SWISS ENVIRONMENTAL STATISTICS

A BRIEF GUIDE 2005

Swiss Agency for the Environment, Forests and Landscape SAEFL

OFS BFS UST

Office fédéral de la statistique
Bundesamt für Statistik
Ufficio federale di statistica
Uffizi federal da statistica
Swiss Federal Statistical Office

USED SYMBOLS

Status
Assessment of the status of an environmental indicator:
☺ positive
😐 stable
☹ negative
◯ not assessed

Trend
Direction of an indicator over the past 3–10 years:
↗ upward
→ stable
↘ downward

* = Glossary page 33

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CONTENTS

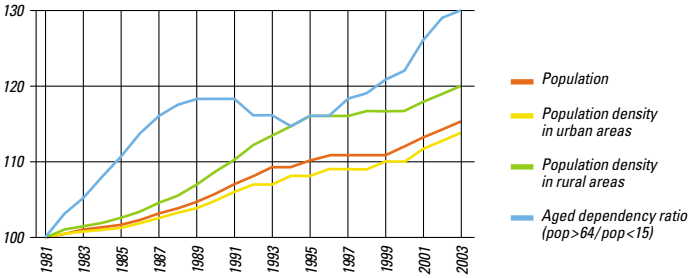
1 Population

Population density in rural areas increasing

	Indicator	Status	Trend
Structure	Population growth	◯	↗
	Population density in urban areas	😐	↗
	Population density in rural areas	☹	↗
	Aged dependency ratio (OECD)	😐	↗

The population structure (density, age, size of families, etc.) has an impact on the standard of living and lifestyle of a population, which in turn affects a population's production and consumption habits. The higher the standard of living, the higher the consumption and subsequent production. There are also implications in terms of use of resources and the extent of environmental pollution. For example, the higher the population of a given location, the greater the environmental impact caused by humans.
Nowadays, 73% of the Swiss population live in urban areas. People tend to work in the city and live in the suburbs or outlying rural areas. This has resulted in increased development of the surrounding countryside (see 15 Landscape and spatial planning) as well as in larger commuter flows (see 6 Transport and mobility).

Correlations – Comparisons – Trends
(Index 100 = 1981)



Source: Swiss Federal Statistical Office.

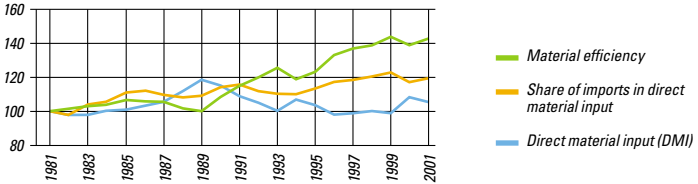
2 Material flows

Dematerialisation of the economy: crucial for sustainable development

	Indicator	Status	Trend
Flows into economy	Direct material input (DMI)*	☹	→
Material efficiency	GDP / tons domestic material consumption	○	↗
Share of imports	% of direct material input (DMI)*	☹	↗

Annual direct material input to the Swiss economy exceeds 100 million tons, amounting to over 14 tons per inhabitant. Only a quarter of these materials are renewable. All materials entering the Swiss economy are accounted for: materials extracted in Switzerland as well as substances and manufactured goods imported into the country. Material efficiency, which measures the value added per unit of domestically consumed material (CHF/kg), has improved since the beginning of the nineties. This trend is partly due to greater efficiency of certain production runs or technical processes and partly due to more reuse and recycling of various materials. At first glance, it is tempting to conclude that improved material efficiency in Switzerland has made the overall environmental situation better. However, there are two reasons to be cautious when making this assessment: first of all, demand for materials in the tertiary sector, which is becoming an increasingly important part of the Swiss economy, is much less than in the secondary sector; in addition, more and more manufactured goods are being imported into the country. The materials and energy that went into making those goods are not taken into account in the DMI calculation. These indirect flows are difficult to quantify. It has been estimated that for every ton of imported manufactured goods, several tons of indirect flows are generated in the country of manufacture. In other words, improved material efficiency in Switzerland can also be ascribed to a shifting of environmental pressure abroad.

Direct material input (DMI*), material efficiency and share of imports in direct material input (Index 100 = 1981)



Source: Swiss Federal Statistical Office.

3 Economy

Economic growth still directly linked to energy consumption

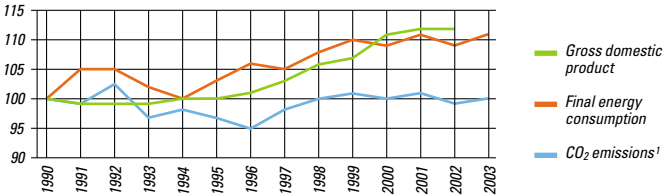
	Indicator	Status	Trend
Labour and income	Gross domestic product (GDP)	○	↗
	Consumer Price Index	○	↗
	Unemployment rate	○	→
	Persons in employment	○	↗
	Total working hours	○	↘
Resources	Final energy consumption	☹	↗
	Energy intensity of the national economy	☹	→
	Carbon dioxide (CO_2) emissions	☹	→
	Carbon dioxide (CO_2) intensity of the national economy	☹	↘

Carbon dioxide (CO2) intensity and energy intensity in the national economy*

Intensities are calculated either as a ratio of CO_2 / GDP or final energy consumption / GDP. CO_2 intensity of the national economy has gone down over the past 10 years; energy intensity has remained stable. The trend in CO_2 emissions is partly due to decreased CO_2 intensity of industrial processes and resulting optimization of material flows. At the same time, however, West European countries have tended to relocate CO_2-intensive production processes abroad and developing the CO_2-extensive tertiary sector at home. The milder winters of the nineties, however, can also be attributed to decreased CO_2 intensity.

The trend in energy consumption in the economy is due to the fact that economic growth is still directly linked to energy consumption, as has always been the case in the past.

Correlations – Comparisons – Trends
(Index 100 = 1990)



[1] *According to Swiss Federal Law on CO_2 emissions Switzerland.*

Source: Swiss Federal Statistical Office, Swiss Federal Office of Energy, Swiss Agency for the Environment, Forests and Landscape.

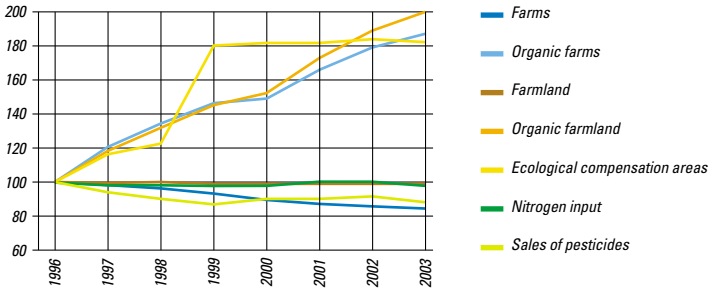
4 Agriculture

Organic farms becoming more prevalent

	Indicator	Status	Trend
Farms	Total number of farms	◯	↘
	Number of organic farms	☺	↗
Land use	Agricultural areas	😐	→
	Agricultural areas used for organic farming	☺	↗
	Ecological compensation areas	☺	→
Pollution	Nitrogen input	☹	→
	Sales of pesticides	☹	→
	Total livestock	😐	↘

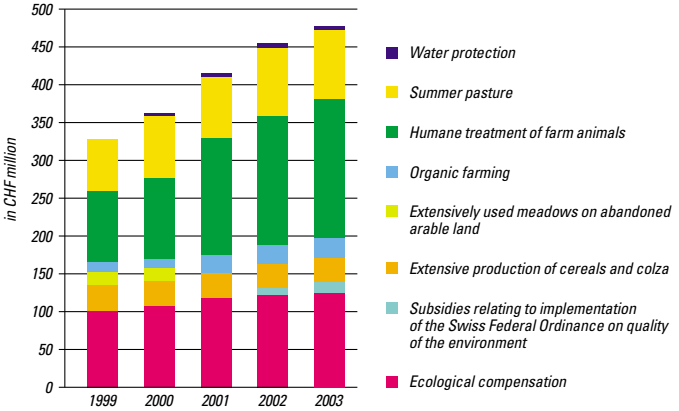
Environmental concerns in agriculture are addressed through certification of environmental management systems (EMS). In order to receive farm subsidies, farmers must obtain EMS certification by demonstrating that they: make a balanced use of fertilizers; use at least 7% of their farmland as ecological compensation areas; regularly rotate crops; adopt appropriate measures to protect animals and soil; make limited and targeted use of pesticides.
Environmental management systems are intended to protect natural biodiversity, reduce nitrate pollution in soils and spring water, reduce phosphorous pollution in surface water (see 11 Water), and ensure that farmers treat animals as humanely as possible. Organic farms, for their part, exceed EMS certification criteria on environmental protection, keeping animals in their natural environments and farm-wide implementation.

Correlations – Comparisons – Trends
(Index 100 = 1996)



Source: Swiss Federal Statistical Office: Statistical Yearbook of Switzerland 2005; Einblicke in die schweizerische Landwirtschaft (Insights into Swiss Agriculture). 2004 edition. Neuchâtel 2004.

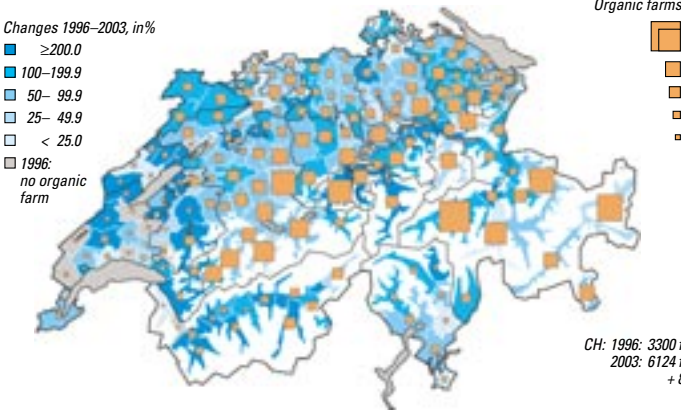
Distribution and trends in farm subsidies devoted to environmental protection, 1999–2003



Source: Swiss Federal Office for Agriculture: Agricultural Report 2004. Bern 2004.

Growth in organic farming 1996–2003

Per district



Source: Swiss Federal Statistical Office: ThemaKart, Neuchâtel 2005.

5 Households and consumption

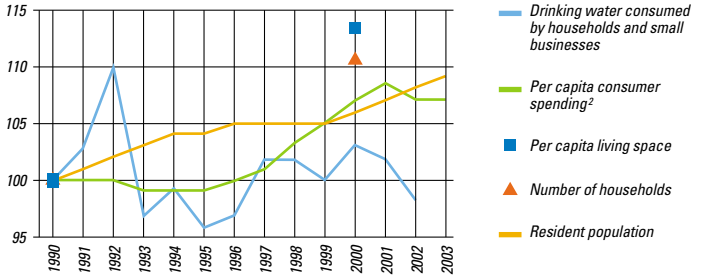
Per capita living space increasing

	Indicator	Status	Trend
Population	Resident population	◯	↗
	Number of households	◯	↗
	1-person housholds	◯	↗
	2-person housholds	◯	↗
Consumption/ pollution	Living space used	☹	↗
	Drinking water consumption	😐	→
	Final energy consumption	☹	↗
	Municipal waste (unsorted)	☹	→
	Consumer spending	☹	↗

Changes in the number of households, household composition and consumption habits all have an impact on the environment. In 2000, the average person required 44m² of living space, which is about 10m² more than back in 1980. Our living and consumption habits are closely linked with our consumption of energy and drinking water as well as with the amount of waste we produce. In 2003, households and small businesses consumed about 28% of total available energy and 62% of the drinking water[1]. In addition, 351kg of waste per capita were incinerated or deposited in landfills and 308kg of waste per capita were sorted and recycled.

[1] *2002 figures.*

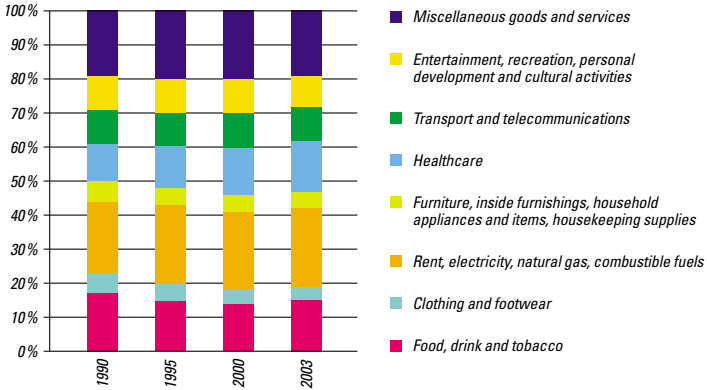
Correlations – Comparisons – Trends
(Index 100 = 1990)



[2] *In real terms.*

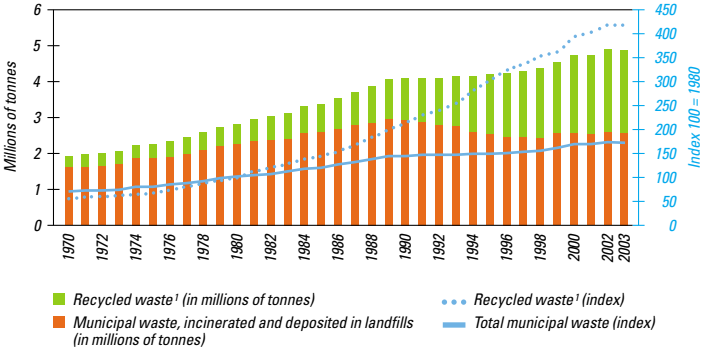
Source: Swiss Federal Statistical Office; Swiss Gas and Water Industry Association.

Breakdown of consumer spending



Source: Swiss Federal Statistical Office.

Trend and composition of municipal waste



[1] Total comprising compost, paper and cardboard, glass, tinfoil, aluminium, PET, textiles.

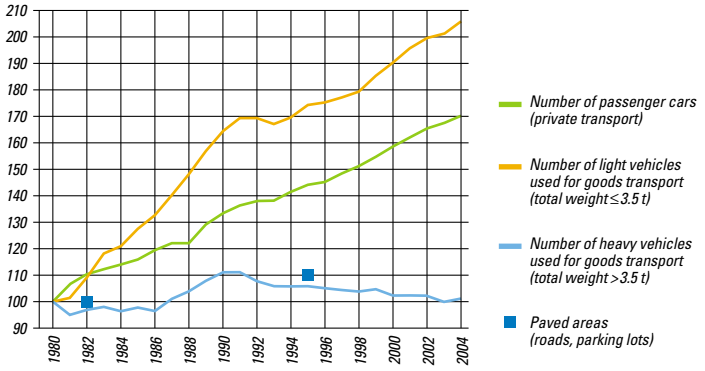
Source: Swiss Agency for the Environment, Forests and Landscape.

6 Transport and mobility

Increased mobility harmful for the environment

	Indicator	Status	Trend
Traffic volume	Road traffic	◯	↗
	Air traffic	◯	↗
	Rail traffic	◯	↗
Traffic growth	Number of passenger cars	◯	↗
	Commute time	◯	↗
	Daily commuting distance per capita	◯	↗
Usage of space	Transportation area	☹	↗
Emissions* (air pollutants)	Nitrogen oxides (NO_x)	☹	↘
	Particulate matter (PM10)	☹	→
Concentrations* (air pollution)	Ozone (O_3, low-lying)	☹	→
Greenhouse gases	Carbon dioxide (CO_2)	☹	↗
Final energy consumption	Passenger traffic	☹	↗
	Goods traffic	☹	↗

Correlations – Comparisions – Trends
(Index 100 = 1980)



Source: Swiss Federal Statistical Office: Swiss Transport Statistics, land use statistics.

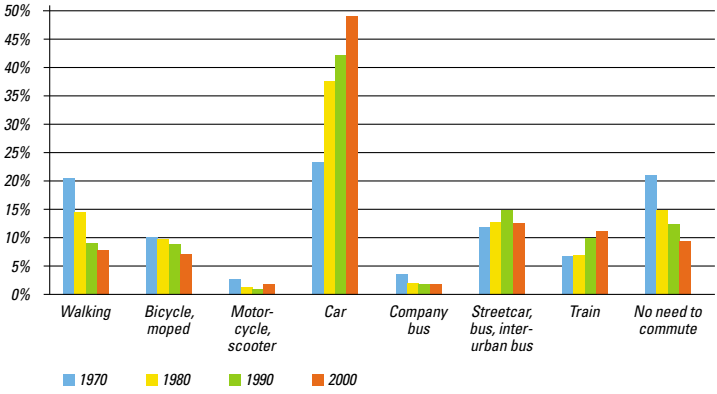
Thanks to air pollution control measures and technological improvements (e.g. introduction of the catalytic converter), emissions of air pollutants have significantly dropped. However, the massive increase in mobility may undermine progress made.
Approximately 34% of carbon dioxide (CO_2) emissions in Switzerland come from transport (excl. international air traffic). A new development has been the dramatic increase in the number of private cars running on diesel fuel. Since 1990, the number of diesel engine cars has practically quadrupled. Although diesel engines emit 12% less CO_2 than comparable petrol engines, they emit about 1000 times more cancer-causing particulate matter than petrol engines (if they are not equipped with particulate filters) (see 10 Climate & Air).
Transport is also a major source of noise (see 14 Noise). In addition, rising demand for mobility is closely linked with increasing encroachment of undeveloped land (see 15 Landscape and spatial planning).

Commuting

In the year 2000, roughly 6 out of 10 people worked in a location other than their place of residence. This situation has led to an increase in commuting, with comuters preferring private cars over other types of transport as shown in the following commuter-specific indicators:

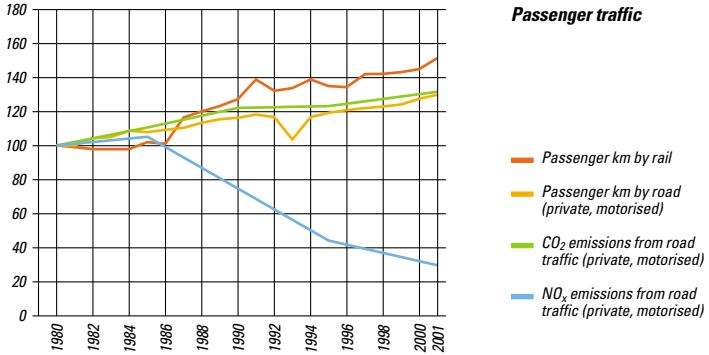
– Rush hour traffic and subsequent traffic jams;
– Concentration in densely populated areas;
– The means of transportation used to go to work has a major impact on the choice of transportation in other circumstances: If a private car is used to go to work, it is generally also used for shopping and leisure activities.

Commuters: Means of transportation used to go to work



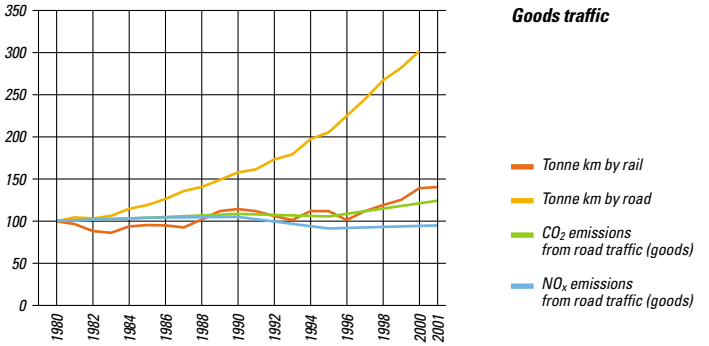
Source: Federal Office for Spatial Development, Swiss Federal Statistical Office: Microcensus 2000 on transportation habits.

Correlations – Comparisions – Trends
(Index 100 = 1980)



Source: Swiss Federal Statistical Office: Swiss Transport Statistics.
Swiss Agency for the Environment, Forests and Landscape: Environmental Report, issue No. 355: Air Pollutant Emissions from Road Transport 1980–2030. Bern 2004.

Correlations – Comparisions – Trends
(Index 100 = 1980)



Source: Swiss Federal Statistical Office: Swiss Transport Statistics.
Swiss Agency for the Environment, Forests and Landscape: Environmental Report, issue No. 355: Air Pollutant Emissions from Road Transport 1980–2030. Bern 2004.

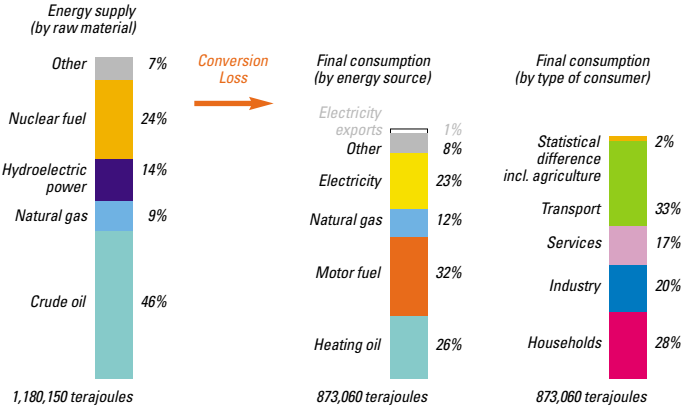
7 Energy

Most of our final energy consumption derived from fossil fuels

	Indicator	Status	Trend
Total energy supply	New renewable energy sources*	◯	↗
	Hydroelectric power	◯	↗
	Fossil fuels	◯	↗
	Nuclear power	◯	↗
Final energy consumption	Total energy	☹	↗
	Electricity	☹	↗
	Industry and services energy consumption	☹	↗
	Household energy consumption	☹	↗
	Energy used for transport	☹	↗

Yearly final energy consumption per capita has been fluctuating between 31,000 and 33,500 kilowatt hours (kWh) since 1990. In 2003 final energy consumption per capita stood at 32,750 kWh, a third of which was used for transport. At the same time, both the population and final energy consumption continues to increase in absolute terms. This is despite improvements made to installations and processes and resulting efficiency gains.

Total energy supply and final energy consumption 2003



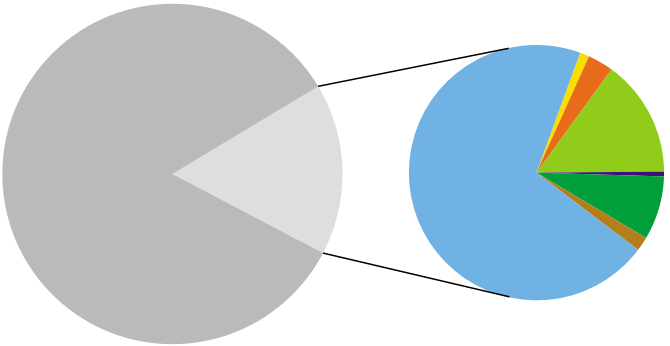
Source: Swiss Federal Office of Energy: Overall energy statistics, 2003. Bern 2004.

SwissEnergy

In 2001, the Swiss Federal Council launched the SwissEnergy Programme, which is designed to promote renewable Energy sources and Energy conservation. The programme objectives to be reached by 2010 are as follows:

- The consumption of fossil fuels in Switzerland and the concomitant CO_2 emissions must be reduced by 10%.
- The growth of electricity demand must not exceed 5%.
- The share of hydroelectric power in total energy supply must not be reduced.
- The yearly contribution made by new renewable energy* (i.e. other than hydropower) to total electricity production must increase by 1% and to heat energy 3%.
- Development of greater awareness of the energy issues among the general public.

Share of renewable energy in final energy consumption, 2003

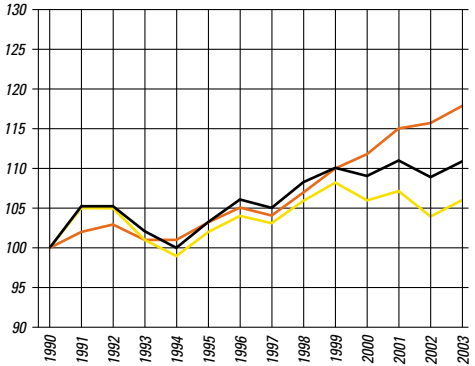


Final consumption, non-renewable sources (e.g. from fossil fuels and nuclear energy)	*83.7%*
Final consumption, renewable sources	*16.3%*

Hydroelectric power	*11.50%*
Solar power	*0.11%*
Ambient heat	*0.57%*
Biomass (wood und biogas)	*2.58%*
Wind energy	*0.002%*
Renewable energy from treatment of waste	*1.32%*
Renewable energy from treatment of sewage	*0.19%*

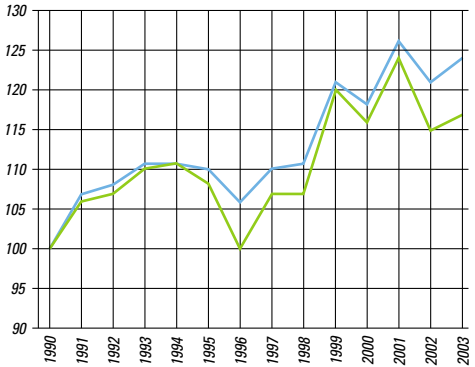
Source: Swiss Federal Office of Energy: Schweizerische Statistik der erneuerbaren Energien (Swiss statistics on renewable energy sources) 2003. Bern 2004.

Trends in final energy consumption (Index 100 = 1990)



Source: Swiss Federal Office of Energy: Overall energy statistics, 2003. Bern 2004.

Trends in final consumption of renewable energy (Index 100 = 1990)



Source: Swiss Federal Office of Energy: Schweizerische Statistik der erneuerbaren Energien (Swiss statistics on renewable energy sources) 2003. Bern 2004.

8 Biotechnology

Strict measures to protect human health and the environment

Research into genetically modified or pathogenic organisms and subsequent use are strictly regulated in Switzerland. The purpose of regulations is to protect human health and the environment, maintain biodiversity, take ethical concerns into account and safeguard the consumer's right to choose.
While extensive laboratory research and production within containment facilities takes place in Switzerland, only rarely are requests to release and market these organisms granted.

Legislation

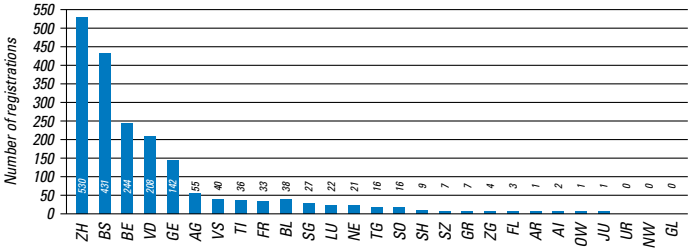
Activities relating to genetically modified organisms (GMOs) fall under Articles 10–12 of the Swiss Federal Law on genetic engineering. Activities relating to pathogenic organisms (POs)* fall under Article 29, paragraphs b–d of the Swiss Federal Law on environmental protection. Both pieces of legislation apply the step-by-step principle: the first step is contained R&D. After that comes trial release of the final product (e.g. fertilizer, seeds) directly into the environment. The last step is the final release onto the market. Each step requires government approval before it can begin. The Swiss Federal Council has strengthened this requirement both in the Swiss Federal Ordinance on use in containment and in the Swiss Federal Ordinance on trial releases.

Number of registrations and authorisation requests granted (GMOs and/or POs)

Contained R&D	(since 1999)	797
Trial release	(since 1999)	2
Gene therapy	(since 2002)	5
Final release onto the market	(since 1999)	6

Reported activities under the Swiss Federal Ordinance on use in containment

Total reported activities involving genetically modified or pathogenic organisms between 1999 and 2003, breakdown according to canton.



Source: Swiss Agency for the Environment, Forests and Landscape.

9 Soils

Naturally developed soils disappearing

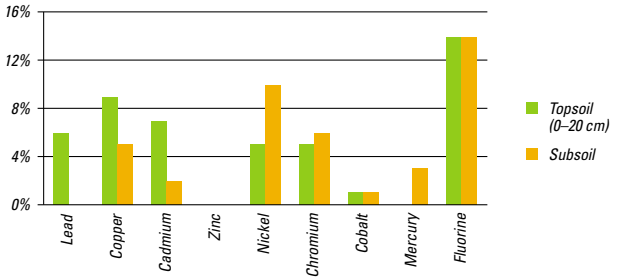
While it only takes a few weeks or years for air and bodies of water to replenish, it takes thousands of years for soils. As they move through the environmental cycle, pollutants such as heavy metals and poorly biodegradable organic compounds gradually accumulate in soils. There, they can interfere with the nitrogen transformations carried out by bacteria living in soils and plants, become absorbed in growing fruit and vegetable plants and finally cause human health problems when those fruit and vegetables are consumed. As a direct result of pollution, it is no longer possible in many places to maintain lasting nutrient-rich soils.

Threshold values

Threshold values are indicative values intended to preserve soil ecosystems in the long-term. Among other things, the Swiss Federal Ordinance on soil contamination (VBBo) establishes threshold values for soil pollutants. Here are a few examples of threshold values for the most important inorganic soil pollutants resulting from human activity:

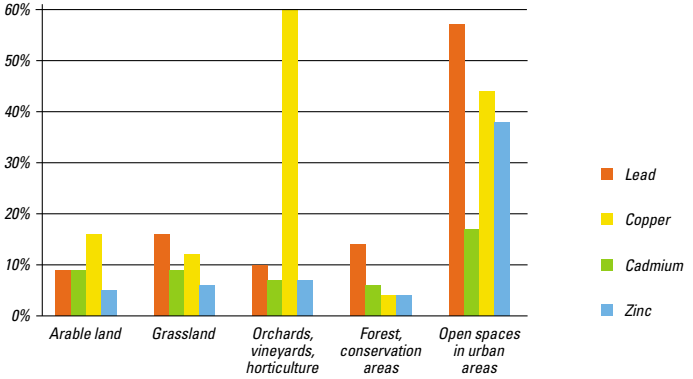
Lead:	50	mg/kg soil
Copper:	40	mg/kg soil
Cadmium:	0,8	mg/kg soil
Zinc:	150	mg/kg soil

Exceedences in 105 experimental fields within the Swiss Soil Monitoring Network (NABO) from 1985–1997
(based on threshold values in the VBBo)



Source: Swiss Agency for the Environment, Forests and Landscape: Environmental Report, issue No. 320, Nationales Beobachtungsnetz – Veränderung von Schadstoffgehalten nach 5 und 10 Jahren (Changes in concentrations of harmful substances after 5- and 10-year period). Bern 2000.

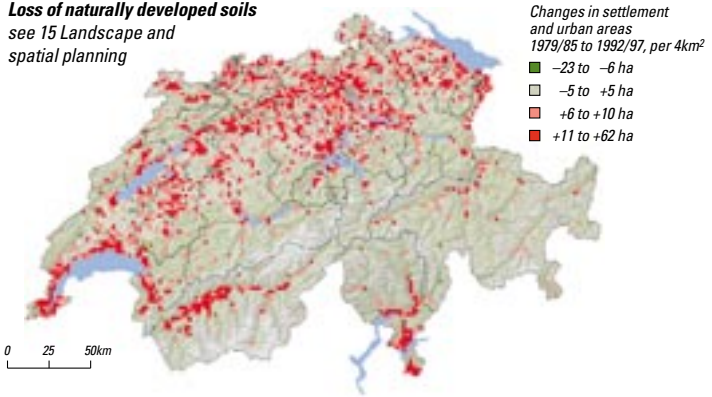
Exceedences shown according to land use in about 1400 cantonal and national measurement stations, 1990–1996



Source: Swiss Agency for the Environment, Forests and Landscape: Environmental Report, issue No. 139, Böden der Schweiz – Schadstoffgehalte und Orientierungswerte (Soils in Switzerland – Concentrations of harmful substances and benchmarks). Bern 2001.

12-year expansion of settlement and urban area – Loss of naturally developed soils

see 15 Landscape and spatial planning



Public parks and green urban areas – where naturally developed soils have only partially been destroyed – are considered part of settlement and urban areas.

Source: Swiss Federal Statistical Office: land use statistics. Neuchâtel 2002.

10 Climate and air

Measures still needed to improve air quality

	Indicator	Status	Trend
Concentrations* (air pollution)	Sulphur dioxide (SO_2)	☺	→
	Nitrogen dioxide (NO_2)	☹	→
	Particulate matter (PM10)	☹	→
	Ozone (O_3, low-lying)	☹	→
Greenhouse gases	Carbon dioxide (CO_2)	☹	→
	Methane (CH_4)	☹	↘
	Nitrous oxide (N_2O)	☹	→
	F-gases: HFCs, PFCs, SF_6	☹	↗
	Chlorofluorocarbons: CFCs, HCFCs	😐	↘
Warming	Global average yearly temperature		↗
	Swiss average yearly temperature		↗

Climate change is an international environmental problem, with the greenhouse effect being the main culprit. Though a natural phenomenon, the greenhouse effect is intensified by greenhouse gas emissions form human activity. The various greenhouse gases make very different contributions to the greenhouse effect, which depend on intensity of emissions and their Global Warming Potential (GWP). Carbon dioxide (CO_2), for example, is by far the most important greenhouse gas, making up 80% of all emissions. CO_2 therefore has a GWP of 1 ($CH_4 \cong 21$, $N_2O \cong 310$, F-gases ≅ a few hundred to several thousand).

Swiss Federal Law on CO_2 emissions

Swiss implementation of the Kyoto Protocol is based on the Swiss Federal Law on CO_2 emissions, which requires CO_2 emissions to be reduced by 2010, using 1990 levels of emissions as a benchmark:

CO_2-Emissions	*2010 target*	*Progress made 1990–2003*
Total	10% reduction	0.2% increase
Combustible fuels	15% reduction	4.6% reduction
Motor fuels	8% reduction	8.1% increase

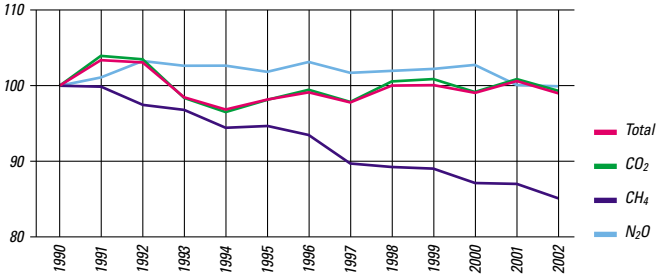
Emissions of most air pollutants have decreased over the past few years. Nevertheless, high concentrations of low-lying ozone, particulate matter (PM10) and nitrogen dioxide are still reported on a regular basis. Severe air pollution is detrimental to both human health and ecosystems.

Particulate matter (PM10)

PM10 are respiratory dust particles with a diameter of less than 10 microns. They are small enough to be inhaled into the deepest parts of the lung, leading to serious health consequences. Diesel engine exhaust is particularly a problem because it contains particles that cause cancer (see 6 Transport and mobility). Other major sources of particles are industry, agriculture, wood burning and illegal incineration of waste.

Trends in greenhouse gas emissions (Index 100 = 1990)

Kyoto Protocol: 8% cut in greenhouse gas emissions between 2008 and 2012, using 1990 levels of emissions as a benchmark.[1]

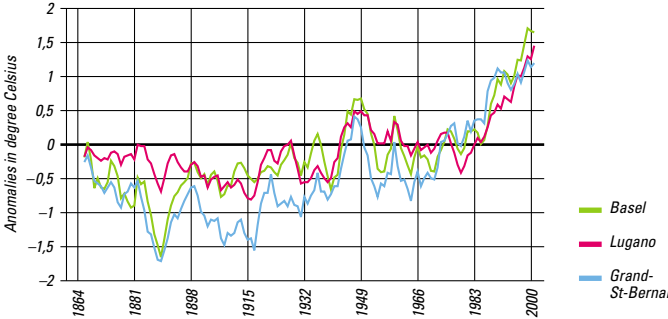


[1] *The Swiss Federal Law on CO_2 emissions calls for a 10% reduction, using 1990 levels of emissions as a benchmark.*

Source: Swiss Agency for the Environment, Forests and Landscape: Swiss greenhouse gas inventory, based on guidelines established for industrialised countries by the UN Framework Convention on Climate Change as well as on technical handbooks produced by the IPCC.

Mean temperature anomalies (relative to 1961–1990)

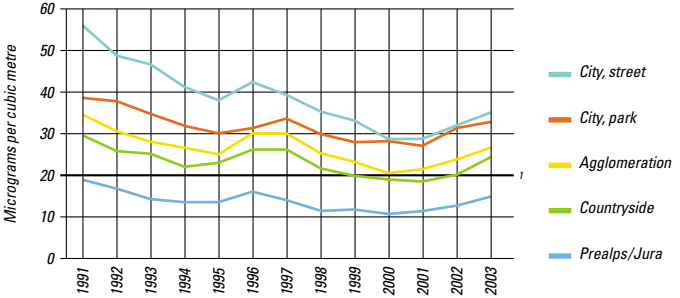
Running mean[2]



[2] *Running mean over 5-year period. E.g. the 1866 value is calculated by taking the arithmetic mean for the period 1864–1868. Likewise, the 1998 value is the result of the arithmetic mean for the period 1996–2000.*

Source: MeteoSwiss

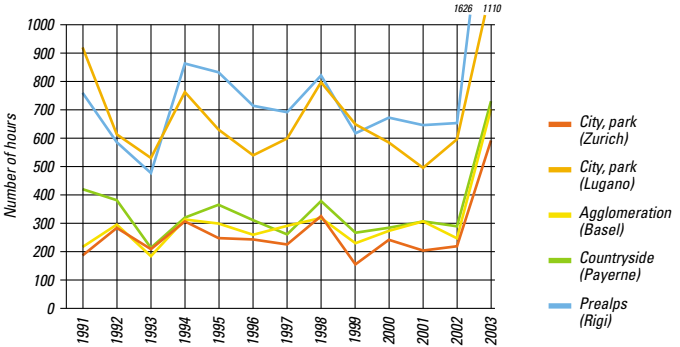
PM10: Yearly averages according to location type



[1] Swiss threshold: Annual mean – 20 micrograms/m³.

Source: Swiss Agency for the Environment, Forests and Landscape: Swiss Air Pollution Monitoring Network (NABEL).

Ozone: One-hour exceedences[2]



Swiss air quality standard: hourly mean (120 micrograms/m³) cannot be exceeded more than once per year. Ozone pollution was extremely high in 2003 due to high summer temperatures.

[2] Number of O_3 hours > 120 micrograms/m³.

Source: Swiss Agency for the Environment, Forests and Landscape: Swiss Air Pollution Monitoring Network (NABEL).

11 Water

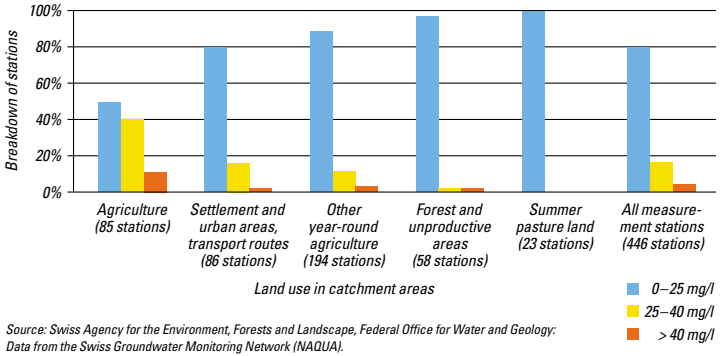
Despite declining concentrations of nutrients in water, progress still needed

	Indicator	Status	Trend
Drinking water consumption	Per capita total	😐	↘
	Businesses and industry	😐	↘
	Households and small businesses	😐	→
Concentration of pollutants (groundwater, lakes and watercourses)	Nitrates	😐	↘
	Phoshorus	😐	↘
	Pesticides	☹	
	Hydrocarbons	☹	

Water is the only major resource that Switzerland has. 4000–5000km of watercourses (roughly 10% of the entire Swiss water distribution network) have been deviated to generate hydroelectric power. In addition, settlement areas, agriculture, businesses and industry all tap into the natural water cycle (mainly for drinking water consumption), burdening this valuable resource in the process.
80% of all drinking water comes from groundwater sources. These sources are polluted by nitrates, pesticide residues and hydrocarbons. Nutrients and pesticides in water generally result from intensive farming (mainly from manure, tilling of the ground and pest management) as well as from settlement and urban areas (use of pesticides). Hydrocarbons in water mainly come from transport, businesses and industry.

Maxium nitrate levels in groundwater at 446 measurement stations 2003
according to land use

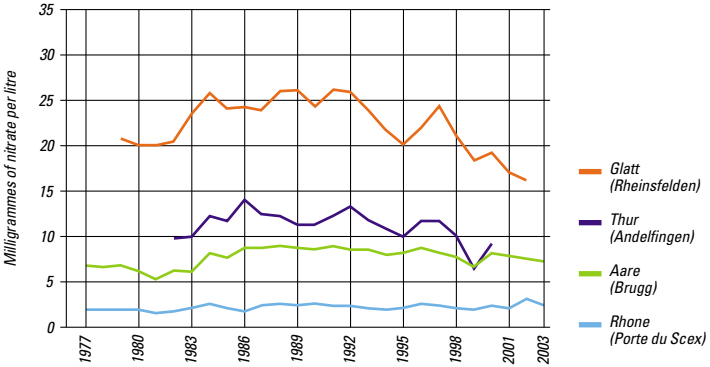
The Swiss Federal Ordinance on protection of lakes and rivers requires concentrations of nitrate in groundwater to be less than 25 milligrammes per litre.



Source: Swiss Agency for the Environment, Forests and Landscape, Federal Office for Water and Geology: Data from the Swiss Groundwater Monitoring Network (NAQUA).

Nitrate levels in four rivers

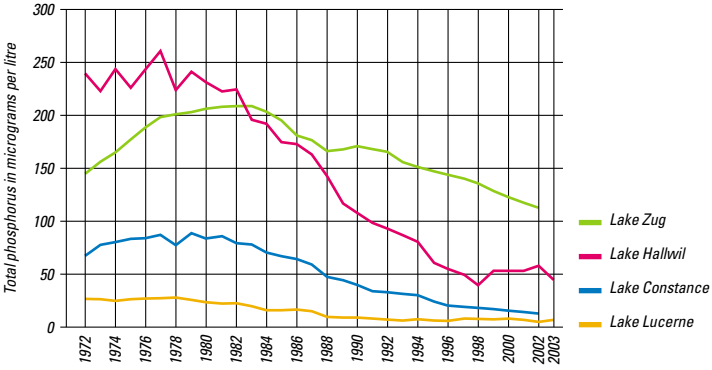
Yearly average



Source: Federal Office for Water and Geology: Swiss River Monitoring Programme (NADUF).

Phosphorus levels in four lakes

Yearly average



Source: Swiss Agency for the Environment, Forests and Landscape.

12 Substances and waste

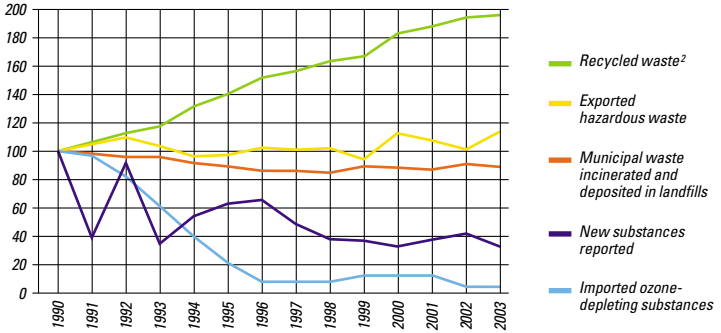
Recycling rate increases from 26% to 47% between 1988 and 2003

	Indicator	Status	Trend
Substances	New substances reported	☹	↗
	Imported ozone-depleting substances	😐	↘
	Emissions of dioxins and furans	😐	↘
Waste	Municipal waste	😐	→
	Waste sorting	😐	↗
	Recycling rates	☺	↗
	Hazardous waste	☹	↗

Substances are natural or man-made chemicals. Worldwide there are about 100,000 commercially used chemical substances. For this reason, both new and old substances need to be tested to determine their environmental impact. All substances and products become waste after they are used. Taxes based on the polluter pays principle have been created to help fund waste disposal. In 2003, fees based on the pay per bag principle and/or garbage weight were applied to roughly 70% of the Swiss population. Communes applying the pay per bag principle report 50–100 kg less waste per capita than communes that do not.[1]

[1] *Swiss Agency for the Environment, Forests and Landscapes: Environmental Report, issue No. 356 and 357. Bern 2000/2001 and 2003.*

Correlations – Comparisons – Trends
(Index 100 = 1990)



[2] *Total comprising compost, paper and cardboard, glass, tinfoil, aluminium, PET, textiles.*

Source: Swiss Agency for the Environment, Forests and Landscape.

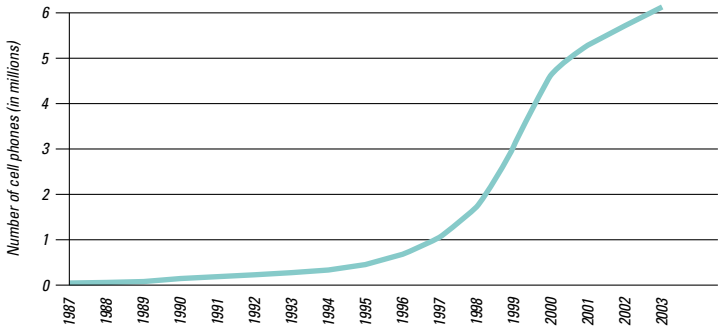
13 Non-ionized radiation

Caution is needed since the effects of non-ionized radiation are still unclear

Non-ionized radiation (NIR) from equipment and devices are all around us nowadays. People are exposed to both high-frequency radiation (cell phones, radar, microwaves, short, medium and long wavelength radio) and low-frequency electric and magnetic fields (power lines and railways). Extremely high-frequency radiation heats up body tissues. Strong low-frequency fields generate electric currents in the body, which can affect nerve and muscle cells. Scientific research and everyday observations of persons exposed to NIR show that there are health implications even with low levels of exposure to NIR. Since no solid assessment of risk has been possible thus far, regulations are to be based on the precautionary principle to ensure that radiation exposure is kept to a minimum.

General radiation exposure limits: *General radiation exposure limits* are intended to prevent the proven detrimental effects on health caused by radiation exposure. They take into account all types of radiation in a given location, are set according to international standards and are generally easy to comply with.
The Swiss Federal Law on environmental protection (USG) requires that pollution be kept as low as possible as a preventive measure. This is why *exposure limits in and around installations*, which are usually below general radiation exposure limits, have also been established. Exposure limits in and around installations apply to radiation coming from individual installations and must be adhered to whenever there is a likelihood that human beings will remain in the vicinity of such installations for extended periods of time.

Growth in cell phone usage 1987–2003



Source: Federal Office of Communications: telecommunication statistics.

14 Noise

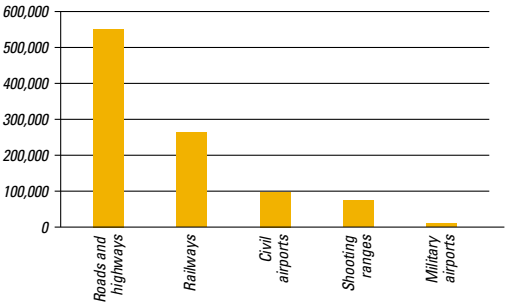
Transport is the primary source of noise

Transport is the primary source of noise and one of the most serious environmental problems of our highly mobile society. Laws have been passed to try and reduce ambient noise. For example there are laws that establish maximum threshold values for noise emissions from vehicles; other laws include noise reduction aspects in spatial planning; still other laws require improvements to existing equipment in order to reduce noise at the source, propagation of noise and concentration* of noise at the measurement point (i.e. buildings). Given increasing mobility of the population, measures to reduce noise at the source along roadways, railways as well as in and around airports are still insufficient. Noise protection along transport routes requires a lengthy planning process that could not be completed within the timeframes established by parliament. This is why timeframe extensions were granted.

Impact of noise on people

People are exposed to continuous noise in their homes and neighbourhoods, places of work and places of leisure. Noise is a subjective term referring to undesirable sound. The implications in terms of health, mind (e.g. discomfort, stress, difficulty communicating, disrupted sleep) and body (e.g. hearing impairment, high blood pressure) are often overlooked. It has been estimated that 25% of the Swiss population suffer from partial hearing loss. And then there are the economic (e. g. rent, spatial planning costs) and social implications to take into consideration.

Estimated number of persons exposed to noise levels above threshold (prior to improvements)



Source: Swiss Agency for the Environment, Forests and Landscape: Environmental Report, issue No. 329, Noise Abatement in Switzerland: Status and perspectives. Bern 2002.

15 Landscape and spatial planning

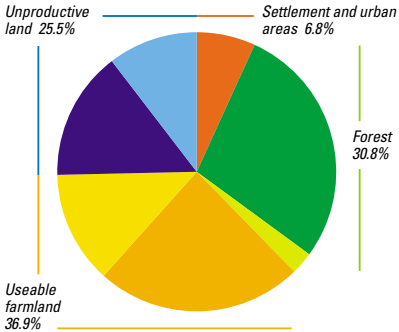
Every second, 0.9 m² of space is taken up by new settlement and urban areas

	Indicator	Status	Trend
Land use (in absolute terms)	Settlement and urban areas	☹	↗
	Forest	☺	↗
	Woods	☹	↘
	Usabe farmland	😐	↘
	Alpine farmland	☺	↘
Usage of available space	Settlement and urban area expansion	☹	↗

Urban sprawl into the countryside continues to be a problem. Agglomerations are encroaching more and more upon rural communes. Modern demand for leisure activities has led to the construction and expansion of sports and leisure facilities. The prevailing conditions are such that farmers are forced to make use of unproductive land and intensify their use of productive land. That said, areas occupied by farm pastures have increased thanks to incentives given to farmers to raise mother cows.

Various types of land use 1992/97

Switzerland has a total surface area of 41,285 km²



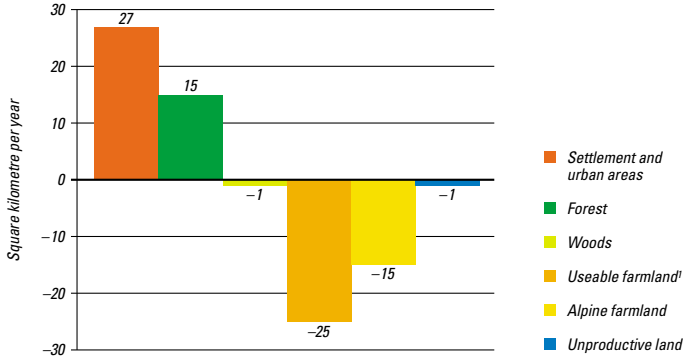
Settlement and urban areas	6.8%
Forest	28.2%
Woods	2.6%
Usabe farmland[1]	23.9%
Alpine farmland	13.0%
Bare land[2]	14.9%
Other unproductive land	10.4%

[1] Except alpine farmland.

[2] Rock, glaciers, perpetual snow, gravel

Source: Swiss Federal Statistical Office: land use statistics.

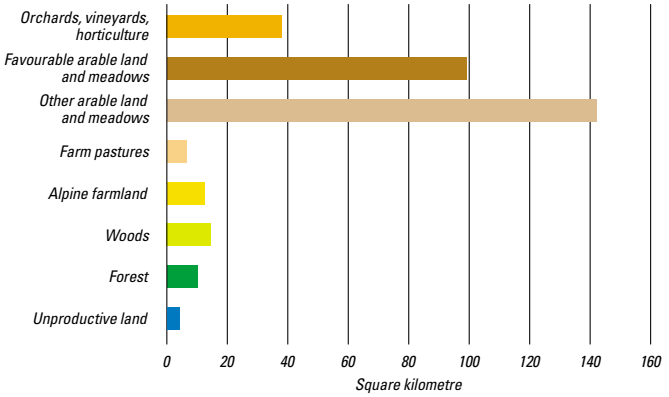
Annual changes in land use in Switzerland
1979/85 to 1992/97



[1] Except alpine farmland.

Source: Swiss Federal Statistical Office: land use statistics.

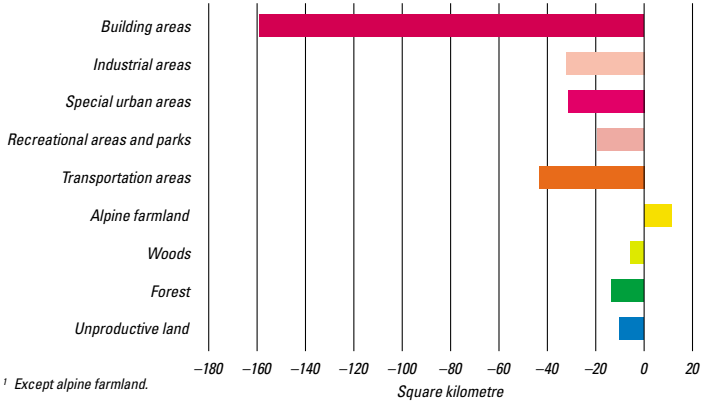
Land encroached upon by new settlement and urban areas
Changes during the 12-year period (1979/85 to 1992/97)



Source: Swiss Federal Statistical Office: land use statistics.

***Usage of lost farmland*[1]**

Changes during the 12-year period (1997/85 to 1992/97)



[1] Except alpine farmland.

Source: Swiss Federal Statistical Office: land use statistics.

Forest area growth

Changes during the 12-year period (1997/85 to 1992/97), per 4 km²

Source: Swiss Federal Statistical Office: land use statistics.

16 Biodiversity

Virtually half of all species endangered

Animals and plants depend on their habitats. When habitats are disrupted or destroyed, the result is a loss of species. Switzerland has a wide array of habitats thanks to its geographical and geomorphological diversity. Roughly 25% of local flowering plants exist only because human activity shaped their environments over several hundred years. In the past two hundred years, however, human encroachment has reduced biodiversity. The various climatic and morphological conditions in the Alps provide a wide range of different habitats. Since most of the Alps are within Switzerland, it is mainly our responsibility to protect alpine species.

Biodiversity

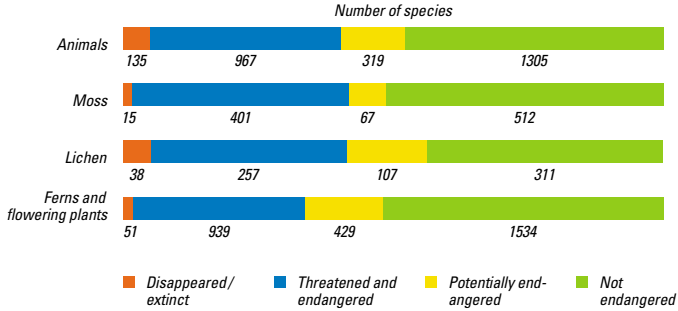
Biological diversity, or biodiversity, refers to the variety and variability among living organisms and the ecological complexes in which they occur. There are three levels of biodiversity[1]:

– Genetic diversity* within a given species
– Species diversity
– Ecosystem diversity

[1] *Primack R.B.: Naturschutzbiologie (Conservation Biology). Heidelberg 1995.*

Red List

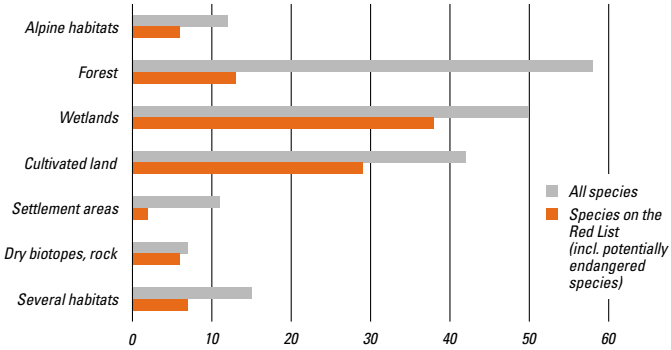
Status in 2002[2]



[2] *Situation of animal species in 1994, excl. birds 2001 and dragonflies 2002, situation of moss in 2004.*

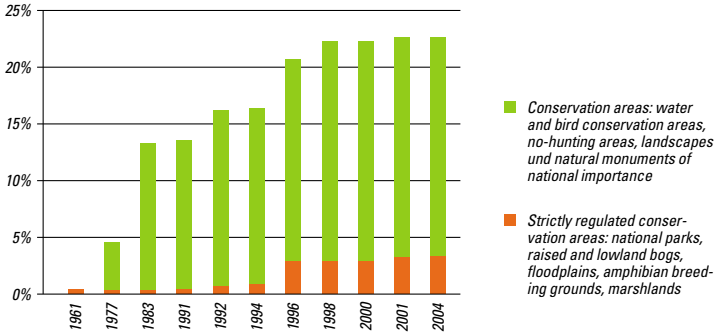
Source: Swiss Agency for the Environment, Forests and Landscape, 2004.

Breeding bird habitats in Switzerland (incl. species on Red List)
195 bird species breed in Switzerland. Of this total, 77 are either endangered or extinct and 24 are potentially endangered.



Source: Swiss Bird Observatory Sempach 2001: Swiss Bird Life at the Turn of the Century.

Natural preserves
Share of national territory[1]



[1] *Surface areas benefiting from several preservation programmes are counted only once.*

Source: Swiss Agency for the Environment, Forests and Landscape.

17 Environmental economics

The road towards more environmentally friendly taxation

	Indicator	Status	Trend
Taxes	Part of environmental taxes	○	↗
Expenditures	Public expenditure for environmental protection	○	→
Jobs	Jobs in the eco-industrial sector	○	↗

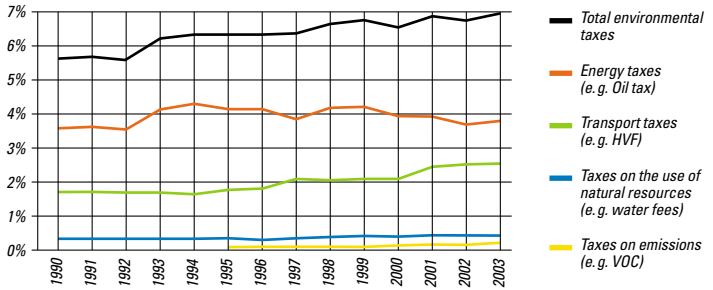
Total public expenditure for environmental protection was around CHF 3.5 billion in 2002, which amounts to a 46% increase over 1990. The net burden of environmental protection after dedution of revenues has been sliding since 1991 (CHF 1.15 billion in 2002) thanks to gradual phasing in of the polluter pays principle, particularly in the area of waste (e. g. pay per bag principle) and wastewater management (e. g. wastewater fees).

According to the Swiss Federal Statistical Office, around 50,000 jobs were in the eco-industrial sector in 1998 (1.3% of all jobs). This sector also generated a turnover of about CHF 9.5 billion (two to three times as much as in 1990). Environmental protection is therefore not just a matter of increased cost, it helps the economy and brings technological progress along with it.

Revenues from environmental taxes and fees amounted to CHF 11 billion in 2002. This type of taxation was phased in around the mid-nineties. Over ten new taxes and fees were created, such as the now firmly entrenched heavy vehicle fee (HVF) and tax on volatile organic compounds (VOC).

The share of environmental taxes in the total amount of taxes und social security contributions increased from 5.7% (1990) to 7% (2003). A slight shifting of the tax burden to cover environmentally unfriendly activities and products is therefore to be expected.

Revenues from environmental taxes as a share of total revenues from all taxes and social security contributions[1] in Switzerland



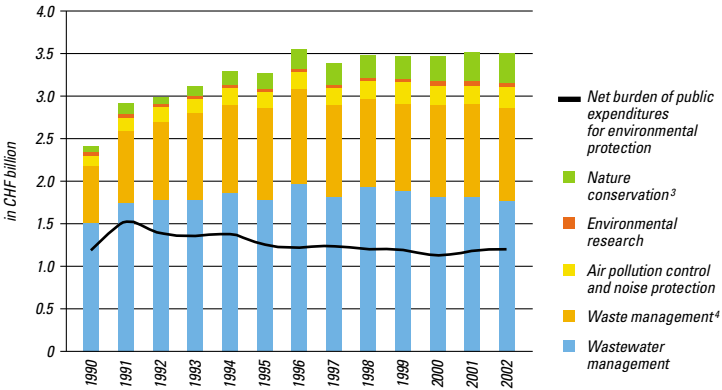
[1] *According to the European System of Accounts (ESA 95).*

Source: Swiss Federal Statistical Office: Updated data on environmental taxation. Neuchâtel 2003.

Environmental accounting takes into account:

- **Expenditure for environmental protection**, which is an indication of the financial committment that government, businesses and households are wiling to make to avoid, reduce or eliminate environmental pollution;
- The **eco-industrial sector**, which can help reduce environmental pollution and the use of natural resources when producing goods and services.
- **Environmental taxes and fees**, designed to protect the environment by levying taxes and fees on waste, energy and transport. Revenues from environmental taxes and fees can be distributed to the population as a whole (e.g. VOC taxes); earmarked for environmental protection (e.g. revenues from the taxation of contaminated sites are used to fund cleanup projects); used for projects that are not directly related to the environment (e.g. 50% of the revenues from carbon taxes are used to fund road infrastructure projects); or added to state coffers.

Breakdown of public expenditure[1] for environmental protection along with net burden[2], at current prices



[1] *After deduction of transfer payments between the various federal departments and offices.*

[2] *After deduction of revenues, particularly those coming from environmental protection measures.*

[3] *Incl. direct payments to farmers for environmental performance since 1993.*

[4] *Excl. domestic waste incinerators.*

Source: Swiss Federal Statistical Office: Statistical Yearbook of Switzerland 2005. Neuchâtel 2005.

GLOSSARY

Concentrations
Impact of pollutants, sound or radiation on the environment.

Direct material input (DMI)
All materials used by the national economy (i.e. raw materials extracted domestically plus all imported raw materials and products).

Emissions
Release of pollutants, sound or radiation from natural or anthropogenic sources into the environment.

Genetic diversity:
Genetic differences between individuals within or among species.

National economy
Economic activities (production, consumption, etc.) by businesses and households whose economic interests are maintained primarily in Switzerland.

New renewable energy sources
Solar energy, ambient heat, biomass energy, wind energy, renewable energy from treatment of waste, renewable energy from treatment of sewage.

Pathogenic organisms
Organisms that cause illness.

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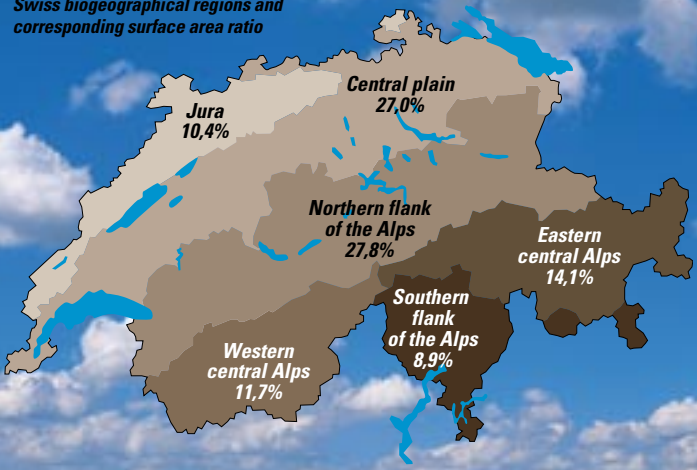
In conjunction with the
Swiss Federal Office of Energy (SFOE)

Swiss biogeographical regions and corresponding surface area ratio



Source: Swiss Federal Statistical Office: land use statistics.