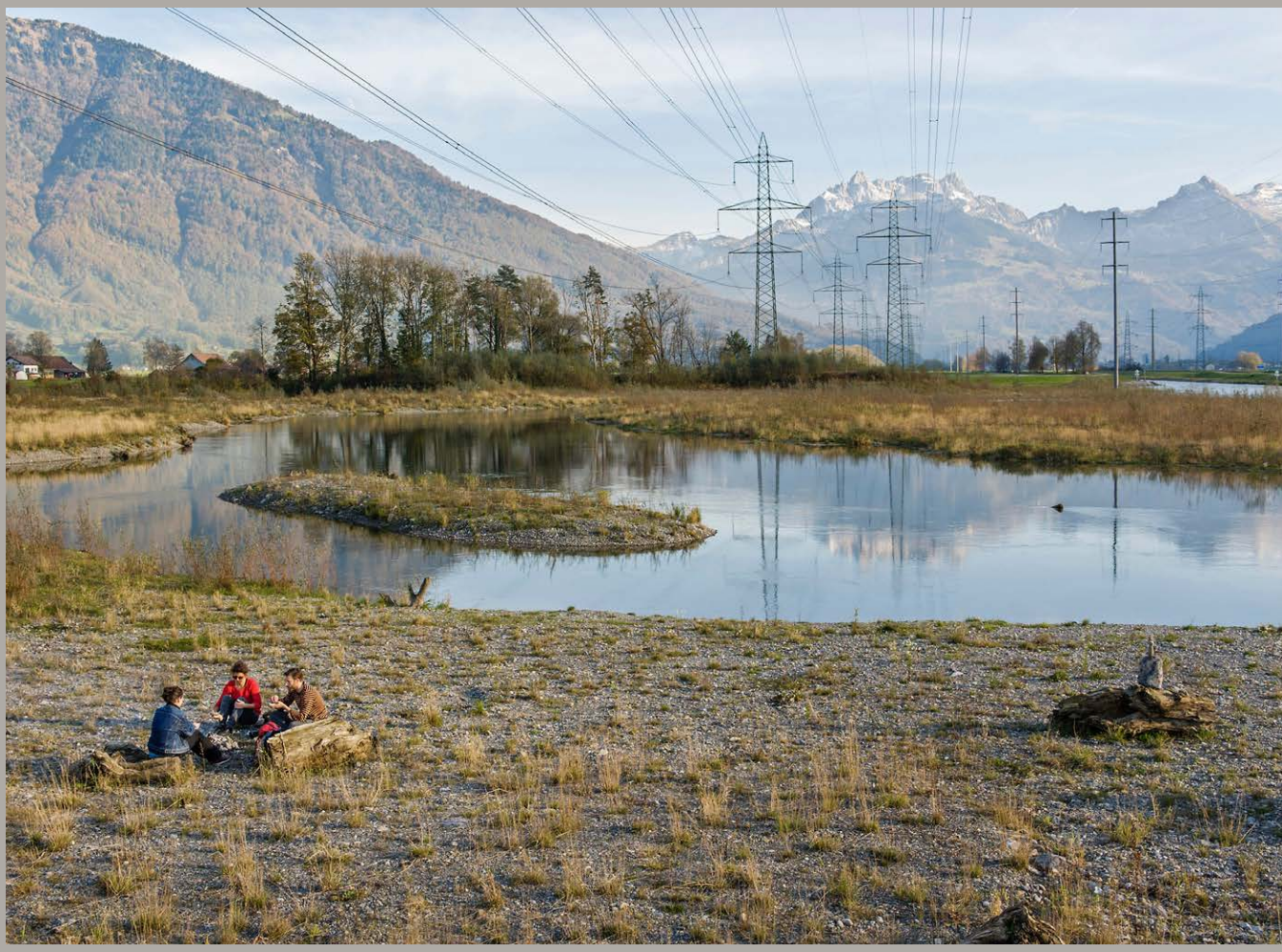
Swiss Environmental Law

A brief guide



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Relaxing by the Linth Canal, with a view towards the broadened and rewilded Hänggelgiessen area in Schänis.
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Abstracts

This publication provides an overview of the diverse body of Swiss environmental legislation that has evolved over recent decades. It begins with a brief history of environmental law and a look at common themes such overarching principles, enforcement, procedure and instruments. It then outlines the acts and ordinances that apply in individual areas. Vivid, informative graphics support the text.

Keywords:
environmental law, law, Environmental Protection Act, EPA, fundamental principles of environmental law

Diese Publikation gibt einen Überblick über die vielfältige und über Jahrzehnte gewachsene schweizerische Umweltgesetzgebung. Sie behandelt eingangs kurz die historische Entwicklung des Umweltrechts sowie bereichsübergreifende Themen wie die übergeordneten Prinzipien, den Vollzug, das Verfahren und die Instrumente. Im Anschluss daran erläutert sie die bereichsspezifischen Gesetze und Verordnungen in ihren Grundzügen. Aussagekräftige graphische Darstellungen unterstützen den Text.

Stichwörter:
Umweltrecht, Recht, Umweltschutzgesetz, Grundprinzipien des Umweltrechts

Cette publication offre une vue d'ensemble de la diversité de la législation environnementale suisse au cours des décennies. Dans ses premières pages, elle traite brièvement de l'évolution historique du droit de l'environnement et y aborde des thématiques transversales telles que les principes qui sous-tendent celui-ci, sa mise en œuvre, la procédure législative et les divers instruments. Enfin, elle présente dans leurs grandes lignes les lois et ordonnances spécifiques aux différents domaines. Au fil des pages, des représentations graphiques viennent appuyer le texte.

Mots-clés :
droit de l'environnement, droit, loi sur la protection de l'environnement, principes de base du droit de l'environnement

La presente pubblicazione fornisce una panoramica della legislazione ambientale svizzera, la quale copre molteplici ambiti ed è il risultato di un'evoluzione durata decenni. Nella prima parte tratta brevemente lo sviluppo storico del diritto ambientale nonché tematiche intersettoriali quali i principi sovraordinati, l'esecuzione, le procedure e gli strumenti. Nella seconda, illustra i tratti essenziali delle leggi e delle ordinanze specifiche ai vari ambiti settoriali. Una serie di rappresentazioni grafiche supporta i contenuti testuali.

Parole chiave:
diritto ambientale, diritto, legge sulla protezione dell'ambiente, principi fondamentali del diritto ambientale

Foreword

Swiss legislation on the environment has been enacted little by little since the mid-1800s, undergoing continual revisions and refinements up to the end of the 2010s. The effects of this regulatory field are felt across the board, in areas as diverse as spatial planning, industrial production, agriculture, infrastructure and the power grid. Projects in all of these areas can impact negatively on the environment.

Efficient and effective protection for the environment requires a high standard of environmental legislation. It must be clear and well structured, specific and appropriately worded, accessible and, of course, enforceable. Swiss legislation must also be aligned with international environmental law.

The federal government and the cantons conduct regular legislative reviews to determine whether action is required in individual areas of law. These assessments also serve to monitor the results of conservation programmes, as well as how various instruments – action by the authorities and police, subsidies, and consulting and information – interact.

Where the legal framework is concerned, environmental legislation faces some specific challenges:

- Regulatory loopholes must be closed. These currently exist in respect of protections for biodiversity and the responsible use of natural resources, for example. The latter is important in achieving a circular economy.
- The mass of 11 acts and 72 ordinances that has grown up over time must be better aligned, according to a set of common principles. This also applies to the criminal aspects of environmental law.
- An innovative approach must be taken to the continued development of environmental regulation. This includes adapting those regulations to changing circumstances, as well as optimising the current mix of instruments.
- Rules and regulations must be enforced.

This booklet gives an overview of the diversity of Swiss environmental legislation. It is a comprehensive presentation of relevant national and international statutes and the interdependencies between them. Original graphics provide a visual access point to the abstract world of the law.

Florian Wild, Legal Affairs Division
Federal Office for the Environment (FOEN)

Aletsch Glacier, Riederalp.

Photo: Markus Bolliger/FOEN

History of environmental law

The first serious environmental problems came to light with the economic boom of the 1950s and 1960s, and the growing pressure that this put on the environment. The response has been a steadily more comprehensive and sophisticated system of environmental legislation, developed against the backdrop of an expanding knowledge of ecological relationships.

As late as the 1950s and 1960s, wastewater from Switzerland's factories, businesses and homes flowed practically untreated into the country's streams, rivers and lakes. It was common for them to be discoloured, or covered in scum. Fish often found it difficult to survive. Mushrooming construction and a rapid rise in traffic also had a downside, in the form of more noise, more air pollution, and farmland increasingly being lost to development.

Clean lakes and rivers, respect for nature

Action was urgently needed to tackle these growing environmental problems. Voters, Parliament and the Federal Council alike demanded new laws. Since then, environmental legislation has gradually been expanded and adapted to current requirements. In 1953, for example, the duty to protect lakes and rivers was enshrined in the Constitution, followed four years later by the entry into force of the corresponding Waters Protection Act (WPA). Its primary aim was to encourage the expansion of sewerage systems and the construction of wastewater treatment plants. Concerns about the rapid changes to the landscape then prompted the Swiss electorate in 1962 to approve the inclusion of an article on the conservation of natural and cultural heritage in the Federal Constitution. This resulted in 1966 in the enactment of the Nature and Cultural Heritage Act (NCHA). It was the first federal-level instrument to govern the protection of indigenous plant and animal life and the preservation of landscapes and monuments. It also formed the basis for the Federal Inventory of Landscapes of National Importance.

The battle over the Environmental Protection Act

In 1965, a parliamentary initiative called for statutory regulations on the environment. Then, in 1971, there was a popular vote in which over 90 per cent approved the inclusion in the Federal Constitution of an article on environmental protection. The new legislation was passed amid wider public debate on environmental problems in the 1970s. The public had been shaken by the oil crisis, the Club of Rome's "The Limits to Growth" report, and the "Global 2000" report commissioned by the US government on the environmental situation around the world. In the end, it still took 15 years before the Environmental Protection Act (EPA) came into force in Switzerland in 1985.

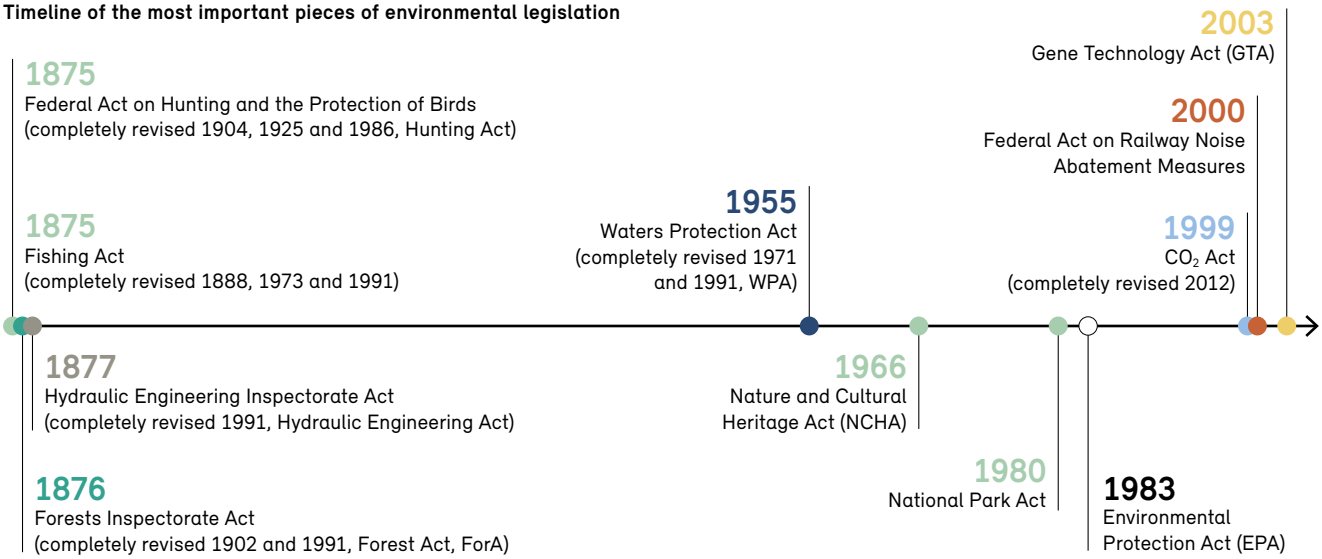
In 1983, the phenomenon of Waldsterben (forest dieback) suddenly put air pollution on the public agenda. It also helped to ensure that additional detail was swiftly added to the EPA, leading to the Air Pollution Control Ordinance.

Protecting forests

The Forests Inspectorate Act of 1876 placed Swiss forests (in high mountain areas initially) under strict protection, and laid down the principles of sustainable management for the first time. The Act was a response to various disastrous floods in the 19th century, including probably the worst-ever flooding in the Alps, which occurred in 1868. Its scale was due in part to massive overexploitation of the forests. One year after the Forests Inspectorate Act, the Hydraulic Engineering Inspectorate Act was also passed, which in subsequent decades led to the widespread damming and channelling of Swiss lakes and rivers.

Figure 1

Timeline of the most important pieces of environmental legislation



Meanwhile, at an international level there was an astonishingly rapid reaction to the discovery in 1985 of a massive thinning of the ozone layer over the Antarctic. Just two years later in 1987, the Montreal Protocol – also ratified by Switzerland – introduced a global ban on the most severely ozone-depleting substances.

Environmentally friendly waste disposal

By the mid-1980s it had become clear that dumping waste was leading to water pollution and unpleasant odours in many places. This led the federal government to include comprehensive waste disposal regulations in the revised EPA of 1997, and to amend the Technical Ordinance on Waste. These provisions require waste first to be treated if necessary, and then to be recycled or deposited in suitable landfill sites in an environmentally sound way. Furthermore, the EPA and the Contaminated Sites Ordinance stipulate that landfill sites and other sites polluted by waste should be remediated quickly if they have a negative impact on the environment, or if there is a real danger of such an impact. By introducing a landfill ban for combustible waste from 2000 onwards, Switzerland reached a further milestone in waste disposal. Since then, waste has been used to produce heat for district heating systems and to generate power, or its component materials have been recycled.

Emerging awareness of risk

People have always been aware that there are toxic substances that harm their health. The 1969 Toxic Substances Act created the legal framework for handling those substances in a way that protects both human and animal health. The Environmental Protection Act then expanded the statutory framework to include protections for the environment.

On 1 November 1986, a fire at a chemicals warehouse at Schweizerhalle near Basel resulted in pollutants entering the River Rhine and causing serious damage. The public became aware at a stroke that storing and handling chemical substances carried major environmental risks. The Major Accidents Ordinance introduced shortly thereafter helped to increase risk awareness in industry and substantially reduce the risks themselves. The Chemicals Act (ChemA) of 2000 comprehensively overhauled regulation in the entire chemicals sector. It was followed in 2005 by the Chemical Risk Reduction Ordinance, which has a particular bearing on the environmental aspects.

Tackling the risks associated with the chemicals industry in such depth also drew attention to other technologies that carry environmental risks, such as biotechnology. This is governed by the Gene Technology Act (GTA) and the EPA, as well as the related ordinances. The arriv-

al of mobile phones has seen the rapid development of another technology that not only has advantages, but also risks for society. As a precautionary measure, lawmakers have responded to this by establishing clear technical requirements.

Space for animals, plants, rivers and lakes

The 1970s and 1980s saw a growing awareness in society of the need for broad-based action to counter the insidious loss of animal and plant species. A decisive step was taken in 1987 with the adoption of the Rothenthurm Initiative, which demanded stricter protections for natural habitats. It led to the conservation of wetland biotopes and moorland being enshrined in the Constitution. Protections were subsequently increased for other endangered habitats such as floodplains, amphibian spawning grounds and dry grasslands. Since 2007, legislation in this field has also taken account of calls for sustainable development, and it is now possible to call for the creation of parks of national importance in regions of especially high natural and scenic value.

Following a popular initiative, in 1991 the new Waters Protection Act was broadened to include minimum flow regulations, which state that a residual volume of water must be left in streams and rivers that are used for hydropower. Previously, conservation laws focused primarily on keeping water clean, but they now recognise that rivers and lakes can fulfil their function as a habitat for plants and animals only if they carry sufficient water and have the space they need to develop naturally. These riverine zones were laid down in law in 2011 in a further revision of the Waters Protection Act.

Integrated environmental protection and sustainable development

A clear breakthrough in the holistic approach to environmental issues was achieved at the first United Nations Conference on Environment and Development (the "Earth Summit") in Rio de Janeiro in 1992. It launched the concept of sustainable development, which demanded the world adopt an inclusive approach to environmental concerns that also took economic and social considerations into account. Two crucial international agreements were also adopted in Rio: the Biodiversity Convention, and the Climate Change Convention. The latter provided the foundation for the 1997 Kyoto Protocol and the 2015 Paris Agreement to reduce greenhouse gas emissions. To implement the Kyoto Protocol, in 1999 Switzerland enacted the first CO_2 Act. The Earth Summit also saw the start of international efforts to mitigate the effects of chemicals production and use. The Stockholm Convention on Persistent Organic Pollutants was adopted in 2002 (see the box on page 18 for more on the global dimension of environmental protection).

Driven by scientific advances on the one hand, and painful real-life experience with ecological damage and disaster at home and abroad on the other, Swiss environmental legislation has developed over the past 50 years into a comprehensive, integrated system of law. New technologies, findings and developments will continue to feed its evolution. The immediate task, however, is to close existing loopholes, such as those relating to biodiversity, and potentially nanotechnology. Action is also needed to promote the circular economy.

Recycling collection, Grandson.

Photo: Peter Baracchi/FOEN

Fundamental principles

Environmental law builds on a series of fundamental principles that influence the overall nature of acts and ordinances independently of the specific provisions they contain. They also play a role in the practical implementation of those provisions.

The precautionary principle

"Prevention is better than cure" is the guiding principle behind Swiss environmental law. The idea is that forward-looking, environmentally sound planning and action is more cost-effective in the long term, and causes less environmental impact than subsequent improvements or attempts to remediate environmental damage. The precautionary principle is applied in the general duty of care in waters protection, for example, or in commitments under pollution control regulations to limit emissions. In practice, this means tackling impacts at source rather than when pollutants have already been released. To limit emissions, companies must institute all of the measures that are financially viable for them. This applies even if those emissions have not yet been classified as harmful or a nuisance, or if scientists are still unsure about the damage they might cause.

The polluter pays principle

This principle is based on the belief that the costs of remediating environmental pollution or damage should be borne not by the general public but by those who are directly responsible for them. Anyone polluting or damaging the environment should have to pay to rectify that damage or pollution. The polluter pays principle has long been taken for granted where refuse sacks and wastewater charges are concerned, but it also applies universally, and to the remediation of landfills and other polluted sites in particular.

The holistic approach

The aim of environmental law is to reduce the overall burden on the environment. Its various aspects should therefore always be given equal consideration. One-sided measures that protect one area at the expense of an excessive impact on the others must be avoided. Noise control regulations should not significantly hinder the protection of nature and the landscape, for example.

The sustainability principle

Our planet has a limited supply of natural resources. According to the sustainability principle, they should be used only to an extent that preserves them intact for future generations. The concept of sustainable development demands that both economic efficiency and social solidarity be strengthened in the interests of reducing environmental burdens and resource consumption to a level that can be sustained long term.

The cooperation principle

Swiss environmental law is not simply ordained, but rather developed and jointly implemented in a broad-based decision-making process. A whole range of stakeholders is included in drafting acts, ordinances and implementation guides, from political parties to the cantons and business and environmental organisations, and individual sectors. This approach ensures that practicable and efficient solutions are found. Cooperation with the private sector also means that environmental measures can be introduced at an early stage, on a voluntary basis where appropriate. Specific enforcement tasks such as inspections or monitoring can also be delegated to sector organisations or companies themselves, as is already the case with waste (recycling) and the enforcement of the Air Pollution Control Ordinance.

Instruments of environmental law

Targets, requirements, bans, incentives or agreements: lawmakers deploy a variety of instruments to protect the environment and to conserve natural resources. The number of these instruments and the ways in which they can be combined should ensure that statutory objectives can be achieved effectively and with the minimum of government involvements. This also keeps economic and social costs down.

Targets

Legislators can set out clear and measurable environmental targets along with an appropriate timetable. These act as fixed navigation points for the public and private sectors alike when drafting and implementing their action plans. Tougher measures or additional instruments can then be used if there are signs that the set targets cannot be met despite the action that has been taken. For example, the CO_2 Act contains a target for the reduction of Switzerland's greenhouse gas emissions relative to the base year of 1990. It is amended regularly, and offers a point of reference for measures under the CO_2 Act and other legislation, as well as for voluntary action by the private sector. The Beverage Container Ordinance, meanwhile, requires at least 75 per cent of the material in waste glass, PET and aluminium drinks packaging to be recycled. The Ordinance largely leaves it up to the beverage companies to organise and finance recycling operations independently. However, if the required recycling rate is not met, wholesalers, manufacturers and importers may be obliged to charge a deposit and to take back and recycle drinks packaging. The target prompted beverage companies to join together and organise themselves – and the system works.

Requirements and bans

One of the ways of achieving environmental targets is to impose official requirements and bans, i.e. statutory provisions that require or prohibit certain behaviours. They set out clearly what must be done, and what minimum standards must be observed. The detailed requirements

Environmental criminal law

Since environmental legislation contains criminal provisions alongside instruments of administrative law, anyone who violates environmental law may be liable to prosecution. This is the basis on which breaches of statutory requirements may result in fines, monetary penalties or custodial sentences. Furthermore, true to the principle that crime must not pay, assets may also be forfeited. The objective here is to cancel out the financial benefits of criminal activity, and thus prevent offenders from profiting from their misdeeds.

Applied consistently, environmental criminal law has a preventive effect, and supports the enforcement of environmental law as a whole. Conversely, if environmental offences are not consistently prosecuted, all environmental legislation becomes less effective.

Not all breaches of environmental regulations are committed intentionally. In many cases, offenders negligently fail to consider the consequences of their actions even though they have a statutory duty of care. Improperly disposing of garden waste can have consequences, for example. Under the Air Pollution Control Ordinance, it may be burned, but only when it is so dry that it produces little smoke. There is a complete ban on burning fence-posts and other wood treated with preservatives or other chemicals, however. Offenders will be fined.

Environmental laws are also broken on scale that is wholly different from offences of negligence, however. Organised, international environmental criminals operate in lucrative businesses such as the illegal trade in waste or natural resources, including protected animal and plant species or illegally felled wood. What's more, international environmental crime often involves other forms of offending closely associated with organised crime, such as corruption and money laundering.

governing what levels of what pollutants a building's heating system may emit are one example here. These emissions must be checked regularly, and proof supplied that they comply with the limits. Furthermore, the use of certain fuels such as particularly high-polluting heavy oils, or high-sulphur heating oils, is prohibited. Official requirements and bans also protect nature conservation areas with clear rules on their use. If land may be used for agriculture, for example, grass may be mowed only at set times.

The authorities check compliance with bans and requirements by means of inspections and as part of licensing, permit and reporting procedures. Failure to comply may result in penalties, or projects being denied authorisation. Those who cause environmental damage can also be held liable under civil law. Bans and requirements have contributed to a significant improvement in the quality of the environment in Switzerland. A ban on clearance has safeguarded forests, which have been able to make a lasting recovery. Pollutant thresholds for heating systems and vehicles have had a positive effect on air quality. The provisions concerned have sparked technological advances ranging from new types of heating boiler to catalytic converters, to particle filters for diesel engines. In addition, it is believed that the internationally agreed ban on chlorofluorocarbons (CFCs) will allow the ozone layer to recover completely by 2060.

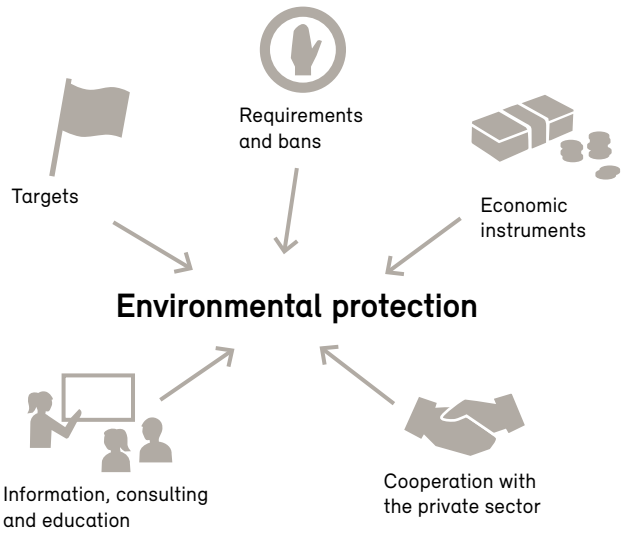
Economic instruments

Economic instruments are intended to harness the mechanisms of the free market economy in the interests of environmental legislation. Instead of requiring or prohibiting certain types of conduct, they offer financial incentives to behave in a particular way. Through economic instruments, businesses and consumers reduce the burden on the environment in areas in which much can be achieved with comparatively little expense or effort. What's more, they give the individual greater freedom and encourage innovation. In this case, the costs to the environment are not borne by the general public, but by those who are responsible for them, in a way they must consider when making their financial decisions. Incentives like these stimulate a personal interest in protecting the environment. As a category, economic instruments include incentive taxes, charges, subsidies and emissions trading systems.

Economic instruments can also be used dynamically. The incentive tax on volatile organic compounds, for example, was designed to be increased gradually during the introductory phase – giving the sectors concerned more and more reason to save on products on which it is levied. The tax has thus helped to ensure that solvents in some production processes in the chemical industry are now recycled entirely, if they are used at all. Revenues from the incentive tax do not go into the public purse, but instead are distributed evenly to the population via their health insurers.

Charges such as those for refuse disposal are levied on those companies or individuals that cause the environmental impact, in accordance with the producer pays principle. These revenues are used to fund action to mitigate or remediate the resulting harm to the environment. Environmentally friendly waste disposal is one example here. Meanwhile, the federal government subsidises initiatives by private-sector organisations, as well as cantonal and communal authorities. They promote the development of environmentally responsible technologies, or support the conservation and management of near-natural farmland.

Figure 2
Instruments of environmental law



Trading in carbon emissions allowances enables emissions to be reduced where costs are low. A price is put on damaging greenhouse gases, so emitting them generates costs. The mechanism is a cost-effective way of achieving climate protection targets.

Cooperation with the private sector

Swiss environmental law provides for measures to be determined in agreements with individual sectors of industry, thereby taking their particular circumstances into account. Here, the sectors undertake to implement improvement measures to a defined extent according to a defined schedule. In return, they are not subject to other requirements. Agreements of this kind have been concluded for instance with operators of cement works, to reduce their emissions of nitrogen oxides. The CO_2 Act also provides for company-level solutions. Some companies can earn exemption from the CO_2 levy by undertaking to limit their carbon emissions.

The federal government intends to identify the economic benefit of resource-efficient ways of production and consumption in dialogue with the various stakeholders from the business and academic spheres, and civil society. The aim is to agree on measures that better harness potential for sustainable production and consumption. An example is for Swiss landscape gardeners and garden centres to stop using peat.

Agreements and dialogue enable special conditions to be accommodated and companies given greater scope to make improvements, although they do demand a greater degree of independent responsibility.

Information, advice and education

Information, advice and education complement and support the implementation of instruments under environmental law. They nonetheless also help in their own right to achieve environmental policy targets. Actively distributing information on looking after the environment enables businesses and individuals alike to behave in an environmentally responsible way on their own initiative. Indeed, the federal government has done much to improve environmental awareness of waste, air and noise pollution issues, showing what each and every person can do to be environmentally responsible. This active spreading of information has been a factor in the progress that Switzerland has achieved on the environment.

Enforcement of environmental law

In its various federal acts and their ordinances, the federal government sets out both the objectives of environmental protection and the instruments and measures that are to be used to achieve them. The task of realising these objectives and implementing the measures that have been determined essentially falls to the cantons, although the federal government is also responsible for enforcing environmental law in some specialised areas. In addition, it monitors whether the cantons are fulfilling their role in accordance with the law. The federal government and the cantons work closely with the private sector at both the law-making and implementation stages.

In Switzerland's federal structure, wherever possible, state functions are fulfilled independently by one of its individual branches. The principle of subsidiarity applies, meaning that tasks are carried out at the lowest possible level of government.

Acts and ordinances

Parliament lays down the legal principles of environmental protection in acts of parliament. The Federal Council then issues ordinances, which add detail to the provisions contained in the acts. The Federal Administration does the preparatory work for both acts and ordinances, working closely with the cantons, political parties, and business and environmental organisations. A well-established system of consultation procedures and hearings allows the specialist knowledge, experience and opinions of politicians and the enforcement authorities to be incorporated into the legislative process.

Key enforcement role for the cantons

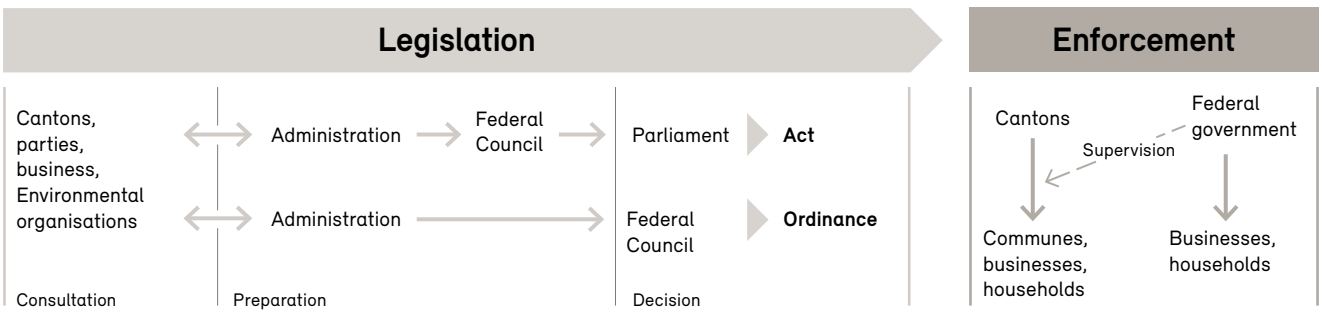
Written law becomes effective when it is applied in practice. Responsibility here lies first and foremost with the cantons, which thus play a crucial role in protecting the environment. They may take very different approaches to enforcing the law, in particular the extent to which they delegate to the communes, or handle those tasks themselves. The federal government is responsible for enforcement in some areas, specifically imports and exports of goods and waste, as well as in fields that are subject to a federal licence, such as railways, motorways, cableways and other infrastructure facilities.

Under Bern's watchful eye

The federal government supervises the cantons' implementation of environmental law, ensuring that it is applied in the same way throughout Switzerland. It provides implementation guides which help to explain environmental legislation in practical terms. The recommendations they contain make it easier to enforce regulations proper-

Figure 3

The legislative process and the enforcement of environmental law in Switzerland



ly, completely and consistently. In certain cases, however, the federal government must review cantonal environmental law and approve it before it enters into force. If the FOEN finds that cantonal authorities are not complying with federal environmental law, by granting a licence unlawfully, for example, it may exercise its right of appeal as a public authority so that the case is then examined by the courts. In the field of environmental law, the federal government also handles complaints made against cantonal authorities by members of the public.

Environmental protection – a global task

Many environmental problems, such as excessive noise or damage to natural habitats, manifest themselves in the immediate vicinity of their actual source. Others only become apparent far away, taking on a worldwide dimension owing to chemical and physical processes, or economic globalisation. The use of chlorofluorocarbons (CFCs) in refrigeration systems and aerosols, for example, was in part responsible for the hole in the ozone layer over the Antarctic. Another global phenomenon is climate change, to which greenhouse gases contribute no matter where in the world they are emitted. Meanwhile, in the search for cheap means of disposal, hazardous waste is shifted around the planet.

Global environmental problems therefore cannot be overcome solely by enacting environmental legislation in individual countries. Rather, it requires concerted, globally coordinated action by the entire international community. In view of the potentially disastrous effects of these problems, international efforts to protect the environment have gained considerable traction in recent years. The international community has agreed on a general set of goals in instruments such as the Climate Change Convention and the Biodiversity Convention. Protocols issued on the basis of the framework conventions govern how these goals are to be achieved in practice. The most well-known example where the climate is concerned is the Kyoto Protocol, the second and final commitment period of which ran from 2013 to 2020. It was superseded in 2015 by the Paris Agreement, which is the first global climate convention to place all states parties under a direct obligation. Commensurate with their responsibility and ability (their "nationally determined contribution"), they must take specific action to reduce emissions and to adapt to climate change.

Having ratified an international environment convention, individual countries normally have to amend their national legislation. Switzerland did so with regard to the climate in the form of the CO_2 Act.

International environment policy is one of the priorities of Swiss foreign policy. With its efforts to achieve an effective system of international environmental law, Switzerland is making a major contribution to protecting the global environment. This also benefits Switzerland itself, of course, because international standards prevent cross-border environmental pollution. Better international environmental standards also protect Switzerland against cheap imports from countries that do not have – or do not enforce – any effective environmental regulations.

Project approvals

Where an authority approves a project that might have ecological repercussions, it must assess environmental factors in addition to all the other legal aspects. In the case of major projects that might cause considerable damage, this assessment is based on an environmental impact report. If a number of authorities are involved, they must align their decisions. Spatial planning also takes account of environmental aspects to avoid subsequent disputes.

Each authority that grants approval for a construction project, be it at local council, cantonal or federal level, must check that the project meets the statutory requirements. Alongside planning law and building regulations, it is essential that environmental impact is also considered. A whole range of factors must be evaluated when granting planning permission, but this is also true where chemicals are concerned, because they affect health, environmental and employee protections simultaneously.

A single project generally requires several permits from several different authorities. To ensure that they do not issue contradictory rulings, these authorities are required to coordinate their decisions. At federal level, all of the necessary permits are issued by the lead authority, which makes its decision on the basis of input from the other responsible offices. In cantons that do not concentrate their procedures in this way, the authorities must find an alternative means of ensuring that their decisions are aligned.

The following example shows how tasks are distributed in a federal-level approval process: 14,000 m^2 of forest must be cleared and vegetation removed from riverbanks to build a new gas pipeline. Planning permission to build the pipeline itself is granted by the Swiss Federal Office of Energy (SFOE). The SFOE also authorises the forest clearance operation and the removal of riverside vegetation, having first obtained the opinion of the FOEN. Since the FOEN comes out against the plans, the two offices must work out their differences.

Spatial planning to avoid conflict

Spatial planning also has an important (preliminary) coordinating function. It determines how specific zones, and building zones in particular, may be used, and the levels of noise that are permitted in a given area. Buildings such as shopping centres and sports and event venues are associated with high volumes of traffic, which in turn means noise and air pollution. The structure and land use plans for such facilities must therefore ensure that the quality of the environment in residential and recreational areas does not suffer.

Spatial planning authorities can also designate special protection zones for wetlands, dry grasslands and floodplains, for example. These are absolutely essential to protect groundwater reserves and ensure that drinking water remains free of fertilisers and pesticides.

Assessing environmental impact

Large projects such as power plants and road, rail and air transport infrastructure, as well as industrial facilities and shopping centres, can all be expected to have a considerable (negative) effect on the environment. For specific types of structure the law therefore requires a detailed investigation of these effects. This is based on an environmental impact report that must also indicate what mitigation measures are planned. The permit-granting authority will study the application dossier and the reports of the specialist environmental protection units to determine whether or not the project complies with the provisions of environmental law. If necessary, it will request revisions. Planning permission is often granted with specific ecological conditions attached to make sure that the project's execution complies with environmental regulations.

Spatial planners are not under any express obligation to account for how they comply with environmental protection legislation. Changing this would first require impact assessments to become part of environmental law. They are already mandatory for land use plans, and a general requirement is currently under discussion.

Recourse to the courts

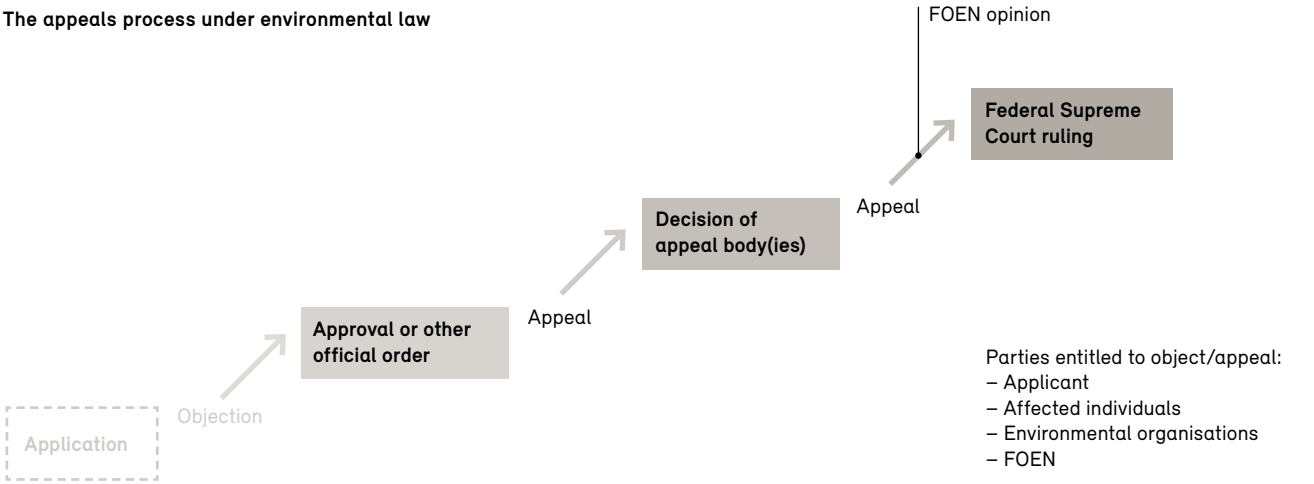
Individuals, environmental organisations and the FOEN are all able to appeal against decisions made by the authorities under environmental law. The courts must then review whether these authorities have applied the law correctly.

Communal, cantonal and federal authorities issue orders to private individuals and companies on the basis of environmental law. For example, they may approve the construction of an industrial warehouse, but planning permission comes with specific conditions attached. These might be measures to limit emissions, or regulations to protect natural habitats that are affected by the building.

Such decisions are subject to appeal by the individuals or companies directly affected by the order in question. In this example, it would be the company that applied for planning permission for the new industrial warehouse which may challenge environmental provisions that it views as excessively harsh. Third parties who are particularly affected by the potential impact on the environment may also appeal against the authority's decision, however. A neighbour might oppose construction of the warehouse on the grounds of non-compliance with environmental legislation, or they might demand tighter controls on noise and air pollution.

Right to information, participation and appeal
Switzerland acceded to the Aarhus Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters in 2014. This requires states parties' authorities actively to inform the general public about the quality of the environment and about activities that have a significant impact on it. What's more, upon request the authorities must allow access to documents containing information on the environment. Decisions about planned environmentally damaging activities and environment-related legislation and programmes must be made public, and the public must be able to respond. Where environmental law matters are concerned, or where there has been a violation of the rights to information and participation guaranteed by the Convention, affected parties have the right to take the case to court. In this way, the Aarhus Convention strengthens procedural rights and ensures that environmental law can be enforced effectively.

Figure 4
The appeals process under environmental law



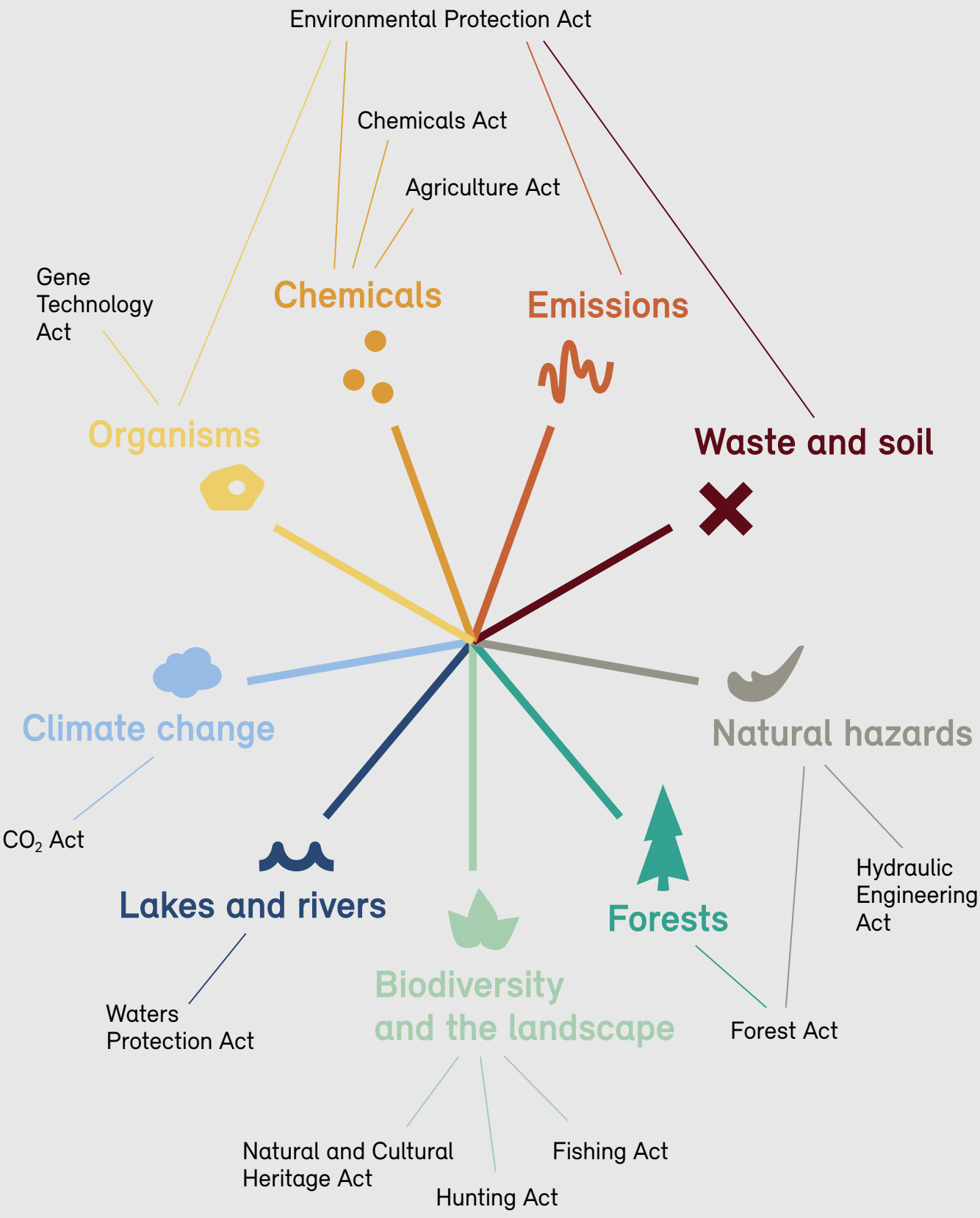
Depending on the rules of procedure that apply, objections or complaints must first be addressed to a body within the authority concerned, or directly to a court. If these bodies conclude that the order under appeal genuinely does violate environmental law, they may cancel or amend it. This decision may itself be referred to a higher court, all the way up to the Federal Supreme Court in Lausanne. Through their decisions, the courts provide a system of checks and balances on the development of environmental law, while protecting the rights of members of the public.

Environmental organisations' right of appeal

Endangered species and protected habitats cannot defend themselves. Instead, environmental law entrusts this task to environmental organisations in a right of appeal, which enables national environmental organisations to contest certain projects. As lawyers for nature, these organisations can have a court examine whether or not construction and other projects are actually lawful.

Important role of the FOEN

Where decisions made by cantonal or federal authorities under environmental law are challenged before the Federal Administrative Court or Federal Supreme Court, the courts will generally ask for the opinion of the FOEN, as the federal government's specialist environment office. The FOEN is able to advise the courts on the facts, and thereby do much to ensure that environmental law is applied properly. Using an instrument known as the public authority appeal, the FOEN is also able on its own initiative to take action against cantonal decisions that do not conform to environmental law.



Fields of environmental legislation and the acts that govern them

Environmental legislation

The Environmental Protection Act (EPA) is the cornerstone of Swiss environmental law. It contains fundamental legal principles and general provisions that apply to all areas of environmental protection. It also governs several central themes in this field of law. Stand-alone legislation has been enacted alongside the EPA for other key environment-related areas.

General provisions

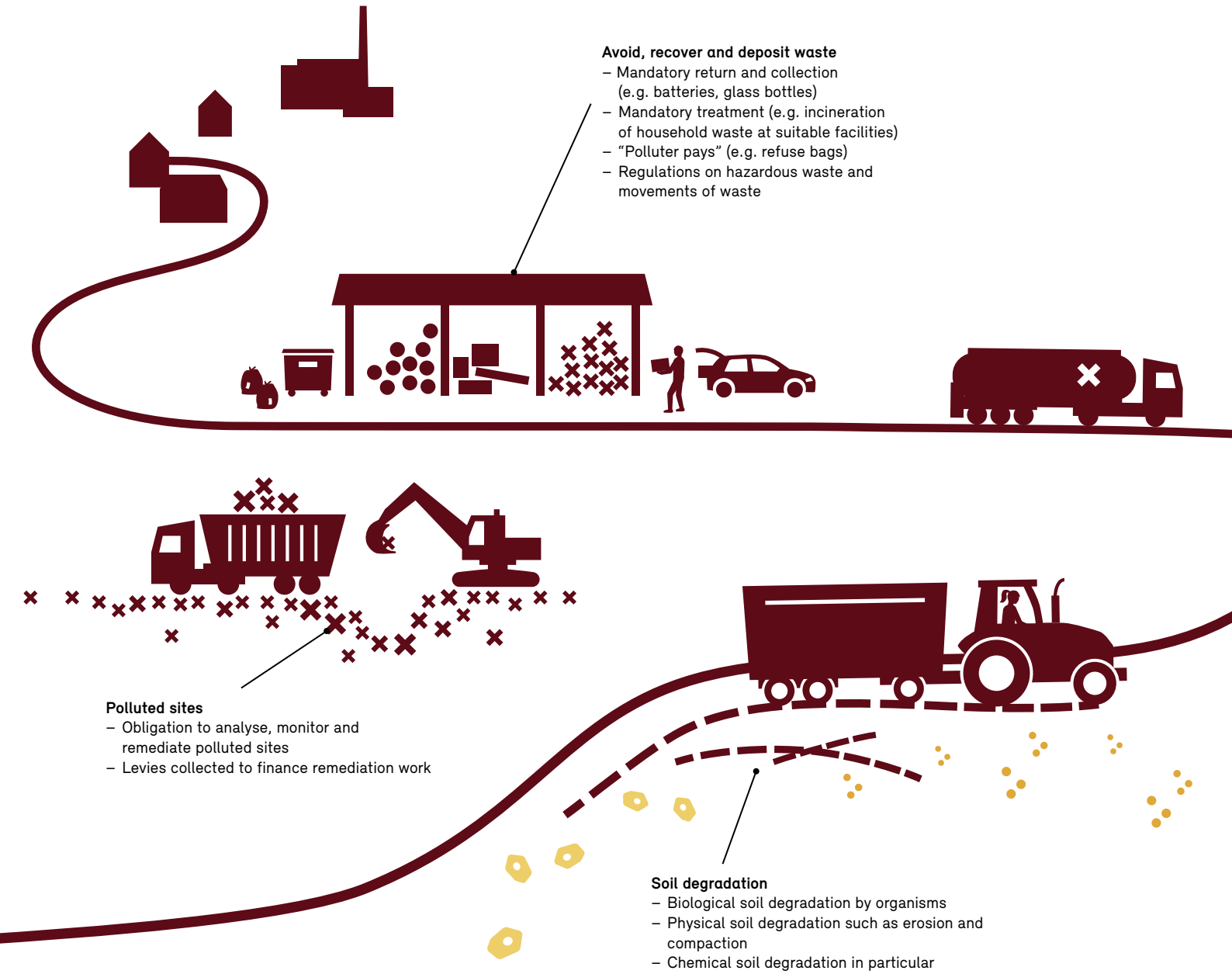
The EPA sets out the fundamental principles of Swiss environmental law. These are designed to bring about a comprehensive understanding of what it means to protect the environment (cf. page <?>). It also contains provisions on universal instruments such as the environmental impact assessment, providing information on environmental protection and current levels of pollution and damage, incentive taxes, and the environmental organisations' right of appeal.

Field-specific provisions

In addition to its general provisions, the EPA covers a number of key aspects of environmental protection, namely emissions, hazardous substances, organisms, waste (including the remediation of polluted sites) and soil protection. It sets out the basic regulations for all of these areas, determining for example which instruments should be used to achieve the targets laid down in the Act. Detailed provisions, such as threshold values, are contained in the applicable ordinances. Other areas of environmental protection, such as water, the climate, forests, nature and the landscape, are each governed by their own special laws. These are put into specific detail by the related ordinances.

Waste and soil

Mishandling waste can seriously damage the environment in various ways. That is why waste disposal is one of the core themes of the Environmental Protection Act (EPA). The law also determines how polluted sites and soil protection should be handled.



Avoid, recover and deposit waste
- Mandatory return and collection (e.g. batteries, glass bottles)
- Mandatory treatment (e.g. incineration of household waste at suitable facilities)
- "Polluter pays" (e.g. refuse bags)
- Regulations on hazardous waste and movements of waste

Polluted sites
- Obligation to analyse, monitor and remediate polluted sites
- Levies collected to finance remediation work

Soil degradation
- Biological soil degradation by organisms
- Physical soil degradation such as erosion and compaction
- Chemical soil degradation in particular by non-degradable and persistent chemicals
- Standard, trigger and remediation values help to assess and decide what action to take

Avoid and recover

The EPA lays down principles on how to handle waste. Chief among these is to avoid creating waste at all if possible. If it is produced, as much as possible should be reintroduced into the materials cycle, i.e. recycled. This type of recoverable waste, which accounts for around half of all domestic waste, should therefore be collected separately and recycled. The Beverage Container Ordinance sets out recycling rates. Consumers are required to return electrical and electronic waste and batteries, while retailers are obliged to accept them.

Strict requirements for landfills

Waste that cannot be recycled will generally have to be treated before it can be deposited in landfills. It must not pose a risk to the environment, i.e. it should no longer be able to react with the environment, and it must be as non-water-soluble as possible. Depending on its properties, waste must therefore be treated physically or chemically before being deposited. Domestic waste, for example, should be burned in waste incineration plants, and only its residues may find their way to landfills, all of which are subject to official permits. Depending on the type of waste they store, landfills must also meet requirements relating to technical equipment and long-term maintenance (post-closure care).

Remediation of polluted sites

Places where waste has not been handled in accordance with environmental standards, such as old landfills, former industrial complexes or the sites of chemicals and oil spills, are designated polluted sites. Where there is a specific risk to the environment, such as to groundwater, the cantons must arrange for the site to be remediated or at least to be monitored. Add in the analysis that this entails, and this work can be very expensive. The federal government will nonetheless contribute in certain cases, for example if the polluter cannot be identified, or if they are unable to pay. It has a Contaminated Sites Fund for just such eventualities, financed by a levy charged for depositing waste in Switzerland and exporting waste to be deposited abroad.

Preserving soil fertility

The fertility of the soil can be impaired by a range of factors. These include essentially non-degradable and persistent chemicals, genetically modified or pathogenic organisms, or physical degradation such as soil erosion and compaction as a result of soil management measures and the use of (excessively) heavy machinery. Statutory provisions to protect the soil have been enacted in response, to preserve the soil's long-term fertility. Measures to protect the soil from chemical and biological degradation are laid down in a variety of acts and ordinances, such as the Waters Protection Act (WPA) and the Air Pollution Control Ordinance. Standard, trigger and remediation values determine how pollution should be assessed, and what measures may be required to protect the soil. Options include further investigation, restrictions on use, or remediation.

International controls on the waste trade – the Basel Convention

In 1976 there was a chemical spill at a subsidiary of Hoffmann-La Roche in Seveso, Italy. During the clean-up operation, 41 barrels of dioxin-contaminate waste vanished, only to turn up months later in Northern France. Two and a half years passed before the hazardous waste was incinerated in a high-temperature furnace in Basel. Events surrounding the Seveso waste incident made the need for international regulations on dealing with waste crystal clear. These were then enacted in 1989 with the Basel Convention, which aims to control transboundary movements of hazardous wastes and to create a global environmentally sound waste management system.

Handling chemicals with care

Chemicals are used day-in, day-out in immense quantities in industry, agriculture and in the home. Some 100,000 chemical substances are manufactured on an industrial scale, there are more than 150 million known chemical compounds around the world, and several million new ones are discovered every year. A system of self-regulation for manufacturers and importers is intended to prevent the use of chemicals causing public health and environmental problems. The federal government also has the power to ban particularly problematic chemicals or make them subject to licence.

Chemicals
- Can be toxic, corrosive and carcinogenic to humans
- Can be essentially non-degradable, accumulate in the environment and threaten the ecological balance
- Problematic/hazardous substances may be banned or made subject to licence

Environmentally sound handling
- Follow the instructions of manufacturers and importers
- Certain products require special usage authorisation
- Special licence required for occupational use of certain substances

Self-regulation
- Manufactured/imported substances assessed and necessary information obtained by manufacturers and importers
- New substances to be tested and registered
- Technical dossier and chemical safety report

Duty to provide information
- About potential environmental impacts and correct handling
- Safety data sheets and labels featuring danger symbols, as well as warnings and safety advice

The Environmental Protection Act (EPA) requires us to handle chemical substances in an environmentally sound manner because of the many ways in which they may endanger people and the environment. Some of them pose a risk to human health because they are toxic, corrosive or carcinogenic, while others threaten water, air and soil and thus the ecological balance. The accumulation in the environment of substances that are essentially non-degradable causes particular problems. Chemicals handling is governed by the Chemicals Act (ChemA) and the Agriculture Act (AgricA) in addition to the EPA.

Self-regulation and duty to provide information

The chemicals business is subject to self-regulation. Manufacturers and importers must assess the extent to which the substances they offer might endanger the environment or public health. To make this assessment, they must gather as much information as possible. A new substance must be tested and registered, and a technical dossier must set out its properties. In certain cases, a chemical safety report will have to be prepared. The procedure in Switzerland largely corresponds to that in the European Chemicals Regulation (REACH).

Manufacturers and importers of chemicals must also brief their customers – in the industrial, commercial, agricultural and household sectors – on the potential environmental impacts of their products and the correct way to handle them. They may do this in the form of safety data sheets and labels featuring danger symbols, as well as warnings and safety advice.

Environmentally sound handling as a guideline

Anyone who uses chemicals must follow the manufacturer's or importer's instructions and generally act to ensure that neither people nor the environment are put at risk. Some products require special authorisation before they can be used. Examples include pesticides sprayed in forests or from the air. Furthermore, those who make professional use of certain substances, such as wood preservatives, refrigeration agents or disinfectants in swimming pools, must hold a special licence for which they must pass the relevant professional examination.

Ban on hazardous substances

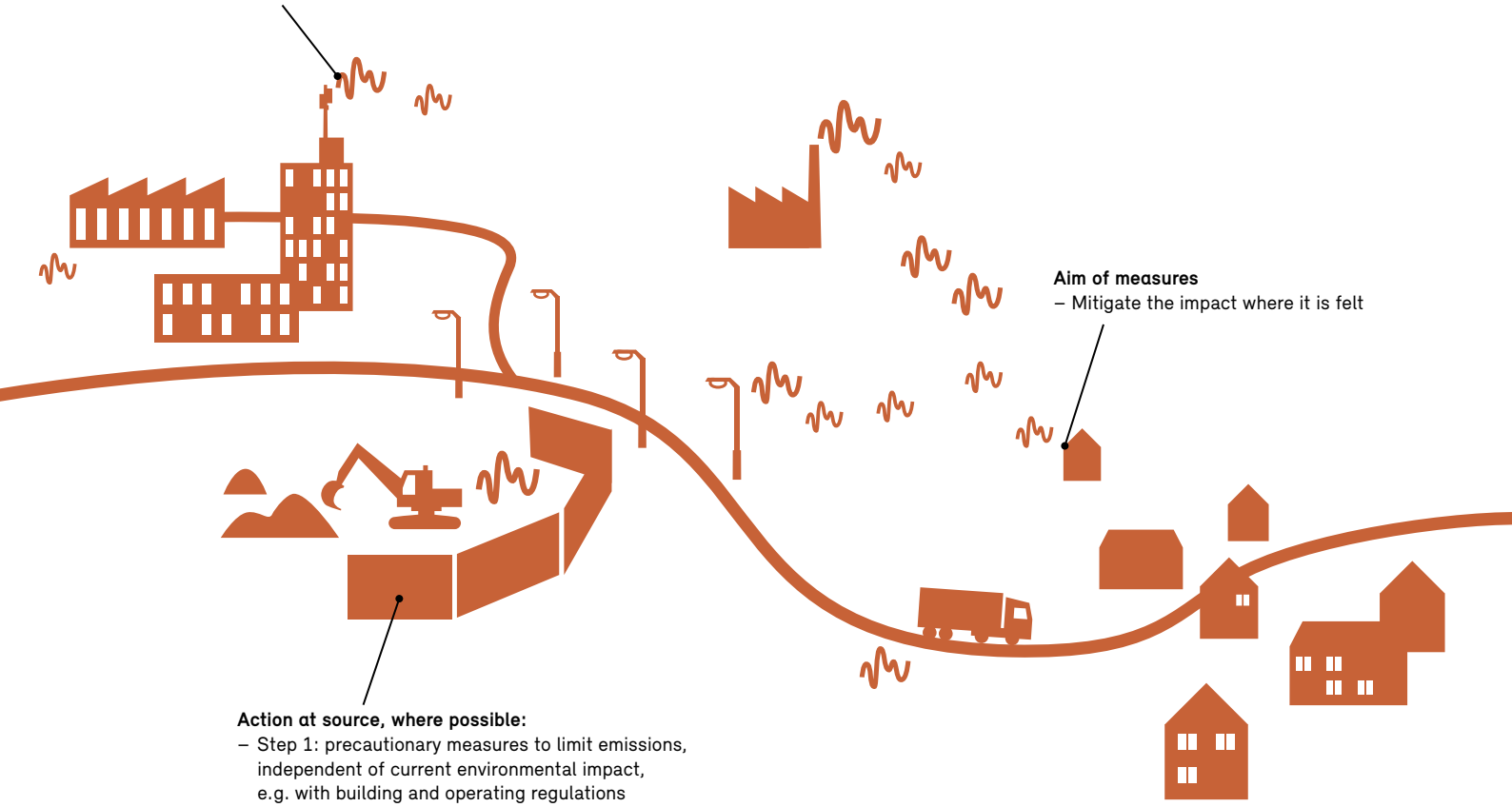
The Federal Council may issue tougher regulations for chemicals that are hazardous to people or the environment, or ban their use entirely. This type of ban applies, for example, to non-degradable brominated flame retardants that accumulate in the environment. Highly persistent chlorofluorocarbons (CFCs) were widely used until the mid-1980s as refrigerants and as propellants in aerosol cans. As CFCs and a range of other substances played a crucial role in depleting the ozone layer, their manufacture, marketing and use was largely banned in 1989, with a blanket ban in force since 2005.

Healthy lakes thanks to a phosphate ban
Phosphates are salts from phosphoric acids. In many places they occur naturally, albeit in limited quantities. They are important nutrients, especially for plants, and are therefore an important agricultural fertiliser. Phosphates also help to soften water by removing lime. This property meant that, until the mid-1980s, they were widely used as additives in laundry detergents – with serious consequences for the environment. Phosphate residues in wastewater proved to be excellent fertilisers which supported the growth of algae in rivers, lakes and seas. This over-fertilisation, which was also due in part to agricultural use, badly affected many lakes and rivers in Switzerland, particularly those in the Central Plateau. The use of phosphates as a detergent additive has therefore been banned since 1986, and this combined with other measures has resulted in a considerable improvement in water quality.

Emissions

One of the principal objectives of the Environmental Protection Act (EPA) is to protect humans, animals, plants and their environments from emissions that harm their health or significantly impair their wellbeing. Such potentially harmful or nuisance emissions include, in particular, air pollution, noise, non-ionising radiation including visible light, and vibration. They arise in the construction and operation of facilities of all types, including immoveable structures such as buildings and traffic routes as well as mobile appliances, machinery and vehicles.

Emission types
- Air pollution, e.g. from cement works, waste incineration plants, pig pens
- Noise, e.g. from roads, airports, beer gardens, lawnmowers
- Vibration, e.g. from building sites, drilling, railway lines
- Light pollution, e.g. from street lighting, neon signs
- Non-ionising radiation, such as mobile communications antennae, power lines



Aim of measures
- Mitigate the impact where it is felt

Action at source, where possible:
- Step 1: precautionary measures to limit emissions, independent of current environmental impact, e.g. with building and operating regulations
- Step 2: stricter measures to limit emissions in the case of damaging environmental impacts or nuisances where they are felt

There is a two-sided approach to protecting against harmful emissions and nuisances. First, they are limited at their respective sources. If this is not enough to keep the overall impact on the local area low, stricter measures are required.

Precautionary emission limits

As a preventive measure, the EPA requires that emissions should be prevented as far as possible. The measures in question – emission limits – should have a direct effect at source to keep them low from the start or to prevent them arising at all. This is the most effective way of protecting the surrounding area. Heating systems and engines, for example, should be designed to release a minimum of noxious exhaust gases into the air, and also to be as quiet as possible. Zoning and development regulations, as well as conditions for granting planning permission, also ensure that areas that already suffer high levels of noise are not subject to further construction.

The ordinances to the EPA establish specific limits for the individual emission types and sources. In many cases there are emission threshold values that stipulate the maximum permitted emissions for a given facility or appliance. A range of technical or operational options may be deployed to prevent emissions and comply with thresholds. For example, air pollution can be reduced by using fuels with a low pollutant content, or by operating boilers and furnaces properly. Mufflers that reduce the noise output from machinery are a further example, and traffic noise can be reduced by laying low-noise road surfaces. The advent of emission threshold values has given technological advances a considerable push, with innovations such as catalytic converters for petrol engines, particle filters for diesel engines, and the development of quieter railway carriages.

Stricter regulations

Even if precautionary emission limits are observed, there is no guarantee that the impact on people and the environment will remain at a tolerable level. Emissions from different sources may coalesce to mutually aggravating effect. For example, there is considerable noise pollution along roads and railway lines with high levels of traffic. The emission threshold values laid down in the relevant ordinances therefore specify the degree of pollution that is permitted in a particular place. In the case of noise, a distinction is made between day and night, because people who are sleeping react more sensitively to noise. If an emission threshold is exceeded, further action must be taken, such as a lower speed limit, or noise barriers. In areas with excessive air pollution, it is the canton's responsibility to draw up an action plan to coordinate additional measures. Even where tougher emissions limits have been imposed, the principle of tackling the problem at source still holds. Approaches to reducing road noise, for example, should concentrate on limiting speed and laying quieter road surfaces. Only where these measures prove insufficient should barriers be constructed to contain the existing noise.

Emissions requirements also apply to older buildings which do not or have ceased to fulfil today's environmental regulations. They must be upgraded.

Pollution control in practice
The details of how people and the environment are to be protected against pollution are set out in a whole range of ordinances. These cover the following areas:

Air pollution
The Ordinance on Air Pollution Control (OAPC) specifically governs precautionary air pollution limits for buildings and other facilities, as well as the procedure when emissions are too high.
The Ordinance on the Incentive Tax on Volatile Organic Compounds creates economic incentives to reduce levels of these VOCs, as well as sulphur.

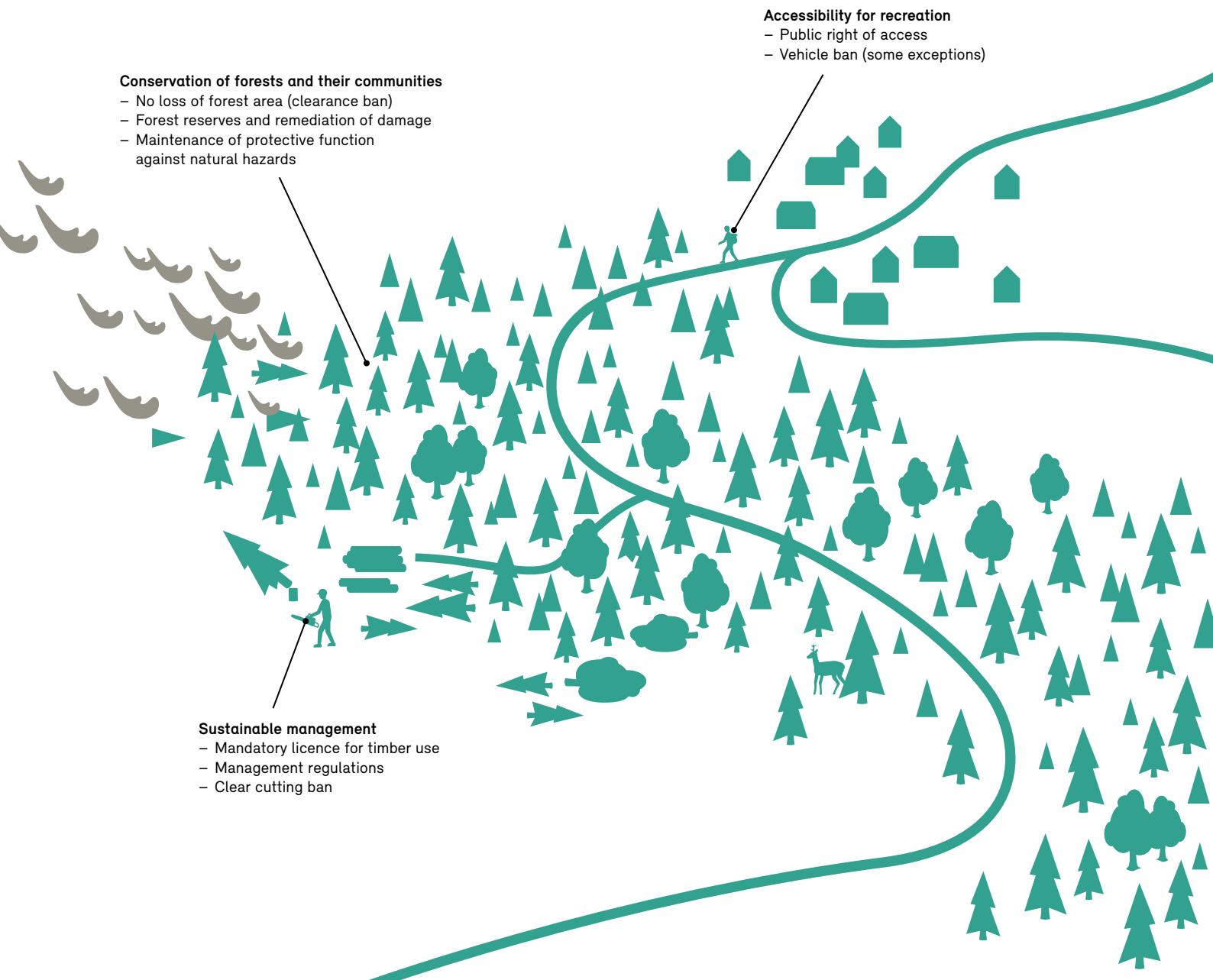
Noise
The Noise Abatement Ordinance (NAO) governs limits on noise emissions from outdoor facilities, and sets requirements for zoning and developing building land and granting planning permission in areas with high levels of noise.
The Ordinance on Railway Noise Abatement Measures contains specific requirements for improving existing railway infrastructure.
Meanwhile, the Machine Noise Ordinance governs emissions requirements for the first-time approval of machinery and equipment used outdoors.

Non-ionising radiation (NIR)
The Ordinance on Protection against Non-Ionising Radiation contains provisions to limit the impact of electrical and magnetic fields, such as those emitted by mobile communications antennae or electricity substations. Scientists are not certain what long-term effect this radiation will have, so lower precautionary limits apply alongside the emission threshold values to keep the impact on the public as low as possible in the long term.

Light pollution and vibration
The environmental impact of artificial light, and vibration, is limited in accordance with the fundamental principles of the EPA. The Federal Council has not yet issued any specific ordinance, however.

Protecting forests

The decision in the 19th century to introduce sustainable forest management practices was a milestone in the use of natural resources. Today, Swiss legislation is internationally recognised as exemplary in its comprehensive coverage of the forests' principal functions – protection, wellbeing and resource – in addition to providing a habitat for animals and plants. By encouraging natural and sustainable forest management, the Forest Act (ForA) not least ensures a continuous supply of a local natural resource, timber. Furthermore, the Act has a key role to play in protections against natural hazards beyond the forests themselves (cf. page 44).



The Forest Act (ForA) affords forests a unique position in land use, protecting not just their size, but also how they are distributed across the country. The main instrument is a general ban on forest clearance, the permanent removal of wooded areas being permitted only in exceptional cases. Forest may be cleared only if a project cannot be realised in a different location, and if the interests attached to that project outweigh those of preserving the forest. This may be true, say, of a drinking water reservoir which is overwhelmingly in the public interest, and which for technical reasons cannot be constructed anywhere else. If a special permit is issued for deforestation, new woodland covering the same area must be planted in the same region. In exceptional cases the authorities may order measures to benefit nature and countryside conservation instead of reforesting.

Habitat – a living community

Forests are more than just trees. Animals, other plants and fungi live in and on the forest floor, in the undergrowth and in the treetops. All kinds of communities may develop, depending on the subsoil, climate and type of use, and protecting them is one of the priorities of the ForA. The use of forests, which is governed by cantonal planning and management regulations, must show consideration for biodiversity. Use may be restricted or even prohibited in certain areas. The cantons may designate such areas as forest reserves.

Wellbeing – a space for recreation

Whether hiking, biking or mushroom-picking in the Alps, or walking, jogging or riding in larger urban areas, many people come to Switzerland's forests and woods to switch off and relax. This is possible in part thanks to the Forest Act, which assigns the cantons the task of making the forest accessible to the general public. They have succeeded in a way seldom seen in other countries. However, access to the forest may be restricted if important public interests require it, such is where forest conservation is at risk, or to protect plants and animals. Moreover, the forests are only accessible to the public on foot. Only the Forestry Service, forest managers and emergency services are permitted to drive on forest roads and tracks. In most cantons, horse-riding and cycling are permitted only on forest roads, surfaced forest paths or specially marked trails.

Protection – a natural barrier

In addition to the functions described above, forests protect people and property against natural disasters such as avalanches, rockfalls, and earth and mudslides. They inhibit the processes that result in such phenomena, and limit their impact when they happen. Whether or not forests are classified as protection forests depends on the potential risk and damage attached to the potential hazard, and on the protective effect that the forest might have. The cantons are obliged to ensure a minimum level of care and management so that the forests are sufficiently able to fulfil their protective role far into the future.

Sustainable forest use

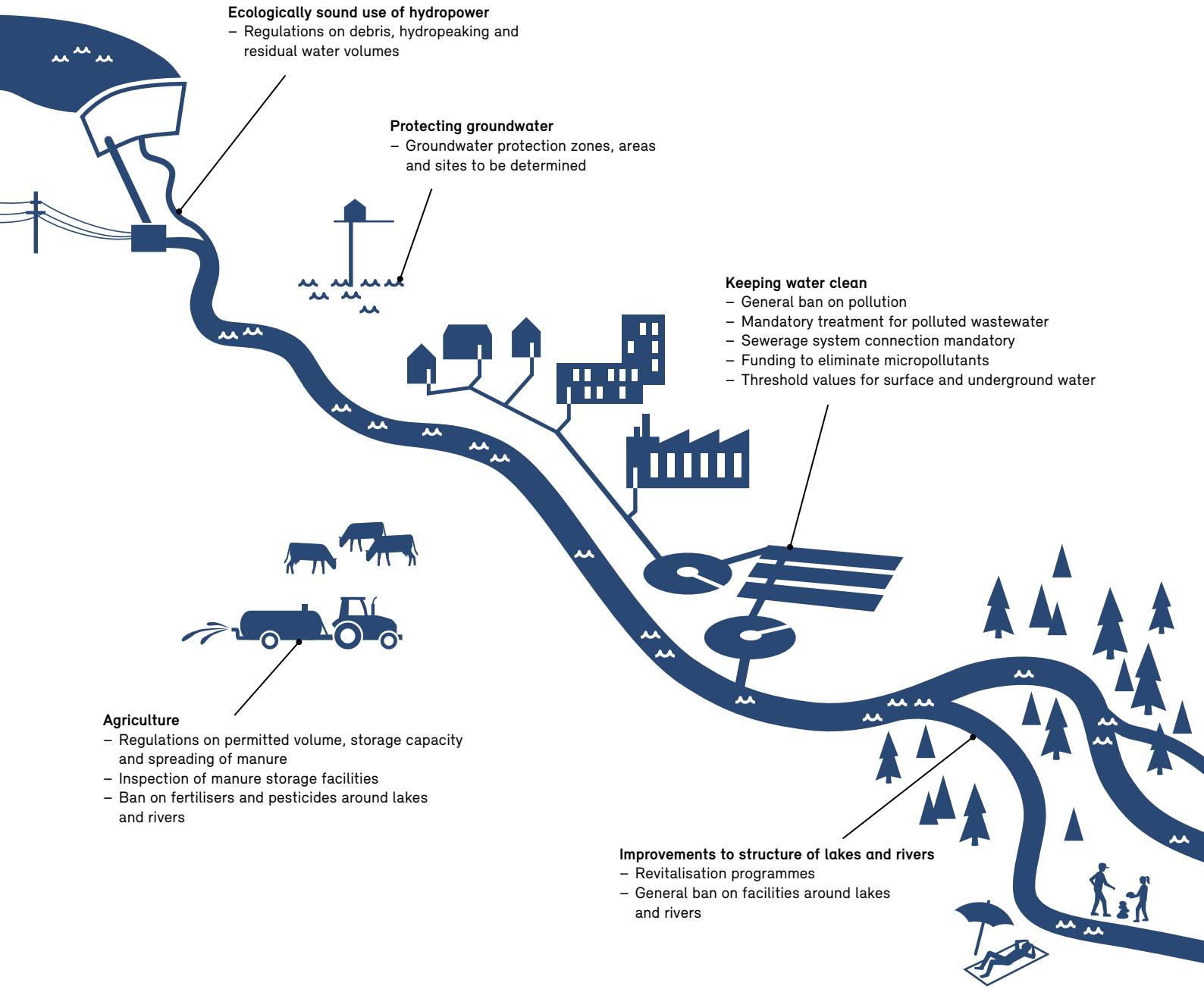
In addition to protecting the forests and ensuring they can fulfil their different functions, the ForA encourages and thus maintains natural forest management methods, and the sustainable use of timber as a resource. It is available in significant volumes in Switzerland. Not only is it a continuously self-renewing resource, but the forests already contain considerable supplies that have lain unused in recent decades. The federal government and the cantons are responsible for training the necessary specialist personnel and advising forest owners. In addition, the federal government supports measures that make forestry more economically viable. These include planning requirements that apply to all companies, or getting forestry firms to work together to improve forestry conditions overall. Efforts to promote the marketing and processing of sustainably produced timber are also supported.

Forests – for the good of humankind

Forests are of enormous importance not just in Switzerland, but around the globe. The world's forests are a haven for biodiversity, and have a crucial function in the carbon balance, and thus climate change, by absorbing CO_2, capturing carbon and keeping it out of the atmosphere as long as it is not released again when timber is burned. Forests also play a vital role in local and regional economic and social development, for example as a source of raw materials and energy, or as an important element in the water balance. Despite this outstanding contribution to the planet, no international convention on forest protection yet exists. Forests are covered indirectly by the Biodiversity and Climate Change Conventions, both of which attach great importance to the world's woodlands. Efforts on a number of fronts indicate that international forest protection initiatives are gaining traction. Many countries have signed the New York Declaration on Forests, for example. It aims to halve forest clearance by 2020 and to end it entirely by 2030. Furthermore, the United Nations Strategic Plan for Forests was adopted in early 2017. For the first time, this provides a common frame of reference for all UN member states, and for all other stakeholders worldwide.

Protecting rivers and lakes

The Waters Protection Act (WPA) protects our water and our lakes and rivers from harm. Its provisions ensure that good quality drinking and process water is available to households, industry, commerce and agriculture. It also safeguards the natural habitats of animals and plants in and around bodies of water. Rivers and lakes should also provide recreation opportunities, and continue to be part of a diverse landscape.



Keeping water clean

Clean, uncontaminated water is vital for people, animals and plants alike. Access to clean water should not be taken for granted, however. Swiss waters were polluted – heavily in some cases – as recently as the 1960s. The WPA requires us all to take the care needed to prevent harm. In particular, it prohibits the introduction of pollutants into any body of water. Polluted wastewater from households, businesses and industry must therefore be treated before it can be released. Wastewater should be discharged into the public sewerage system if this is possible at reasonable expense. However, in some cases the effluent produced by commercial and industrial operations such as garages, fruit processors and the chemicals industry, must be pretreated.

Farmers may not spread more fertiliser (e.g. nitrogen or phosphorous) on their land than their crops actually need. They must thus ensure a balance between their livestock, the additional fertilisers used, and the land they farm. Their liquid and solid manure storage facilities must have at least three months of capacity so that they do not have to spread manure on the fields during the dormant winter season.

Switzerland gets 80 per cent of its drinking water from groundwater (wells and springs). So that it does not become contaminated, the cantons must designate groundwater protection zones, in which there are restrictions on the construction of buildings and other facilities, as well as on their commercial, industrial and agricultural use. Construction is prohibited entirely around the groundwater wellhead (zone S1) and in the inner protected zone (S2). In the outer protected zone (S3), meanwhile, any building or facility that impairs the quality of the groundwater is banned.

Micropollutants from agriculture, built-up areas and from traffic also find their way into our lakes and rivers. This may happen directly or via the clean water released by water treatment plants. These micropollutants are traces of substances such as medication, cleaning products or pesticides. They are basically residues from organic chemicals, and can impact on aquatic organisms and drinking water resources. To reduce levels of these micropollutants in wastewater, over the next few years selected treatment plants will be equipped with an additional treatment process. This will be co-financed by the federal government and funded by a wastewater levy charged to the owners of central wastewater treatment plants. The relevant statutory provisions have been in force since 1 January 2016.

Sufficient water in rivers and streams

Clean, unpolluted water in itself is not enough to enable animals and plants to live in and on the water. They also need intact aquatic habitats, which have been damaged greatly in the past by the construction of flood defences and the channelling of watercourses, as well as by hydroelectric power stations. In many places today, water flows are too low, or streams run dry, and the natural environments on stream and riverbeds and riverbanks have gone. In response, the WPA requires that the natural structure and flow of our rivers and lakes should be restored as far as is possible in future.

To ensure that not just fish but also microorganisms survive, the WPA determines that there must always be a sufficient flow of water. Anyone taking any more than negligible volumes of water from these rivers and lakes requires a permit, whether to operate a power generation plant, or to irrigate farmland. Permits will be issued only if sufficient residual flow can be guaranteed at all times. One of the downsides of hydroelectric power plants is the rapid rise and fall in the water level caused by switching the facility online or offline, a phenomenon known as hydropeaking. Plant operators are therefore required to minimise harmful effects on aquatic habitats by taking structural measures.

Living watercourses

In the past it was common practice to divert streams and rivers to make use of the water or for defensive reasons. This is now permitted only in specific cases. Covering or culverting watercourses is prohibited, for example. Instead, the WPA requires that diverted, corrected, covered and culverted waters be revitalised. Consideration

must also be given here to the recreational aspects of rivers and lakes and their role as part of an attractive landscape. The costs and benefits of environmental rehabilitation projects must also be weighed up against each other. The cantons are obliged to include waterbody revitalisation programmes in their planning.

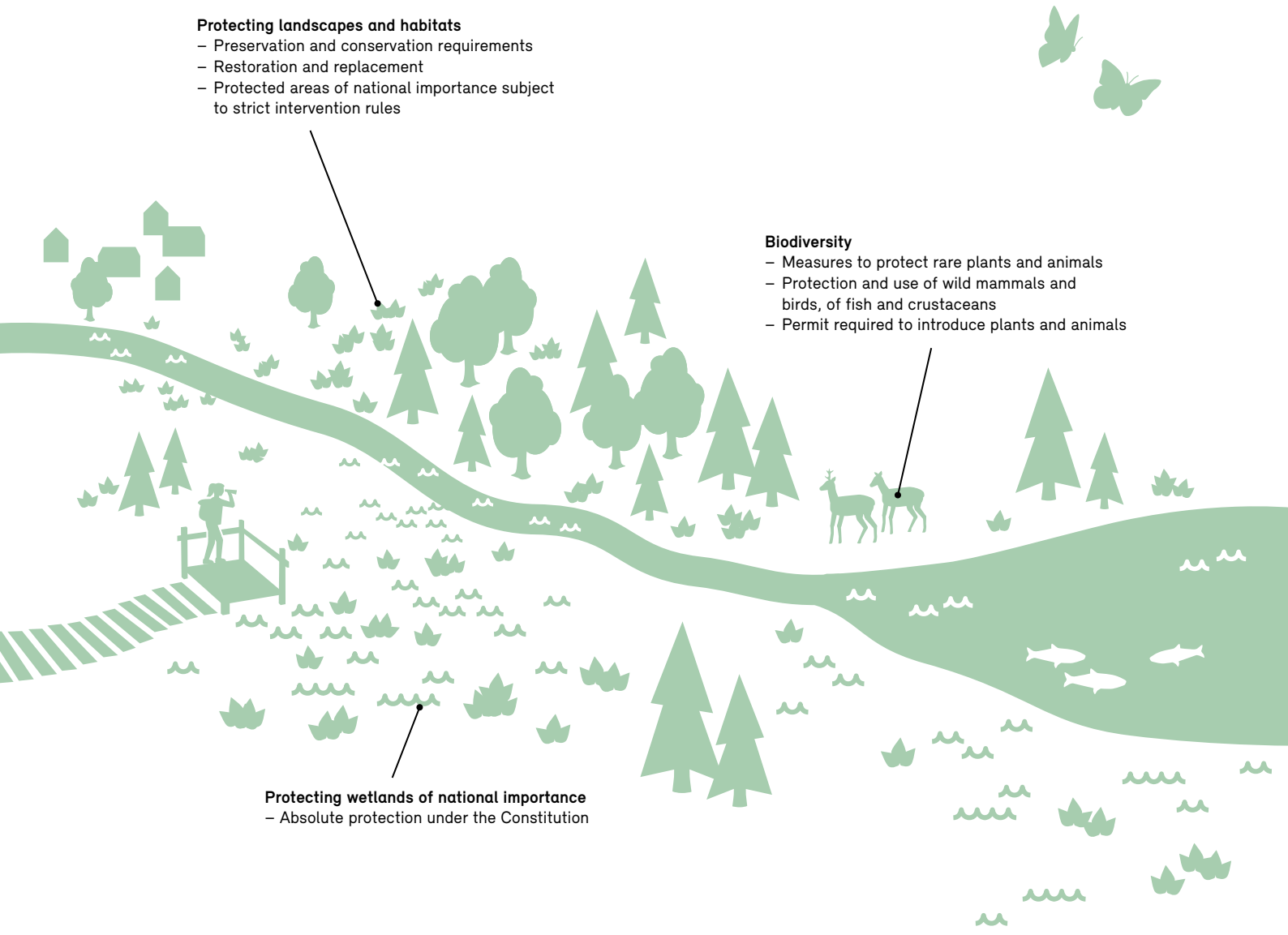
In many places, streams and rivers have too little space owing to the buildings and other facilities nearby, or intensive farming. Since 2011 the WPA has therefore required the cantons to define the amount of space needed by surface waters so that they once again have room to fulfil their natural functions, while at the same time ensuring that flood defences remain effective and that lakes and rivers can still be used.

Salmon return to the Rhine

In the 1999 Convention on the Protection of the Rhine, the five countries adjoining the river (Switzerland, France, Germany, Luxembourg and the Netherlands), along with the European Union, undertook to protect the Rhine as a habitat. The Rhine Convention represents an extension of earlier conventions dealing with the improvement of water quality. It is intended to preserve the individual character of the Rhine, its banks and flood plains. To protect the animals and plants that live in the river and on its banks, natural habitats and the original course of the river are to be conserved and restored as far as possible. Ecologically sustainable flood defences are another of the Convention's objectives. A secondary aim is to reintroduce salmon to the Rhine, in what has become a flagship project that has been warmly received by the public.

Protecting biodiversity and the landscape

The Swiss landscape has changed radically over the past hundred years. Two of the driving forces have been urban sprawl and the need for infrastructure, for transport in particular, but also for energy generation and transmission. Developments in agriculture have also played a part, with farming being intensified on the Central Plateau, but abandoned in some mountain areas. The look of the landscape has changed, but with that has come a loss of plant and animal habitats. Those that remain do not offer the same quality as before. Protecting and preserving these habitats, and biodiversity, are at the heart of the Nature and Cultural Heritage Act (NCHA), the Hunting Act and the Fishing Act.



Over the past century, numerous animal and plant species have died out or become much rarer in Switzerland and around the world. Experience has taught us that we can only protect and preserve species if their habitats survive intact, not only as a source of food, but as a place where they can live undisturbed and reproduce. The NCHA therefore requires us to counter the extinction of indigenous plant and animal species by maintaining adequately large and connected habitats, also known as biotopes. Riversides, reedbeds and marshlands, hedgerows, copses, rare forest ecosystems and dry grasslands are all deemed worth protecting, with special conservation status accorded to non-hunting zones, water and migratory bird reserves, waterside vegetation and forest reserves.

Important habitats and biodiversity offsets

The federal government is tasked with designating habitats of national importance. Sites such as raised bogs, fens, flood plains, amphibian spawning grounds and dry grasslands are listed in federal inventories. Meanwhile, the cantons are responsible for protecting and maintaining not only these inventoried sites, but also biotopes of regional and local importance. Furthermore, they must ensure that there is an ecological balance in urban and non-urban areas, for example by planting copses, hedgerows, or other forms of natural vegetation to offset those that have been lost.

Biodiversity

Wild plants and animals are best protected by protecting their habitats. Maintaining these populations nonetheless requires specific regulations, such as those protecting individual wild plant and animal specials that are laid down in the NCHA, the Hunting Act and the Fishing Act. Picking rare plants or trapping animals protected under the NCHA is banned, for example, as is catching certain species of fish. Closed seasons and minimum catch sizes are planned for other fish types. The Hunting Act determines that all birds and wild mammals that fall under its scope are protected, unless the law explicitly states that they may be hunted. This particularly affects large predators such as the lynx, bear and wolf, which had previously been eradicated in Switzerland but have since been re-introduced, or have returned of their own accord.

Protecting Swiss landscapes

The countryside is of incalculable value in many respects. Ecologically, it is provides habitats and a place where natural resources can regenerate. Economically, it is the foundation of the tourism industry and a factor in attracting business. The landscape is also a geographical expression of our diverse cultural heritage, giving a sense of identity and shaping our sense of home. The resource-efficient care of Switzerland's landscapes is therefore a key objective of the Spatial Planning Act (SPA). For its part, the NCHA requires the federal government to respect the unique nature of different landscapes. Those of national importance – such as the Lavaux vineyards on Lake Geneva – are also recorded in the Federal Inventory of Landscapes and Natural Monuments of National Importance. Particular attention must be paid to keeping these listed areas intact or to conserving them as far as is possible.

Protecting wetlands of national importance

Wetlands and wetland landscapes have enjoyed absolute protection since the Rothenthurm Initiative was passed in 1987. Nothing may be built in these areas, nor may any changes be made to the soil, unless such action helps to protect the landscapes themselves, or serves their historical agricultural use. The unusual aspect of this protection is that it is rooted not just in law, but in the Swiss Constitution.

Parks of national importance

Parks of national importance also help to conserve areas of great natural or scenic value. Whereas the main purpose of a national park is to provide unspoiled habitats for flora and fauna, regional nature parks also strengthen a sustainable regional economy. Located close to major urban centres, nature discovery parks provide an opportunity to experience nature and to learn about the environment.

Established in 1914, the Swiss National Park is the oldest such park in the Alps and in central Europe. To date it has been one of the few parks in the region that enjoys the very highest degree of protection, making it a true wilderness.

International responsibility for biodiversity

"Biodiversity" refers to all aspects of diversity in the living world. It encompasses the diversity of ecosystems, the diversity of species and genetic diversity, and how they interact. This natural diversity must be used sustainably so that ecosystem services, species diversity and also genetic diversity are preserved. What we do in Switzerland has an effect on biodiversity not only at home, but also around the world. This might be our consumption of natural resources, of agricultural goods such as meat, of exotic fruit, cut flowers, or above all feedstuffs for farm animals. Preserving biodiversity therefore requires action on a global scale. That is the goal of the Biodiversity Convention, which was adopted in 1992 at the United Nations Conference on Environment and Development in Rio de Janeiro. It has now been signed by more than 190 countries.

The Nagoya Protocol and the use of genetic resources

The Nagoya Protocol is based on the Biodiversity Convention. It specifically governs access to genetic resources and the fair and equitable sharing of benefits arising from their use. Genetic resources are used in a range of sectors, primarily research but also agriculture, pharmaceuticals, cosmetics and the biotech industry. Countries wishing to have a say in access to their genetic resources must incorporate the relevant rules into their national systems of law. The Protocol would typically be applied, say, if a Swiss company wished to use an agent made from a plant in Madagascar to develop a new therapeutic drug. In this case, Madagascan law requires the Swiss company to obtain the prior approval of the Madagascan authorities, and reach agreement with them on conditions of use. The company has a duty of care to ensure compliance with these rules. Before the product gains market approval, it must report to the FOEN that it has properly exercised its duty of care, and must also submit the relevant documentation.

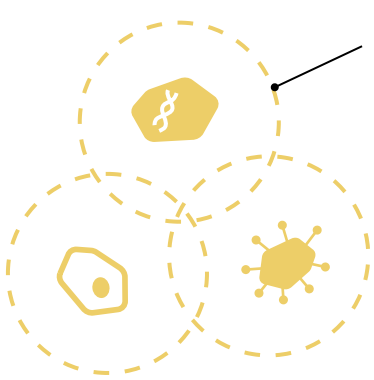
Access to genetic resources originating in Switzerland is free under the Nagoya Protocol. However, anyone wishing to use those resources must comply with a duty to document that use, and must provide the FOEN with the relevant information before the product receives market approval.

Nature conservation – a European task

The Convention on the Conservation of European Wildlife and Natural Habitats is representative of efforts by European countries to protect valuable habitats and endangered animal and plant species across the continent. Referred to as the Bern Convention, it was signed in 1979 at Bern City Hall, and has been ratified by 44 countries, as well as the EU. It protects around 600 plant and 363 bird species, as well as 111 mammals and numerous other animal species. Designated "emerald sites" are intended to provide a network of valuable habitats for species that are endangered throughout Europe. Switzerland has reported a total of 37 such sites, which will be protected primarily under the conservation framework for biotopes of national importance. At a regional level, the Bern Convention implements many of the goals that were adopted at a global level in the Biodiversity Convention of 1992.

Controlled handling of organisms

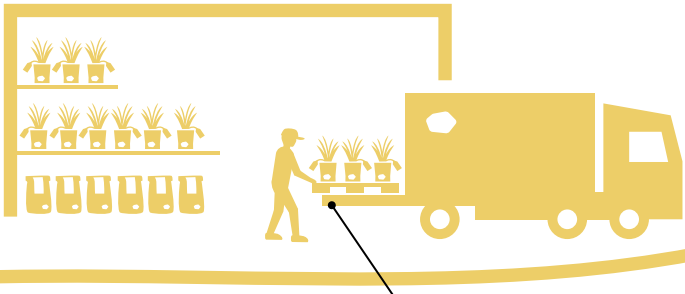
Biotechnology is undergoing rapid technological change. It is increasingly being employed worldwide in areas such as agriculture, medicine and the food industry. However, if genetically modified, pathogenic or alien organisms enter the environment unchecked, they may endanger people, animals, plants or other organisms. The Environmental Protection Act (EPA) and the Gene Technology Act (GTA) ensure that these organisms are handled safely.



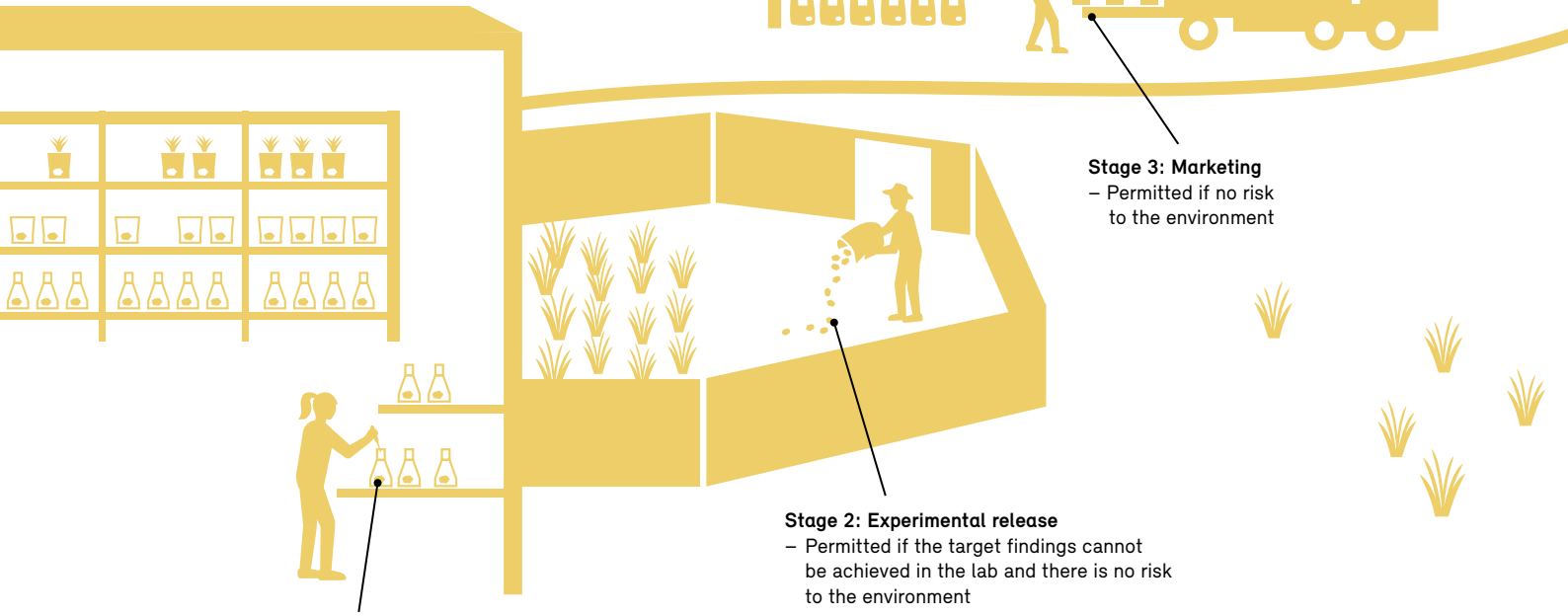
Main categories of organism
– Genetically modified
– Pathogenic
– Alien

Ethical considerations
– Respect for animals and plants

Obligations at every stage
– Identify and evaluate risk
– Possible reporting and licensing process
– Duties of care



Stage 3: Marketing
– Permitted if no risk to the environment



Stage 2: Experimental release
– Permitted if the target findings cannot be achieved in the lab and there is no risk to the environment

Stage 1: Containment in the lab
– Organisms must first be handled in a laboratory

Safety step by step

Organisms of all types are characterised by their ability to reproduce and pass on genetic material. Here, "organism" refers to both naturally occurring organisms and their genetically modified forms. When handling organisms, the principle is that neither people nor the environment may be put at risk, and that biodiversity and its sustainable use may not be compromised. Anyone working with genetically modified, pathogenic or particularly dangerous alien organisms must therefore do so in an enclosed space. A licence from the federal government is required for field trials with these organisms, as well as before products containing genetically modified or pathogenic organisms are brought to market for the first time. The latter will be granted only if there is proof that no harm will be done to either humans or the environment. A moratorium on the cultivation of genetically modified plants in agriculture was in place from 2005 until the end of 2021. Currently, an extension until the end of 2025 is being discussed by the Parliament.

Action against alien organisms

Damage to the environment, and to biodiversity in particular, can also be caused by alien plant and animal species that are brought or imported into Switzerland, if they have no natural predators here. Himalayan Balsam, for example, was originally imported as an ornamental and fodder plant, but is now increasingly suppressing native species and exacerbating erosion, especially on the banks of rivers and streams. Environmental and genetic engineering legislation gives the federal and cantonal authorities the option of taking specific action against such invasive organisms.

Safe use worldwide
The Cartagena Protocol is designed to ensure the safe transport and use of living organisms modified with the aid of modern biotechnology.

Genome editing
The latest tools in the genetic engineering toolbox, like the CRISPR/Cas9 gene editing technology, allow specific regions of DNA to be edited – deleted, replaced or inserted – with great precision. Genome editing tools are not perfect, however, and the way in which genetic material interacts is complex. There may be unintended changes to DNA, or interactivity with other genes, with undesirable outcomes. These new processes also fall under the scope of legislation on gene technology, which focuses on the well-being of humans, animals and the environment, and protects them against abuses of these tools.

Protection against natural hazards

Floods, avalanches, landslides and rockfalls are frequent occurrences in Switzerland, often causing considerable damage. The Hydraulic Engineering Act and the Forest Act (ForA) govern how defences against these natural hazards are to be organised.

Recognising hazards
- Natural hazards: avalanches, landslides, rockfalls, flooding, etc.
- Hazard maps show at-risk areas

Preventing disaster
- Modified use of space: ensure sufficient room is available to accommodate flooding and avalanches, etc.
- Early warning systems
- Structural measures such as embankments, containment facilities, corrections
- Expert and financial support from the federal government

Potential damage
- Measures are designed to protect people and valuable property

Recognising hazards

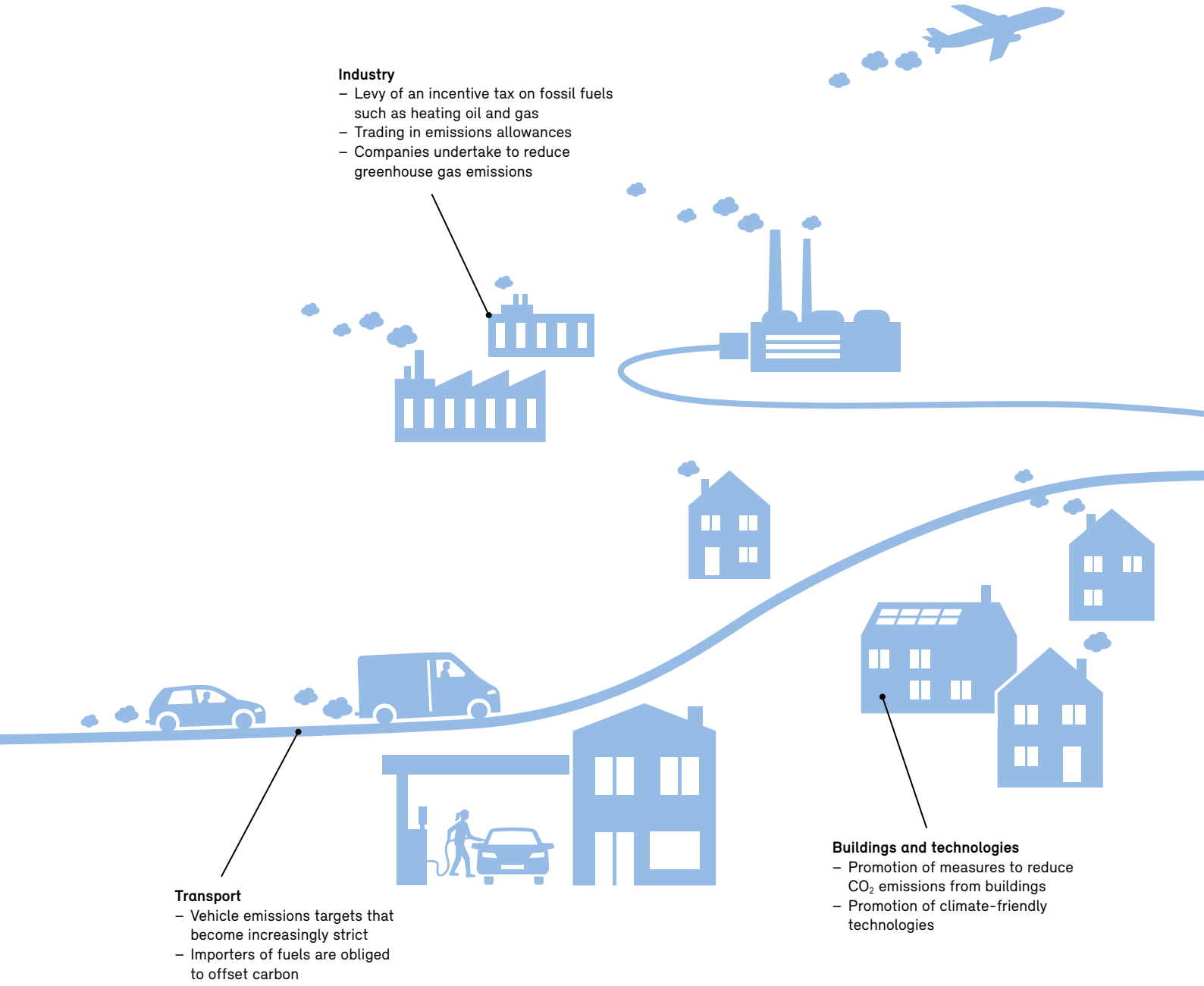
If we are to protect ourselves effectively from natural hazards, we must recognise them early on. The cantons are therefore tasked with drawing up maps that show the areas at threat. The findings shown on these hazard maps must then be incorporated into the cantons' structure plans and the communes' land use plans. Early warning systems developed and operated by the cantons alert the public to the threat of natural hazard events and enable them to get to safety in good time, or take additional precautions if necessary.

Preventing disaster

Protecting against natural hazards is the responsibility of the cantons, although they are able to call on expert and financial support from the federal government. The various measures are designed to protect people and valuable property. The best way to do this is to use space appropriately. The cantons and communes must ensure that sufficient space is allowed for natural phenomena such as flooding or avalanches, and that no buildings or infrastructures are constructed in areas under threat. However, in Switzerland a large proportion of such at-risk areas are already developed, so technical structures such as embankments and other containment facilities, as well as watercourse corrections, are required. These must meet certain ecological requirements, and their negative impact on the natural environment must be kept to a minimum. Protection forests also provide defences against avalanches, rockfalls and landslides (see page 33). For maximum protective effect, defences and designated forests must always be well maintained and managed.

Protecting the climate

Since records began in 1864, the average increase in temperature in Switzerland has been 2 °C, almost twice as high as the global mean. By joining forces, we can limit this warming. The CO_2 Act is the central element of Switzerland's sustainable climate policy.



Man-made climate change is caused by a variety of gases that amplify the atmosphere's natural greenhouse effect. Under the revised CO_2 Act passed by Parliament in December 2011, domestic greenhouse gas emissions must be at least 20 per cent lower than their 1990 level by 2020. They can be reduced mainly in the areas of traffic, buildings and industry, for which specific reduction targets are set out in the Act's implementing provisions. With parliamentary consultations concerning the period up to 2030 having been delayed, Parliament has extended the instruments that had been scheduled to end in 2020 and stipulated that greenhouse gas emissions be reduced in 2021 by a further 1.5 percentage points compared with 1990.

On 25 September 2020, Parliament approved a total revision of the CO_2 Act, which was to come into force at the beginning of 2022. However, voters rejected the bill in a referendum on 13 June 2021. Now parliament is once again discussing how to reduce greenhouse gas emissions from 2022 onwards.

CO_2 incentive tax on fossil fuels

One of the most important measures under the CO_2 Act is the CO_2 levy on fossil fuels. This has been CHF 96 per tonne of CO_2 since 2018, and will be increased incrementally up to CHF 120 as far as this is necessary to achieve the targets set. Most of the revenue from this levy is redistributed to the general public and to businesses. Some of it goes to the Buildings Programme, which supports building renovations to meet new energy standards, and to investments in renewable energies, waste heat recovery systems, and optimising building technology. Another portion of revenue from the CO_2 levy feeds a technology fund that the federal government uses for loan guarantees for companies developing and marketing climate-friendly technologies.

Action by industry

Companies from energy-intensive sectors may gain exemption from the CO_2 levy by committing to reducing their greenhouse gas outputs, or by taking part in the emissions trading scheme. Trading works on the principle that, each year, participating companies must deliver emissions allowances equivalent to the greenhouse gases they produce. They receive some of these allowances free of charge. If they do not have enough to cover their emissions, they must buy more at auction or acquire them from other companies. Companies which produce large amounts of greenhouse gases must trade in emissions allowances. In return, they are automatically exempt from the CO_2 levy.

Target values for vehicles

The CO_2 Act is also specifically aimed at the transport sector. The car industry had to cut the carbon emissions of newly registered cars to an average of 130 g CO_2 per kilometre by 2015. This target was tightened further, to 95 g per kilometre by the end of 2020 and a target of 147 g CO_2 per kilometre was introduced for vans and light articulated vehicles. In addition, importers of fossil motor fuels must offset a rising share of the carbon emissions generated from those imports.

An international challenge
The Climate Change Convention was adopted at the 1992 Earth Summit in Rio de Janeiro. To date, it has been ratified by 165 states. The Convention aims to prevent dangerous disruption to the climate system and to stabilise man-made greenhouse gas emissions at safe levels. The 1997 Kyoto Protocol and its 2012 Doha Amendment (not in force) were designed to define global climate policy in greater detail, and to set reduction targets for industrialised countries for the 2008 – 2020 period. A new agreement for the post-2020 period was then adopted at the Paris climate conference in 2015 – the first time that all states parties assumed a legally binding obligation to reduce their greenhouse gas emissions. A rulebook for the implementation of the Paris Agreement was agreed by states parties at the UN Conference on Environment and Development in Katowice, Poland (COP24) in 2018.