent of selected biomes, ecosystems and habitats (A) (decision VII/30 and VIII/15)*
- *Trends in proportion of degraded/threatened habitats (B)*
- *Trends in fragmentation of natural habitats (B) (decision VII/30 and VIII/15)*
- *Trends in condition and vulnerability of ecosystems (C)*
- *Trends in the proportion of natural habitats converted (C)*

Trends in pressures from unsustainable agriculture, forestry, fisheries and aquaculture

- *Trends in primary productivity (C)*
- *Trends in proportion of land affected by desertification (C) (also used by UNCCD)*

Trends in pressures from habitat conversion, pollution, invasive species, climate change, overexploitation and underlying drivers

- *Population trends of habitat dependent species in each major habitat type (A)*

Goal of the Swiss Biodiversity Strategy:

- By 2020, an ecological infrastructure consisting of protected and connected areas is developed. The state of threatened habitats is improved.

National indicators:

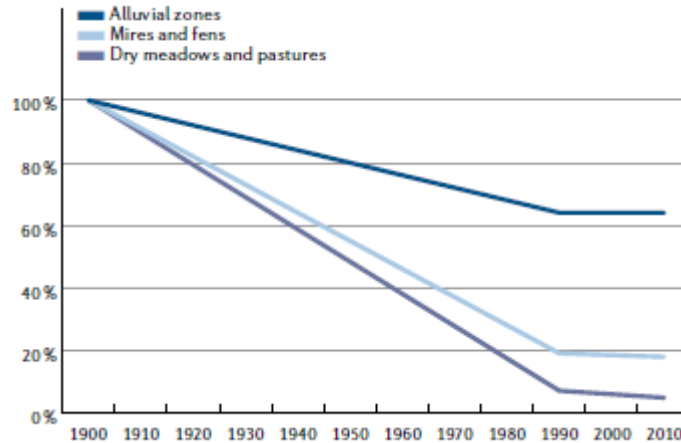


Figure 48: Switzerland has lost 82% of area covered by mires and bogs, over 90% of its dry meadows and pastures, and 36% of its alluvial zones between 1900 and 2010¹⁸⁰

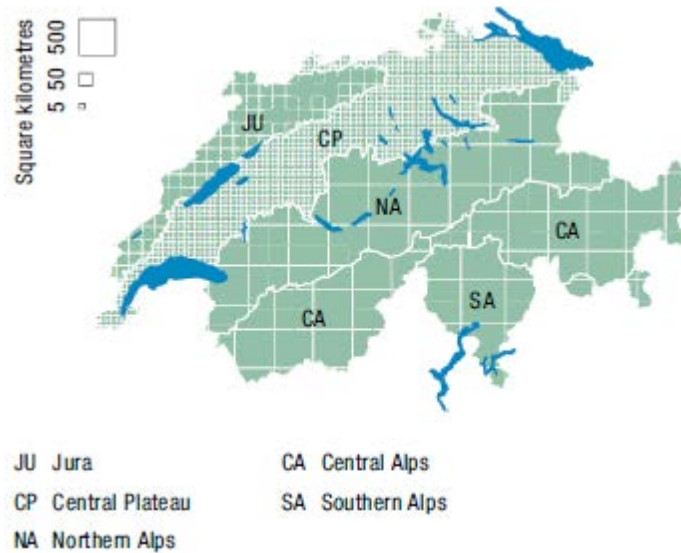


Figure 49: Landscape fragmentation: landscape fragmentation is highest on the densely populated central plateau with an effective mesh size of only 8 square kilometres¹⁸¹

¹⁸⁰ Lachat et al. 2010, cited in FOEN (ed.), Environment Switzerland 2013, Bern 2013, 86 pages.

¹⁸¹ FOEN (ed.) 2010: Implementing the Biodiversity Convention. Abridged version of Switzerland's Fourth National Report. Federal Office for the Environment, Bern, 20 p. Download: www.environment-switzerland.ch/ud-1029-e

Settlement growth and transport networks are the major causes of habitat fragmentation. This results in animal and plant populations becoming isolated, leading in turn to a loss of genetic diversity. The indicator (Figure 49) visualises landscape fragmentation in terms of effective mesh sizes. The effective mesh size on the Central Plateau is only 8 square kilometres, while in the southern Alps it is still 595 square kilometres.

Assessment

Ecosystems and their habitats have evolved in different ways, dependent on the biogeographic region. Switzerland's total forest area, for instance, has been growing since many years, due to the introduction of sustainability criteria in the nineteenth century (Figure 16) and today covers 31% of the country's surface. The populations of 57 bird species relying on forests respond positively to this trend (Figure 17). On the plateau – the densely populated part of Switzerland – forest biodiversity remains under pressure (chapter 1.2.3).

The agricultural ecosystem, however, has been shrinking since many years (Figure 12, chapter 1.2.2). Whereas areas managed according to the provisions of organic farming are steadily increasing, surfaces within the ecosystem, such as ecological compensation areas, remain stable (Figure 13, Figure 14). According to the decline of the populations of 38 bird species relying on agricultural ecosystems, the overall development of the agro-ecosystem seems not to be beneficial for biodiversity (Figure 15). Switzerland has suffered heavy losses in inland waters habitats, especially regarding mires and bogs (-82%) and alluvial zones (-36%, chapter 1.2.4, Figure 48) and losses continue despite legal protection of habitats (e.g. peatlands, Figure 19). Considerable efforts are deployed to restore watercourses (Box 3).

The probably most prominent reasons for habitat loss is land-use change due to the increase of the settlement and urban area (Figure 30) and the landscape fragmentation due to transport networks (Figure 49).

In conclusion, even though many valuable habitats have already sharply declined, habitat loss persists.



Sustainable fisheries

By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.

Relevant CBD indicators (decision XI/3)

Trends in pressures from unsustainable agriculture, forestry, fisheries and aquaculture

- *Trends in extinction risk of target and bycatch aquatic species (A)*
- *Trends in population of target and bycatch aquatic species (A)*
- *Trends in proportion of utilized stocks outside safe biological limits (A) (MDG indicator 7.4)*
- *Trends in catch per unit effort (C)*
- *Trends in fishing effort capacity (C)*
- *Trends in area, frequency, and/or intensity of destructive fishing practices (C)*

Trends in integration of biodiversity, ecosystem services and benefits sharing into planning, policy formulation and implementation and incentives

- *Trends in proportion of depleted target and by catch species with recovery plans (B)*

Goal of the Swiss Biodiversity Strategy:

- By 2020, the use of natural resources and interventions involving them are sustainable so that the conservation of ecosystems and their services and of species and their genetic diversity is ensured.
- By 2020, Switzerland's commitment to the conservation of global biodiversity at international levels is strengthened.

No national indicator

Assessment

Switzerland has a small fishery and aquaculture industry that is mostly managed according to sustainability criteria (chapter 1.1.2, 4NR section 1.4.5) but over-exploitation of fish populations exists and certain fish stocking measures can have negative effects on local biodiversity.^{182,183,184} However, the main threats to aquatic biodiversity emanates from water pollution, from the ecomorphological insufficient state of surface waters (chapters 1.2.4 and 1.5.2, 4 NR section 1.4.7), and from invasive alien species (4NR section 1.4.8), rather than from impacts due to fishery.

¹⁸² Gmünder R, Friedl C. 2002: Efficacité des repeuplements piscicoles effectués en Suisse. Informations concernant la pêche n° 71. Publié par l'Office fédéral de l'environnement, des forêts et du paysage OFEFP Berne, 2002

¹⁸³ Cattaneo F., Grimardias D., Weiss St., Winkler K. & Persat H. 2011: Caractérisation génétique des populations d'ombrin commun (*Thymallus thymallus* L.) de Suisse et France transfrontalière. Etude a été réalisée sur mandat de l'OFEV.

¹⁸⁴ BAFU 1999: Einfluss von Kläranlagen auf Fische. Mitt. zur Fischerei 61.

However, over 90% of the fish, shellfish and crustaceans consumed in Switzerland are imported from abroad. NGO's strongly promote the Marine Stewardship Council (MSC) label, an effort which is echoed by many retailers. Nevertheless, the market share of MSC products amounts to merely 12.6% (2012-2013, chapter 1.1.2, provisioning services).

In conclusion, main pressures on fish stocks in Switzerland emanate from pollution and the insufficient state of inland water ecosystems, rather than from the management of fish stocks. However, with the high market share of imported fish, crayfish and crustaceans, Switzerland has a particular responsibility to strengthen its commitment to the conservation of global biodiversity at international levels.



Areas under sustainable management

By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.

Relevant CBD indicators (decision XI/3)

Trends in pressures from unsustainable agriculture, forestry, fisheries and aquaculture

- *Trends in population of forest and agriculture dependent species in production systems (B)*
- *Trends in production per input (B)*
- *Trends in proportion of products derived from sustainable sources (C) (decision VII/30 and VIII/15)*

Trends in integration of biodiversity, ecosystem services and benefits sharing into planning, policy formulation and implementation and incentives

- *Trends in area of forest, agricultural and aquaculture ecosystems under sustainable management (B) (decision VII/30 and VIII/15)*

Objectives of the Swiss Biodiversity Strategy:

- By 2020, the use of natural resources and interventions involving them are sustainable, so that the conservation of ecosystems and their services and of species and their genetic diversity is ensured.
- By 2020, biodiversity in settlement areas is promoted so that settlement areas contribute to the connection of habitats, settlement-specific species are conserved and the population is able to experience nature in the residential environment and in local recreational areas.

National indicators:

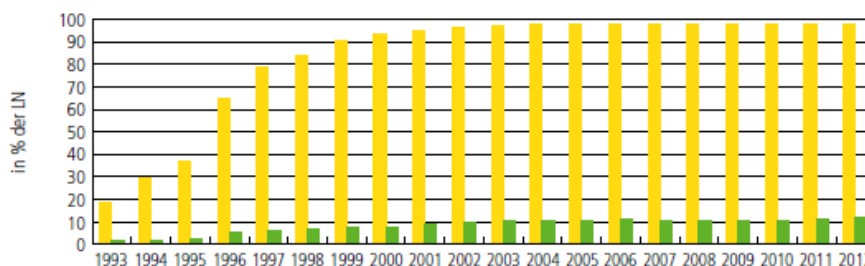


Figure 50: Development of the agricultural area under proof of ecological performance (yellow) and managed according to the prescriptions of organic farming (green) ¹⁸⁵

Farmers have to fulfil proof of ecological performance, a cross compliance system, to be eligible for direct payments. These criteria include, among others, the designation of ecological compensation areas (see chapter 1.2.2), appropriate measures to protect the soil, buffer strips along surface waters, etc.

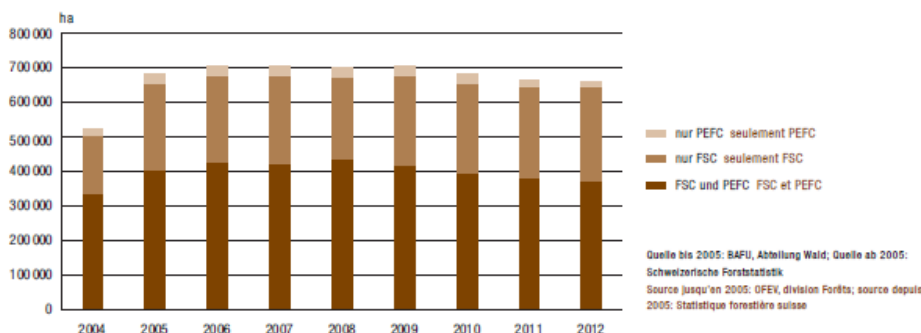


Figure 51: Development of the forest area certified according to the Programme for the Endorsement of Forest Certification Schemes (PEFC) and the Forest Stewardship Council (FSC) ¹⁸⁶

Assessment

Sustainable agriculture: Through its approval of Article 104 of the Federal Constitution in 1996, the Swiss population established a political basis for sustainable agriculture (chapter 1.2.2). Several instruments contribute to this objective, e.g. the proof of ecological performance (Figure 50, see also 4 NR, chapter 2.3.1) as the basic condition for direct payments, ecological compensation and ecological quality (chapter 1.2.2), or the Swiss agricultural policy (Box 6). With its environmental targets for agriculture (Objectifs environnementaux pour l'agriculture), ¹⁸⁷ the federal authorities defined the extent to

¹⁸⁵ Federal Office for Agriculture 2013: Agricultural Report 2013.

¹⁸⁶ OFEV (Ed.) 2013: Annuaire La forêt et le bois 2013. Office fédéral de l'environnement, Berne. Etat de l'environnement no 1332: 180 p.

¹⁸⁷ OFEV et OFAG 2008: Objectifs environnementaux pour l'agriculture. A partir de bases légales existantes. Connaissance de l'environnement n° 0820. Office fédéral de l'environnement, Berne: 221 p.

which agriculture must contribute to different general environmental objectives, in particular relating to biodiversity, air pollution (ammonia, nitrogen oxides), water pollution (nitrate, phosphorous, plant protection products, veterinary drugs) and soil pollution (see 4 NR, Appendix II).

Further, there are also private initiatives fostering sustainable agriculture based on labels. Today, around 5,600 farms follow the provisions for organic farming (BioSuisse, 10%, Figure 14) and 20,000 those of IP Suisse, the association for environmentally friendly agriculture. These farms make targeted use of the agricultural policy direct payments incentives for additional ecological services (e.g. through the designation of additional ecological compensation areas, Figure 13) and obtain higher market prices for their products. If all farms were to fulfil the criteria of these labels, Swiss agriculture would have considerably fewer environmental deficits.¹⁸⁸

Sustainable forest management. Environmentally friendly, socially and economically sustainable forest management is documented through certification. Both of the certification systems (FSC and PEFC) are used in Switzerland. Approximately 53% of Switzerland's forest area is currently certified.¹⁸⁹ In 2009, the certified area was highest, encompassing a total of 706'000 ha. Since then, the certified area has declined by 7% (2012), due to renounced recertification.

In conclusion, the proof of ecological performance is a success, having been disseminated on almost the whole agricultural area since 2004. However, the label reflects basic requirements that are not sufficient to promote biodiversity in agricultural landscapes, especially when compared to provisions of other labels, e.g. organic farming or IP-Suisse. The forest area certified is high - even though declining - when compared at the international level (surfaces certified in 2012: globally: 10.5%, North America 52%, Europe: 37%).



Pollution

By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.

Relevant CBD indicators (decision XI/3)

Trends in pressures from habitat conversion, pollution, invasive species, climate change, overexploitation and underlying drivers

- *Trends in incidence of hypoxic zones and algal blooms (A)*
- *Trends in water quality in aquatic ecosystems (A) (decision VII/30 and VIII/15)*
- *Impact of pollution on extinction risk trends (B)*
- *Trends in pollution deposition rate (B) (decision VII/30 and VIII/15)*

¹⁸⁸ FOEN (ed.) 2013: Environment Switzerland 2013, Bern 2013, 86 pages

¹⁸⁹ Federal Office for the Environment: Status report on Forest and Wood: www.bafu.admin.ch/, visited February 2014

- Trends in sediment transfer rates (B)
- Trends in emission to the environment of pollutants relevant for biodiversity (C)
- Trends in levels of contaminants in wildlife (C)
- Trends in nitrogen footprint of consumption activities (C)
- Trends in ozone levels in natural ecosystems (C)
- Trends in proportion of wastewater discharged after treatment (C)
- Trends in UV-radiation levels (C)

Goal of the Swiss Biodiversity Strategy:

- By 2020, an ecological infrastructure consisting of protected and connected areas is developed. The state of threatened habitats is improved.

National indicators:

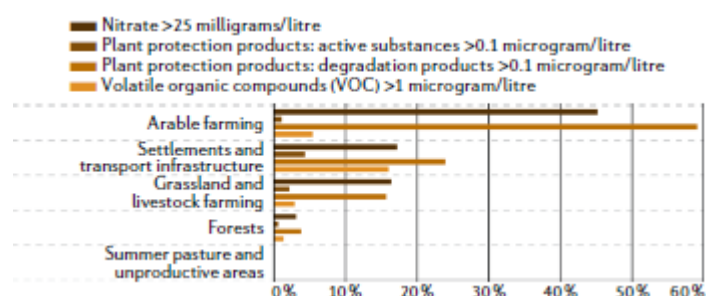


Figure 52: Groundwater quality: monitoring sites with excessive concentrations of nitrate and artificial organic substances¹⁹⁰

The concentration of nitrate and artificial organic substances in Swiss groundwater is recorded at national level under the NAQUA National Groundwater Monitoring. The NAQUA routine programme tests around 40 different active substances in plant protection products and their degradation products.

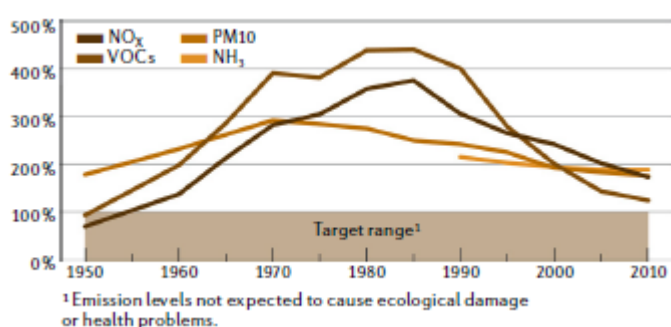


Figure 53: Air pollutant emissions¹⁹¹

Air pollutants are recorded through the National Air Pollution Monitoring Network (NABEL, 4 NR, section 2.3.9). The 16 NABEL stations are distributed throughout the country and monitor pollution at typical locations (e.g. city centre streets, residential areas, rural stations).

¹⁹⁰ FOEN (ed.) 2013: Environment Switzerland 2013, Bern 2013, 86 pages.

¹⁹¹ FOEN (ed.) 2013: Environment Switzerland 2013, Bern 2013, 86 pages.

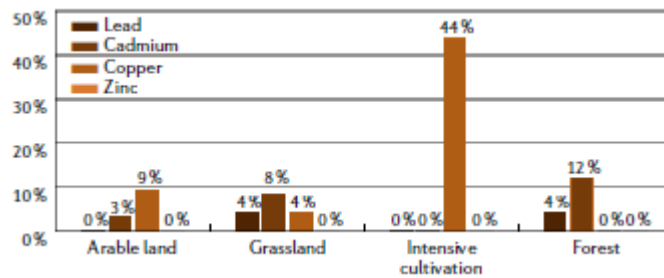


Figure 54: Soil pollution, 2000 – 2004. Exceedance of guideline values by land use type in percentages (101 monitoring sites)¹⁹²

Soil pollution is recorded at national level under the Swiss Soil Monitoring Network (NABO, 4 NR, section 2.3.9). Since 1984, FOEN and the Federal Office for Agriculture have jointly operated the Swiss Soil Monitoring Network.

Assessment

Despite the generally good quality of the groundwater, the legally required limit values for nitrate and plant protection products are not complied with throughout Switzerland. The main source of this pollution is agriculture. Thanks to wastewater treatment, the water quality in rivers and lakes has shown a marked improvement in recent decades (chapter 1.5.2, Figure 33). 97% of the Swiss population is now connected to central wastewater treatment plants (WTP). As a result, there has been a strong decline in the contamination of waters by nutrients and pollutants.

Thanks to the implementation of air pollution control measures, air quality in Switzerland has improved substantially over the past 25 years (chapter 1.5.2, Figure 53). However, excessive levels of exposure to ozone (O₃) and nitrogen dioxide (NO₂) remain problematic for biodiversity. It was estimated that for the year 2000, the critical load for nitrogen deposition was exceeded in 90% of the forest area and 55% of other valuable ecosystem such as bogs¹⁹³. Moreover, high acid and nitrogen inputs from the air – in particular of ammonia (NH₃) and nitrogen oxides (NO_x) – have negative impacts on soil and water quality, the stability of ecosystems and biodiversity.

Chemical contamination of open soil is widespread (chapter 1.5.2, Figure 34; 4 NR, section 1.2.9). The guideline values for heavy metals are exceeded in around 15% of tested soils. Soil heavy metals are taken up by organisms, accumulate in the food chain and can affect biodiversity (Figure 54).

In conclusion, the greatest remedial effect up to now has been achieved through the limitation of emissions of airborne pollutants, and propagation of central wastewater treatment plants (WTP) leading to a significant decline in

¹⁹² FOEN/FSO (ed.) 2011: Environment Switzerland 2011, Bern and Neuchâtel 101 pages.

¹⁹³ EKL, 2005: Stickstoffhaltige Luftschadstoffe in der Schweiz. Status-Bericht der Eidg. Kommission für Lufthygiene (EKL). Bundesamt für Umwelt, Wald und Landschaft (BUWAL, Ed.), Schriftenreihe Umwelt Nr. 384, Bern. 168 S.

phosphorous content of lakes since the seventies (Figure 33). However, some impacts such as nitrogen deposition remain and new threats are arising, for instance micropollutants such as endocrine disrupters continue to pass through the WTPs. Micropollutants have a negative impact on ecosystems and, even in minute concentrations, can affect biodiversity. Therefore, the Swiss parliament recently decided to upgrade WWTPs regarding the removal of micropollutants.



Invasive Alien Species

By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.

Relevant CBD indicators (decision XI/3)

- Trends in the impact of invasive alien species on extinction risk trends (A)
- Trends in the economic impacts of selected invasive alien species (B)
- Trends in number of invasive alien species (B) (decision VII/30 and VIII/15)
- Trends in incidence of wildlife diseases caused by invasive alien species (C)
- Trends in policy responses, legislation and management plans to control and prevent spread of invasive alien species (B)
- Trends in invasive alien species pathways management (C)

Goal of the Swiss Biodiversity Strategy:

- By 2020, the conservation status of the populations of national priority species is improved, and their extinction prevented insofar as possible. The spread of invasive alien species with the potential to cause damage is contained.

National indicator:

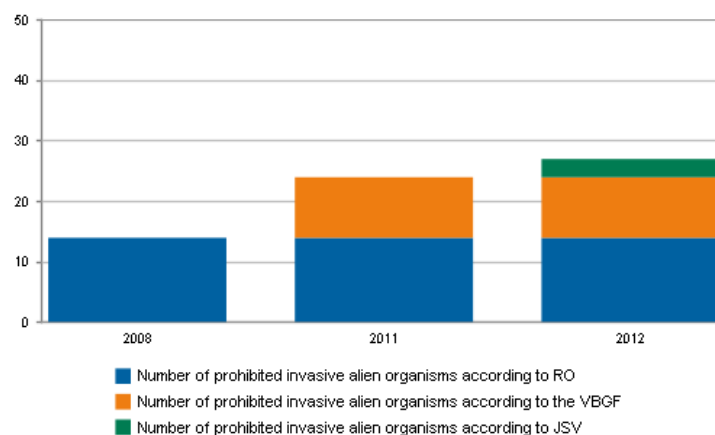


Figure 55: Prohibited invasive alien organisms¹⁹⁴

¹⁹⁴ Federal Office for the Environment: Indicator Prohibited invasive alien organisms, www.bafu.admin.ch, visited February 2014.

Information is in accordance with the Release Ordinance (RO), the Ordinance to the Federal Act on Fishery (VBGF, since its revision in 2011) and the Ordinance on Hunting and Protection of Wild mammals and Birds (JSV, since its revision in 2012). Species listed in annexes of the ordinances mentioned in Fig. 48 may not be handled directly in the environment. Control measures are to be prescribed and, if necessary and useful, measures to prevent future occurrence of invasive alien species.

Assessment

In 2006 an inventory of alien species was published, including approximately 800 species and providing information-sheets for 107 of them (chapter 1.5.3). A black and a watch list for alien plant species is maintained. Further, a total of 27 invasive organisms were prohibited by law (Figure 55), thus contributing to the management of pathways to prevent their introduction and establishment. National species action plans exist for the crayfish, the Asian Tiger-Mosquito and for selected, particularly harmful species affecting forests and guidelines and recommendations are being elaborated in collaboration with the cantonal authorities. A national strategy on invasive alien species is in preparation.



Vulnerable ecosystems

By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.

Relevant CBD indicators (decision XI/3)

Trends in pressures from habitat conversion, pollution, invasive species, climate change, overexploitation and underlying drivers

- *Extinction risk trends of coral and reef fish (A)*
- *Trends in climate change impacts on extinction risk (B)*
- *Trends in coral reef condition (B)*
- *Trends in extent, and rate of shifts of boundaries, of vulnerable ecosystems (B)*
- *Trends in climatic impacts on community composition (C)*
- *Trends in climatic impacts on population trends (C)*

Goal of the Swiss Biodiversity Strategy:

- By 2020, Switzerland's commitment to the conservation of global biodiversity at international level is strengthened.

No national indicator

Further information:

Switzerland, as a landlocked country, is not directly affected by coral bleaching or ocean acidification. However, in a way or another, almost all ecosys-

tems are affected by climate change and anthropogenic pressures (4 NR, agricultural ecosystems: section 1.2.8, forest ecosystems: section 1.3.10, inland waters ecosystems: section 1.4.9).

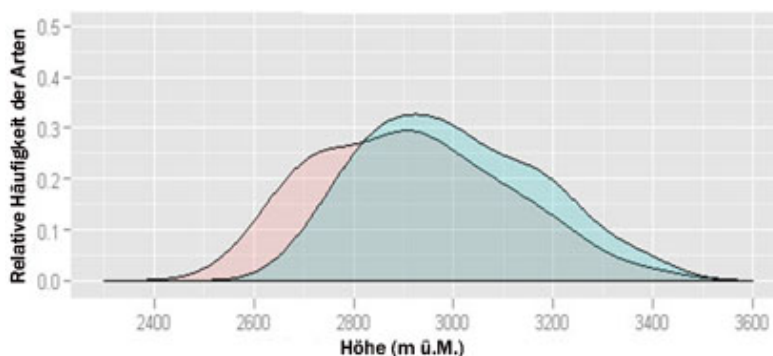


Figure 56: In comparison with data from botanists over a hundred years ago, plant species have clearly advanced to higher elevations. Today (blue area), summit flora species occur approximately 82 meters higher than previously (red area)¹⁹⁵

Assessment

The effects of climate change in Switzerland are tangible (e.g. temperature of watercourses is rising (Figure 36), as are the consequences for biodiversity (e.g. phenological phases are altered as is the distribution of plant species or populations of birds, see chapter 1.5.3).

Of specific interest for Switzerland are alpine ecosystems, as they are already at the extreme of their range, being “trapped” at the top of the summits (4 NR, section 1.6.8). However, it is still unclear whether other factors than climate change, such as wildlife or hikers who are now much more numerous than 100 years ago, may have influenced the changes in distribution of alpine plants (Figure 39).

In conclusion, in Switzerland almost all ecosystems are affected by climate change and anthropogenic pressures. The strategy "Adaptation to climate change in Switzerland" provides the basis for future action using a broad approach not specifically targeted to defined ecosystems.

¹⁹⁵ Institute for Snow and Avalanche Research SLF: Summit Flora in a changing climate, www.slf.ch, visited February 2014.

3.3 Aichi Goal C: Improve the Status of Biodiversity by Safeguarding Ecosystems, Species and Genetic Diversity



Protected areas

By 2020, at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes

Relevant CBD indicators (decision XI/3)

Trends in coverage, condition, representativeness and effectiveness of protected areas and other area-based approaches

- *Trends in coverage of protected areas (A) (decision VII/30 and VIII/15)*
- *Trends in extent of marine protected areas, coverage of key biodiversity areas and management effectiveness (A)*
- *Trends in protected area condition and/or management effectiveness including more equitable management (A) (decision X/31)*
- *Trends in representative coverage of protected areas and other area based approaches, including sites of particular importance for biodiversity, and of terrestrial, marine and inland water systems (A)*
- *Trends in the connectivity of protected areas and other area based approaches integrated into landscapes and seascapes (B) (decision VII/30 and VIII/15)*
- *Trends in the delivery of ecosystem services and equitable benefits from protected areas (C)*

Goal of the Swiss Biodiversity Strategy:

- By 2020, an ecological infrastructure consisting of protected and connected areas is developed. The state of threatened habitats is improved.

National indicator:

Table 5: Designated biodiversity areas. Due to incomplete area statistics and the partially deficient quality of available georeferenced area information, it is extremely difficult to produce a precise overview of the protected areas in Switzerland. Overlaps are included in all of the figures presented in the table below.¹⁹⁶

Designated biodiversity areas	Area (ha)	% of national territory
National park	17'033	0.41
Biotopes of national importance ¹		
• Amphibian spawning areas	13'886	0.34
• Alluvial zones	22'639	0.55
• Raised bogs	1'524	0.04
• Fens	19'218	0.47
• Dry meadows and pastures	21'412	0.52
Aquatic and migratory bird reserves WZVV	22'164	0.54
Swiss game reserves	150'888	3.65
Emerald Network candidate sites	64'245 ²	1.56
Forest reserves	61'000 ³	1.48
Biotopes of regional and local importance	51'518 ⁴	1.25
Buffer zone biotopes of national + regional importance	20'683 ⁵	0.50
Third-party nature protection areas	41'300 ⁶	1.00
Areas designated in accordance with the Ordinance on Ecological Quality	59'000	1.43

¹ Total portion of the area, only counted once in cases of overlaps between biotopes of national importance: 73, 296 ha = 1.79%

² Almost fully overlapping biotopes of national importance (Exception: Oberaargau)

³ GIS analysis and estimate FOEN, status: end of 2011

⁴ GIS analysis FOEN, data from 1995

⁵ Estimate FOEN, 2011

⁶ Pro Natura Leistungsbericht, 2010 (www.pronatura.ch/content/data/10_leistungsbericht.pdf)

Assessment

The total size of protected areas increased from 29'449 ha in 1991 to 257'018 ha in 2013, which corresponds to 6.2% of the country's expanse. Strictly protected areas - including alluvial zones, raised bogs, fenlands, amphibian spawning areas, dry grasslands and the Swiss National Park - were extended during that period of time as well, increasing from 18'160 ha to 90'495 ha. In other words, they amount to 2.2% of Switzerland.¹⁹⁷

Emerald network: The first 37 sites of the Emerald network were officially adopted by the Berne Convention in 2012. This is a fraction of what is needed to meet the objectives of the Berne Convention in terms of species and habitat requirement. Six of the 31 important bird areas defined for Switzerland are included in the 37 Emerald sites.

Forest reserves are established at the cantonal level, in contrast to the protected areas mentioned above. Today, forest reserves cover an area of 58,000 ha, which corresponds to 4.8% of the Swiss forest area (chapter

¹⁹⁶ Swiss Confederation 2012: Swiss Biodiversity Strategy. Download: www.bafu.admin.ch/ud-1060-e.

¹⁹⁷ FOEN: Indicator Nature and landscape reserves, www.bafu.admin.ch, visited February 2014.

3.1.2). Thus, the national target of 10% of the forest area having reserve status by 2030 is partially achieved and seems realistic. However, regional differences are quite large, and attention needs to focus on designating the reserves according to species and habitat criteria (Figure 42).

A vision for the interconnection of habitats, including protected areas, has been established, i.e. the National Ecological Network (Réseau écologique national, REN, see 4NR section 2.3).¹⁹⁸ However, national data on surfaces dedicated to interconnection are mostly limited to ecological compensation areas in agriculture (Figure 13). The connection of protected areas and their integration into the wider landscape is one of the strategic goals of the Swiss Biodiversity Strategy (see above) that needs to be specified in its action plan.

A study conducted by the Swiss Biodiversity Forum concluded that the quality, quantity and interconnection of many habitats are insufficient to safeguard their biodiversity and ecosystem services in the long term. The space requirement to do so is indeed much higher than the remaining habitat surfaces (chapter 3.1.4). Priority must be given to halting the loss of high quality areas and the continued fragmentation of habitats. Protected areas and the establishment of an ecological infrastructure could contribute to this.

In conclusion, the weaknesses of the Swiss protected area network have been assessed, and are recognised. The adoption of the Swiss Biodiversity Strategy provides the basis for Switzerland's contribution to Aichi target 11.



Preventing extinctions

By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.

Relevant CBD indicators (decision XI/3)

Trends in abundance, distribution and extinction risk of species

- *Trends in abundance of selected species (A) (decision VII/30 and VIII/15) (UNCCD indicator)*
- *Trends in extinction risk of species (A) (decision VII/30 and VIII/15) (MDG indicator 7.7) (also used by CMS)*

Goal of the Swiss Biodiversity Strategy:

- By 2020, the conservation status of the populations of national priority species is improved and their extinction prevented insofar as possible. The spread of invasive alien species with the potential to cause damage is contained.

¹⁹⁸ Berthoud G., Lebeau R. P., Righetti A. 2004: Réseau écologique national REN. Rapport final. Cahier de l'environnement no 373. Office fédéral de l'environnement, des forêts et du paysage, Berne. 132 p.

National indicator:

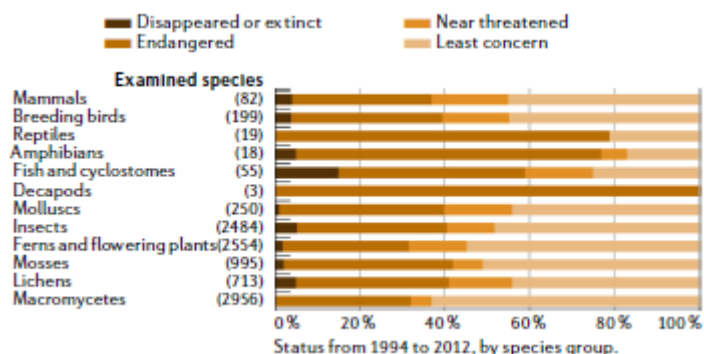


Figure 57: Threatened species according to the Red Lists: Extinct, endangered, near threatened and least concern species, per group ¹⁹⁹

Assessment:

A quarter of the 45'890 species known to occur in Switzerland have been evaluated for Red Lists so far (Figure 22). Thereof 36% are categorised as threatened, and an additional 3% as extinct (Figure 25). When compared to the state of species worldwide, the share of threatened species in Switzerland is very high (Figure 24).

To prevent extinctions, threatened species in need of conservation activities have been prioritised by experts, based on the degree to which the species is threatened, the responsibility Switzerland has in maintaining populations of the particular species on a regional and international level, and knowledge of measures that need to be met (Swiss List of Priority Species, chapter 2.4.6). Species action plans are developed in consequence (chapter 2.4.6, 4 NR sections 2.3.4, 2.3.5 and 2.3.6).

In conclusion, the multiple pressures on species from land-use change and habitat fragmentation (chapter 1.5.1), climate change (chapter 1.5.3) and invasive alien species (chapter 1.5.4) are high and levels of threat are expected to remain, if not increase.



Genetic diversity

By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.

Relevant CBD indicators (decision XI/3)

Trends in genetic diversity of species

- Trends in genetic diversity of cultivated plants, and farmed and domesticated animals and their wild relatives (B) (decision VII/30 and VIII/15)

¹⁹⁹ FOEN (ed.) 2013: Environment Switzerland 2013, Bern, 86 pages.

- *Trends in genetic diversity of selected species (C)*

Trends in integration of biodiversity, ecosystem services and benefits sharing into planning, policy formulation and implementation and incentives

- *Trends in number of effective policy mechanisms implemented to reduce genetic erosion and safeguard genetic diversity related to plant and animal genetic resources (B)*

Objectives of the Swiss Biodiversity Strategy:

- By 2020, an ecological infrastructure consisting of protected and connected areas is developed. The state of threatened habitats is improved.
- By 2020, genetic impoverishment is decelerated and, if possible, halted. The conservation and sustainable use of genetic resources, including that of livestock and crops, is ensured.

National indicators:

- Number of cattle, pig, sheep and goat breeds registered in Swiss herd-books (Figure 29, p. 39)
- Number of species with accessions included in positive lists in 2013 (Table 3, p.38)

Assessment:

Important and successful efforts are being conducted to maintain the genetic diversity especially of cultivated plants and farmed and domesticated animals (chapters 1.4; 4 NR sections 1.1.3 and 1.2.4) and of wild relatives (chapter 1.1.2, supporting services). Therefore, the conclusion remains the same as for goal 3 of the 2010 Biodiversity Targets (4 NR, section 4.1): Important efforts are being conducted to inventory the animal and plant genetic diversity resources in agriculture, and activities for the conservation of these genetic resources are planned and being implemented with the support of the Federal Office of Agriculture. Switzerland has therewith established a sound baseline for the future conservation of genetic resources in agriculture.

3.3.1 Aichi Goal D: Enhance the Benefits to All from Biodiversity and Ecosystem Services



Essential ecosystem services

By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.

Relevant CBD indicators (decision XI/3)

Trends in distribution, condition and sustainability of ecosystem services for equitable human well-being

- *Trends in proportion of total freshwater resources used (A) (MDG indicator 7.5)*
- *Trends in proportion of the population using improved water services (A) (MDG indicator 7.8 and 7.9)*
- *Trends in benefits that humans derive from selected ecosystem services (A)*
- *Population trends and extinction risk trends of species that provide ecosystem services (A)*
- *Trends in delivery of multiple ecosystem services (B)*
- *Trends in economic and non-economic values of selected ecosystem services (B)*
- *Trends in health and wellbeing of communities who depend directly on local ecosystem goods and services (B) (decision VII/30 and VIII/15)*
- *Trends in human and economic losses due to water or natural resource related disasters (B)*
- *Trends in nutritional contribution of biodiversity: Food composition (B) (decision VII/30 and VIII/15)*
- *Trends in incidences of emerging zoonotic diseases (C)*
- *Trends in inclusive wealth (C)*
- *Trends in nutritional contribution of biodiversity: Food consumption (C) (decision VII/30 and VIII/15)*
- *Trends in prevalence of underweight children under five years of age (C) (MDG indicator 1.8)*
- *Trends in natural resource conflicts (C)*
- *Trends in the condition of selected ecosystem services (C)*
- *Trends in biocapacity (C)*

Trends in coverage, condition, representativeness and effectiveness of protected areas and other area-based approaches

- *Trends in area of degraded ecosystems restored or being restored (B)*

Goal of the Swiss Biodiversity Strategy:

- By 2020, an ecological infrastructure consisting of protected and connected areas is developed. The state of threatened habitats is improved

National indicator:

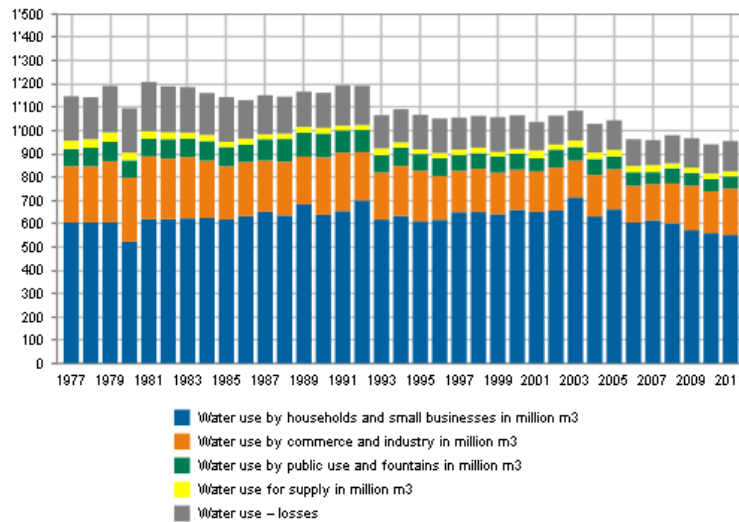


Figure 58: Water use²⁰⁰

The indicator (Figure 58) is intended to demonstrate the extent to which the domestic, commercial and industrial sectors use water resources efficiently and economically.

Total Swiss water consumption (including use by industry, commerce and agriculture) has decreased since 1975 despite a rising population. In 1981 it was 500 litres per head per day but the figure is now closer to 350 litres. This reduction is mainly attributable to industry (greater water use efficiency) and to a lesser extent to households and small businesses. A Swiss household now uses an average of approximately 160 litres of water per person per day. This figure has also decreased continuously over the last 30 years.

At national level, water resources are not currently scarce in Switzerland and will not be in the future. For this reason the status is rated neutral. In exceptional situations however (e.g. longer periods of drought), local or regional shortages may occur. These situations could become more frequent and serious as climate change progresses. Careful use of drinking and process water remains very important.

Assessment:

An overview of ecosystem services in terms of an inventory of Final Ecosystem Goods and Services (FEGS) is being elaborated (chapter 1.1.1). Safeguarding of the forest to secure ecosystem services has a long tradition, be it for drinking water purification (4 NR, section 1.3.12) or for the protection from natural hazards (chapter 1.1.2). Currently, major efforts are being deployed to strengthen the protection of water; based, among other things, on a long-term

²⁰⁰ Federal Office for the Environment: Indicator Water use, www.bafu.admin.ch, visited February 2014.

strategic planning for the restoration of 4'000 km of watercourses (chapter 1.2.4). The safeguarding of ecosystems services also requires sustainable use of these services. For instance, implementing integrated water management plans (4 NR, section 2.3.3) and, sustainable forest management principles (46% of Swiss groundwater zones are in forests); and promoting the efficient use of water (Figure 58); serves to secure the use of water resources.

The prominent service delivered by ecosystems is the provision of food (chapter 1.1.2, provisioning services). The vast majority of food is produced in agro-ecosystems (Figure 6), whereas food harvested in natural or near natural ecosystems is of secondary importance (Table 1). From the import statistics it is apparent that approximately 44% of the food consumed in Switzerland is imported from abroad (Figure 4). The share of imported fish, shellfish and crustaceans is higher even than 90% (Figure 5). Therewith, it becomes apparent that Switzerland benefits from ecosystem services from abroad.

In conclusion, it is noted that Switzerland's ecosystems are under pressure (chapter 1.2; 4NR chapter I). Successes in restoring and safeguarding essential ecosystem services have been achieved, e.g. through increased water use efficiency. Other pressures on ecosystems are assumed to persist (e.g. land use change) or to increase, e.g. as a result of progressing climate change or increased usage (e.g. carbon stocks through soil use, Figure 59), thus affecting the delivery of ecosystem services. To restore and safeguard these services, while Switzerland's biocapacity is decreasing (Figure 47), is a major challenge. Further, Switzerland benefits from ecosystem services abroad, and therefore also bears a responsibility to strengthen its commitment to the conservation of ecosystem services at the international level.



Ecosystem resilience

By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.

Relevant CBD indicators (decision XI/3)

Trends in distribution, condition and sustainability of ecosystem services for equitable human well-being

- *Status and trends in extent and condition of habitats that provide carbon storage (A)*

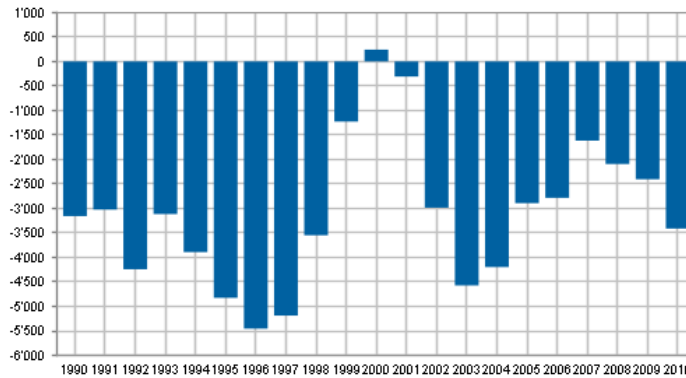
Trends in coverage, condition, representativeness and effectiveness of protected areas and other area-based approaches

- *Population trends of forest-dependent species in forests under restoration (C)*
- *Trends in area of degraded ecosystems restored or being restored (B)*

Goal of the Swiss Biodiversity Strategy:

- By 2020, an ecological infrastructure consisting of protected and connected areas is developed. The state of threatened habitats is improved.

National indicator:



■ Changes in carbon stocks through soil use and changing in soil use in 1000 t CO₂eq*

* a positive balance means that there are emissions, while a negative balance means that the carbon is absorbed by "Land Use, Land-Use Change and Forestry" (LULUCF)

Figure 59: Carbon stocks through soil use²⁰¹

The data for Figure 59 are taken from the inventory of greenhouse gas emissions in Switzerland, which is drawn up annually by the FOEN in accordance with the guidelines of the UN Framework Convention on Climate Change (UNFCCC). The methods are consistent with the guidelines of the Intergovernmental Panel on Climate Change (IPCC).

Emissions caused by soil use or soil use change were calculated for six soil categories (forest land, cropland, grasslands, wetlands, peri-urban and others). Methane (CH₄) and nitrous oxide (N₂O) emissions were converted into tonnes of CO₂ equivalent and added to those of CO₂ (negative value = stored amounts). Greenhouse gas emissions for this indicator are almost entirely made up of CO₂.

²⁰¹ Federal Office for the Environment: Indicator Carbon stocks through soil use, www.bafu.admin.ch/, visited February 2014.

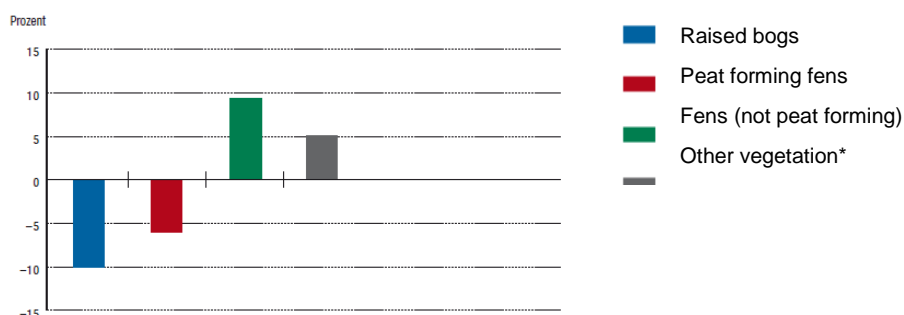


Figure 60: Changes in surface area of raised bogs and fens of national importance within five years²⁰²

Observation period 1997/2001 to 2002/06.

* Within the perimeters of raised bogs and fens of national importance other vegetation types than the typical mire vegetation are observed.

Assessment:

The Federal Council has defined ecosystem resilience to be a the cornerstone of the Swiss Biodiversity Strategy, i.e. *biodiversity is rich and capable of reacting to change* (chapter 2.1).

A major threat to ecosystem resilience in Switzerland is the fragmentation of habitats caused by settlement growth, transport networks (Figure 49) and water control structures (chapter 1.2.4). This fragmentation inhibits seasonal migration of species and gene exchange, but also shifts in natural ranges due to climate change. Major efforts to establish a green infrastructure include the rehabilitation of approximately 4'000 km of watercourses, and the building of around 50 wildlife passages in the next few decades.²⁰³ Ecological compensation areas as well as protected areas will act as stepping stones and enhance the permeability and thus the quality of the landscape.

An assessment of the effectiveness of Swiss mire protection concludes that the areas of raised bog and fen of national importance have been approximately maintained (Figure 60). However, the quality of the mires has clearly declined (Figure 19). Many mires have become drier, poorer in peat and richer in nutrients, and there is an increased amount of woody plant growth. Regeneration measures have been successful, but they have been too infrequent and at too small a scale to compensate for the qualitative losses. There are considerable deficiencies in the implementation and execution of buffer zones. Despite being inconsistent with the objectives of protection,²⁰⁴ buildings, roads and paths are being constructed in mire landscapes of national importance, the same as they have been in the past.

²⁰² Klaus G. (réd.) 2007 : État et évolution des marais en Suisse. Résultats du suivi de la protection des marais. État de l'environnement n° 0730. Office fédéral de l'environnement, Berne. 97 pp. Download: www.environnement-suisse.ch/publications

²⁰³ Federal Office for the Environment: Vernetzung von Lebensräumen, www.bafu.admin.ch, visited February 2014.

²⁰⁴ Klaus G. (Red.) 2007: Zustand und Entwicklung der Moore in der Schweiz. Ergebnisse der Erfolgskontrolle Moorschutz. Umwelt-Zustand Nr. 0730. Bundesamt für Umwelt, Bern. 97 S.

Currently, a study commissioned by the Federal Office for the Environment is being conducted, which aims to estimate the need of restoration measures within all types of biotopes of national importance (see Table 5), to secure their protection in conformity with the law. Preliminary results of the study identified an urgent need for restoration measures on the following surface area of biotopes of national importance: Amphibian spawning areas - 25% Alluvial zones - 30%, Raised bogs - 79%, Fens - 30% and Dry meadows and pastures - 8-20%.²⁰⁵

In terms of carbon stocks, all types of soil use, with the exception of forests, result in carbon dioxide emissions (chapter 1.1.2, Figure 8). These emissions have been relatively stable since the beginning of the 1990s, and so these soils have never contributed to carbon storage. Forest management, on the other hand, has long contributed to increasing biomass (chapter 1.2.3, Figure 16), meaning that the forests act as a carbon sink. The carbon emissions observed in the forest sector from 2000 to 2002 do not reflect this trend as they resulted from isolated cases of extreme weather such as storms, which resulted in the clearance of large areas of forest.

In conclusion, a clear trend cannot be given for the achievement of this Aichi target. Whereas on the one hand, efforts have been deployed for the rehabilitation of watercourses, and the permeability of the landscape is anticipated to increase due to restoration measures; on the other hand, the ability of forests to act as carbon sinks is expected to decrease, and additional efforts are needed to restore the biotopes of national importance. To increase ecosystem resilience and achieve the restoration of at least 15% of degraded ecosystems by 2020, efforts will have to be strongly intensified.



Nagoya Protocol on ABS

By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.

Relevant CBD indicators (decision XI/3): none

Objectives of the Swiss Biodiversity Strategy:

- By 2020, genetic impoverishment is decelerated and, if possible, halted. The conservation and sustainable use of genetic resources, including that of livestock and crops, is ensured
- By 2020, Switzerland's commitment to the conservation of global biodiversity at international level is strengthened.

²⁰⁵ Martin M., Jöhl R. 2013: Biotope von nationaler Bedeutung - Kosten der Biotopinventare. Expertenbericht zuhanden des Bundes, Überarbeitung Stand 30.9.2013 Version BAFU Vernehmlassung

No national indicator

Assessment:

Switzerland signed the Nagoya Protocol on 11. May 2011, following a formal consultation within the federal administration, the decision of the Federal Council to sign the Protocol and a national ABS conference (6 April 2011).

Since then, awareness raising and capacity building activities have continued, including the update of voluntary guidelines and best practice tools (e.g. ABS site of the Swiss Academy of Sciences,²⁰⁶ and the release of the updated ABS Management-Tool).

After two further rounds of formal consultations within the federal administration and a public hearing on the ratification of the Protocol, the message to the parliament on the approval of the Nagoya Protocol was adopted by the Federal Council on 10 April 2013. The Swiss parliament has approved the Nagoya Protocol and its implementation in the Federal Act on the Protection of Nature and Cultural Heritage on 21 March 2014. The decision is subject to an optional referendum (see chapter 2.3). Therefore, Switzerland is likely to fully achieve this target by time.

Comprehensive information on the ratification process as well as further documents is included in the Swiss ABS Clearing House.²⁰⁷

²⁰⁶ Swiss Academy of Sciences: Access to Genetic Resources and Benefit Sharing & Non-Commercial Academic Research; <http://abs.scnat.ch>, visited March 2014

²⁰⁷ Swiss Information System Biodiversity (SIB); www.sib.admin.ch/, visited March 2014

3.3.2 Aichi Goal E: Enhance Implementation through Participatory Planning, Knowledge Management and Capacity Building



NBSAPs

By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.

Relevant CBD indicators (decision XI/3)

Trends in integration of biodiversity, ecosystem services and benefit-sharing into planning, policy formulation and implementation and incentives

- *Trends in implementation of national biodiversity strategies and action plans, including development, comprehensiveness, adoption and implementation (B)*

Goal of the Swiss Biodiversity Strategy:

- By 2020, the monitoring of changes in ecosystems and in species and genetic diversity is ensured.

No national indicator

Further information

A review of the Swiss Biodiversity Strategy will have to be undertaken in 2017.

Assessment:

On 25 April 2012, the Federal Council adopted the Swiss Biodiversity Strategy (SBS) which was developed in the light of the global Strategic Plan for Biodiversity and its Aichi Biodiversity Targets, with a special focus on mainstreaming biodiversity and on ecosystem conservation. At the same time, the Federal Council mandated the Federal Office with the elaboration of an action plan by 2014, in order to concretize the objectives of the Swiss Biodiversity Strategy by defining measures to ensure the conservation of biodiversity in our country in the long term. The action plan has been developed in a participatory process (chapter 2.1).

In conclusion, the Aichi target will be met as soon as the action plan is adopted by the government.



Traditional knowledge

By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.

Relevant CBD indicators (decision XI/3)

Trends in integration of biodiversity, ecosystem services and benefit-sharing into planning, policy formulation and implementation and incentives

- *Trends in land use change and land tenure in the traditional territories of indigenous and local communities (B) (decision X/43)*
- *Trends in the practice of traditional occupations (B) (decision X/43)*

Trends in accessibility of scientific/technical/traditional knowledge and its application

- *Trends in which traditional knowledge and practices are respected through their full integration, safeguards and the full and effective participation of indigenous and local communities in the national implementation of the Strategic Plan (B)*

Trends in accessibility of scientific/technical/traditional knowledge and its application

- *Trends of linguistic diversity and numbers of speakers of indigenous languages (B) (decision VII/30 and VIII/15)*

Goal of the Swiss Biodiversity Strategy:

- By 2020, Switzerland's commitment to the conservation of global biodiversity at international level is strengthened.

No national indicator

Assessment:

Switzerland has no indigenous communities as understood by the Convention. Switzerland's local communities, however, are fully integrated in the implementation of the Convention, as described in the principles of Swiss federalism (4 NR, section 2.1.1), e.g. through environmental protection organisations' collective right of appeal, as highlighted in chapter 3.1.1.

As a measure to increase transparency in access and benefit sharing, the Swiss Patent Act requires patent applicants to disclose the source of a genetic resource and/or traditional knowledge in the patent application, if the invention is directly based on this resource or knowledge.²⁰⁸ Moreover, the amendments in the Federal Act on the Protection of Nature and Cultural Heritage on 21 March 2014 that have been adopted by the Swiss parliament on 21 March 2014 in order to implement the Nagoya Protocol also contain

²⁰⁸ Swiss Federal Institute of Intellectual Property: Patent law reform - Biotechnological inventions, www.ige.ch, visited March 2014

measures with regard to the utilization of traditional knowledge associated with genetic resources (see chapter 2.3).

As a Party to the UNESCO Convention for the Safeguarding of Intangible Cultural Heritage (16 October 2008), Switzerland pledged to compile and periodically update an inventory of the living traditions found on its territory. The "Inventory of Living Traditions" is accessible online (<http://www.lebendige-traditionen.ch>). Many living traditions are related to agriculture and therefore interlinked and of relevance for biodiversity conservation, e.g. chestnut farming, fruit growing, herbal knowledge, "Wässermatten", wild hay making etc. Many of these traditional practices are promoted, among others, by means of ecological compensation (chapter 1.2.2).

Switzerland has been actively participating in the ongoing negotiations of the Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore (IGC) of the World Intellectual Property Organization (WIPO) about an international legal instrument (or instruments) for the protection of genetic resources and traditional knowledge.

The protection of traditional knowledge, innovations and practices as well as the rights of the indigenous and local communities, is an important pillar of Switzerland's technical cooperation (chapter 3.4).

In conclusion, the respect of traditional knowledge relevant for the conservation and sustainable use of biodiversity is integrated in Switzerland's relevant legal provisions and activities.



Biodiversity knowledge

By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.

Relevant CBD indicators (decision XI/3)

Trends in accessibility of scientific/technical/traditional knowledge and its application

- *Trends in coverage of comprehensive policy relevant sub-global assessments including related capacity-building and knowledge transfer, plus trends in uptake into policy (B)*
- *Number of maintained species inventories being used to implement the Convention (C)*

Goals of the Swiss Biodiversity Strategy:

- By 2020, sufficient knowledge about biodiversity is available to society and provides the basis for the universal understanding of biodiversity as a central pillar of life, and for its consideration in relevant decision-making processes.
- By 2020, the monitoring of changes in ecosystems and in species and genetic diversity is ensured.

No national indicator

Assessment:

Switzerland has a comprehensive set of national monitoring programmes related to the environment, and specifically to biodiversity. The programmes are introduced in section 2.3.9 of Switzerland's Fourth National report. The management of the publicly available data is depicted in section 2.3.10 of the mentioned report. All information is accessible online (see Swiss Information-System Biodiversity (SIB): www.sib.admin.ch > Convention on Biodiversity > Biodiversity: Data & State).

The major shortcoming for the generation of biodiversity knowledge in the future is the creeping loss of knowledge in systematics in general due to the abolishment of many professorships.²⁰⁹ In order to counteract this development, the Swiss Systematic Society (SSS) was founded in 2005. The SSS is a scientific society open to both professionals and amateurs. The basic objective of the SSS is to ensure that expertise in systematics is guaranteed in the long term in Switzerland. More generally, the SSS wants to be an authoritative voice in discussions of systematic-related questions in this country.²¹⁰

Knowledge and how knowledge is used, are two of the most precious resources in designing sustainable development processes. Therefore, basic and professional training as well as research and innovation are supported by the Confederation. The Federal Office for the Environment, for instance, supports the integration of environmental issues in basic and professional training and, to this effect, collaborates with the cantons as well as with its partners (Sanu future learning²¹¹; FEE – Foundation for Environmental Training;²¹² SILVIVA – Foundation for Environmental Training and Forest;²¹³ and the training centre of the World Wide Fund for Nature WWF).

In conclusion, high quality information on Switzerland's biodiversity is available (see also 4 NR, chapter 2.3.9). However, significant efforts will be needed, not only to secure the availability of such information in future, but also to further develop the knowledge base, e.g. by addressing biodiversity values, and to effectively communicate biodiversity knowledge to promote action to achieve the objectives of the Aichi targets.

²⁰⁹ Die Zukunft der Systematik in der Schweiz Systematik als biologische Schlüsseldisziplin - Ein Positionspapier der Akademie der Naturwissenschaften. Download: www.biodiversity.ch/downloads/Systematik_d_leicht.pdf.

²¹⁰ Connaissances especes: www.connaissances-especes.ch, visited March 2014.

²¹¹ Sanu future learning: www.sanu.ch, visited March 2014

²¹² Foundation for Environmental Training: www.educ-envir.ch, visited March 2014

²¹³ Silviva - Foundation for Environmental Training and Forest: www.silviva.ch, visited March 2014



Resource mobilization

By 2020, at the latest, the mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020 from all sources, and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization, should increase substantially from the current levels. This target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties.

Relevant CBD indicators (decision XI/3)

Trends in mobilization of financial resources

- *Indicators agreed in decision X/3 (B)*

Objectives of the Swiss Biodiversity Strategy:

- By 2020, ecosystem services are recorded quantitatively. This enables their consideration in the measurement of welfare as complementary indicators to gross domestic product, and in regulatory impact assessments.
- By 2020, Switzerland's commitment to the conservation of global biodiversity at international level is strengthened.

National indicator:

See Switzerland's responses provided through the „Resource Mobilization Strategy – Preliminary reporting Framework“.

Assessment:

See Switzerland's responses provided through the „Resource Mobilization Strategy – Preliminary reporting Framework“.

3.4 Switzerland and the Millennium Development Goals MDGs

Baseline information in the Fourth National Report:

- Cooperation: chapter 3.9, p. 93 ff.

Article 54 paragraph 2 of the Swiss Federal Constitution states: “The Confederation shall ensure that the independence of Switzerland and its welfare are safeguarded; it shall in particular assist in the alleviation of need and of poverty in the world and promote respect for human rights and democracy, the peaceful coexistence of peoples as well as the conservation of natural resources”.

This reflects the content of the Millennium Development Goals fairly accurately. With its strong global network, Switzerland wishes to contribute to sustainable economic, social and environmental development worldwide.

The MDGs are another measure of the success of Swiss development cooperation and humanitarian aid efforts. Since proclamation of the Millennium Declaration in the year 2000, Switzerland has increased its Official Development Assistance (ODA) from 0.34% of GNI (2008) to 0.47% of GNI (2009), or just under CHF 2.5 billion (including migrants-related costs/debt relief). Further, the parliament decided in February 2011 to further increase development aid to 0.5% of gross national income by 2015. Switzerland has also focused its development cooperation activities on a smaller number of countries and aligned these activities more specifically along MDGs. Swiss programmes and projects are also now more results-based.

Various federal agencies work together at bilateral and multilateral levels to achieve the MDGs, specifically the Federal Department of Foreign Affairs (FDFA), which works through the Swiss Agency for Development and Cooperation (SDC) and the Political Affairs Division IV: Human Security and the State Secretariat for Economic Affairs (SECO), which works through its Economic Cooperation and Development Division. The international divisions of other federal agencies are also involved.²¹⁴

Switzerland has adopted a proactive international environmental policy that also contributes to the achievement of the qualitative aspects of MDG 7. The small country plays a very active role in international environmental protection organisations, processes and instruments. As a case in point, Switzerland is an active member in and one of the largest donors to the United Nations Environment Programme (UNEP). Switzerland has ratified all major multilateral environmental agreements. In various multilateral organizations, such as UN agencies, the World Bank and the Global Environment Facility, Switzerland is engaged in the development of policies and standards to promote the sustainable use and protection of natural resources.

Switzerland has aligned the international cooperation framework at the request of global sustainable development. In 2012, the Swiss parliament adopted the Federal Council Dispatch on International Cooperation for 2013–2016. Five strategic key aspects were put forward for the current period.²¹⁵

1. Management and prevention of conflicts, crises, and disasters
2. Access to health, basic education and vocational training, water and food.
3. Promotion of a sustainable economy.
4. Support countries in transition to democratic and free-market systems.
5. Contribution to a pro-development, environmentally and socially sustainable globalisation

The 5th strategic objective - the most relevant for biodiversity aspects - is both implemented specifically in the bilateral cooperation by the SDC and SECO,

²¹⁴ Swiss Federal Council 2010: Millennium Development Goals - Progress Report of Switzerland 2010. Federal Department of Foreign Affairs (ed.), Berne. .

²¹⁵ Swiss Federal Council: Botschaft über die internationale Zusammenarbeit 2013–2016 vom 15. Februar 2012 (12.029)


and through their global programmes. Biodiversity in general is in most cases considered as a cross-cutting aspect, concerning most of the activities in the area of environment and sustainability.

In development programmes, sustainable use and protection of natural resources and of biodiversity are promoted and supported with targeted measures such as in forestry or agriculture programmes and projects. There are several initiatives, development programmes and projects directly addressing biodiversity, as presented in the following examples:

The Agrobiodiversity Initiative (TABI) is a programme being developed by SDC in the Lao PDR. It will directly address the escalating destruction of biodiversity resources which represent the foundation and safety net for the livelihoods of hundreds of thousands of rural upland farmers in Lao. The design of the TABI is guided by basic principles drawn from outcomes of regional and global meetings on the implementation of multilateral environment agreements, particularly CBD, and their practical application to farm level issues.

Biodiversity trade: protection through use - Switzerland supports the approach adopted by CBD. Therefore, since 2002, Switzerland has developed and implemented the concept of "biotrade" in collaboration with UNCTAD: export products are promoted on the basis of local biological resources. At the same time, the sustainable management of the ecosystem is guaranteed. Since 2003 the UNCTAD BioTrade Initiative has also hosted the BioTrade Facilitation Programme (BTFFP), which focuses on enhancing sustainable bio-resources management, product development, value adding processing and marketing. The BTFFP complements the UNCTAD BioTrade Initiative activities. It is currently in its second phase (BTFFP II) with various partners implementing its objectives. Activities are funded by the Danish, Dutch and Swiss governments (SECO).

Appendix I: Information concerning reporting Party and the preparation of the National Report

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SUBMISSION	
Signature of officer responsible for submitting national report	
Date of submission	30.04.2014

This report was prepared by the Federal Office for the Environment (FOEN) in cooperation with the other government departments concerned at federal level and with representatives of the scientific community and NGO's.

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Appendix II: Further Sources of Information

The **Swiss Information-system Biodiversity SIB** is Switzerland's contribution to the global network of Clearing-House Mechanisms (CHM) under the Convention on Biological Diversity (CBD).

The SIB (www.sib.admin.ch / <http://ch.chm-cbd.net/>) includes, among others, information about:

- **The legal framework, the Swiss Biodiversity strategy and its Action Plan, further strategies and action plans, mainstreaming biodiversity**
> *Convention on Biodiversity > National Implementation*
- **Biodiversity Data & State, including national monitoring programmes, data centres, indicators and environmental status reports**
> *Convention on Biodiversity > Biodiversity Data & State*
- **Publications of the Swiss Confederation** relevant for the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits. You may search the database by CBD programme, by article of the Convention as well as other fields
> *Documentation > Biodiversity Publications*
- **A compilation of Switzerland's national reports under relevant conventions and agreements**
> *Documentation > National Reports*
- **Information on the Cartagena Protocol and its implementation**
> *Cartagena Protocol*
- **Information on the Nagoya Protocol and its implementation**
> *Nagoya Protocol*