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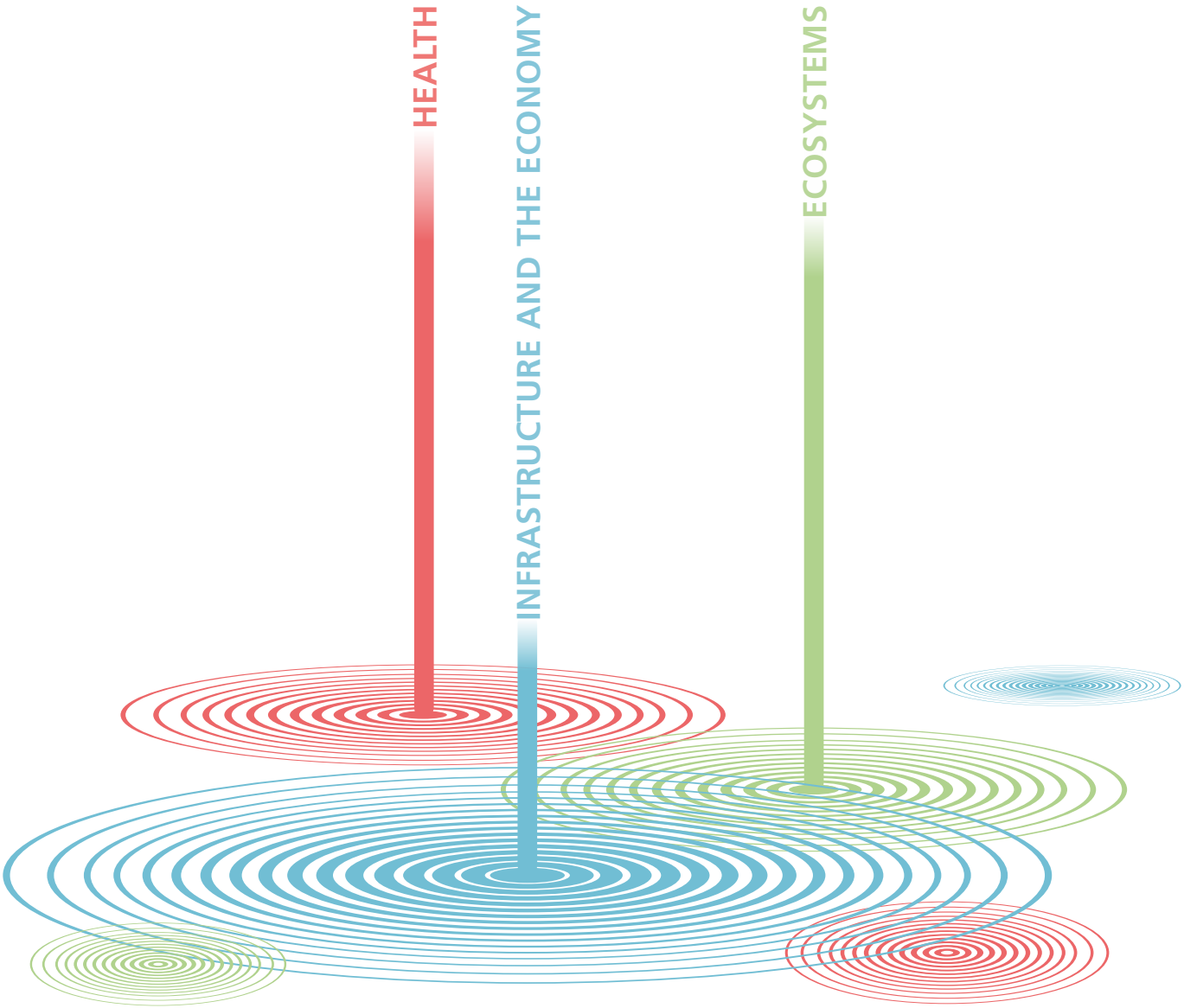

NCCS-Impacts

Impacts of Climate Change on Switzerland –
Decision Support from the NCCS-Impacts Programme

OVERVIEW AND GUIDE

Foreword

The summer of 2026 will be remembered by many people in Switzerland as one of extreme weather. A succession of heatwaves, record temperatures and a severe drought had a significant impact: record low water levels and high water temperatures in rivers and lakes, restrictions on shipping on the Rhine, and adverse effects on agriculture and forestry, as well as on public health. Last summer offered a glimpse of what a warmer world feels like and the challenges we will increasingly have to face in the future. Climate extremes affect people, the economy and the environment simultaneously.

That is precisely why we require sound decision support. The impacts of climate change respect neither sectoral nor national boundaries. Policymakers, public authorities, businesses and society need robust evidence: How are climate changes impacting us? Which areas are particularly affected? What action can be taken?

The NCCS-Impacts programme brought together federal agencies from various departments, research institutions and partner practitioners to generate new cross-sectoral insights and develop innovative tools. New scientifically sound and actionable resources are now available to support forward-looking decision-making. They enable us to better understand the impacts of climate change on ecosystems, infrastructure, the economy and health, and to take these into account in our actions.

This guide provides an overview of the programme's findings and tools. It shows how climate impacts are a cross-sectoral challenge and why a joined-up view of risks and adaptation options is becoming increasingly important. Adapting to climate change is not a question for the future; it is a key prerequisite for a safe, liveable and resilient Switzerland.

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NCCS Impacts

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What's new?

NCCS-Impacts saw multiple federal offices and research institutions work closely together for the first time in a national interdisciplinary and transdisciplinary programme, co-producing with practitioners targeted and actionable decision support for dealing with climate change.

At the heart of NCCS-Impacts are tangible results and outputs. Over 30 products have been developed, including numerous digital applications, models and decision-making tools that enable climate impacts to be systematically analysed and integrated into planning processes. The results from NCCS-Impacts not only describe the impacts of climate change, but – wherever possible – make them quantifiable, comparable and relevant for action.

A key innovation is the development of Shared Socioeconomic Pathways for Switzerland (SSP-CH). These scenarios show how society, the economy and land use could develop up to 2100, and for the first time make it possible to systematically link climate risks with future societal developments. This provides a solid basis for long-term planning and strategic decision-making.

New tools are also available for ecosystems and natural resources. A range of applications help explore how agriculture, forests and water bodies could change under different climate conditions, in areas such as crop yields, ecosystem services and water quality. A cross-sectoral dashboard complements these tools by highlighting hotspots of change and supporting a coordinated assessment across sectors.

With regard to infrastructure and the economy, the programme provides new resources for assessing climate risks and the costs of climate change impacts. For the first time, detailed estimates of the costs of climate impacts and adaptation have been developed for selected risks. New analyses also reveal how direct damage from extreme events, as well as indirect effects – for example through productivity and international interdependencies – can affect the Swiss economy.

In the field of health, the programme has generated new insights and specific tools that can be directly applied in practice. These include projections of heat-related mortality and a forecasting tool that estimates emergency hospital admissions during hot spells, helping to support healthcare planning. The programme has also produced analyses of the spread of vector-borne diseases. The One Health approach was implemented to provide an integrated perspective on human, animal and environmental health.

Together, these results create a broad, cross-sectoral foundation for addressing the impacts of climate change in Switzerland. They connect scientific knowledge with practical solutions and support informed, forward-looking decisions in a changing climate.

Beyond its scientific results, NCCS-Impacts has fostered long-term exchange and collaboration between researchers, government and practitioners. The programme has brought together an active network that will continue to drive cross-sectoral knowledge transfer, collaboration and the development of decision support tools.

Introduction

What specific impacts is climate change having on Switzerland? How can we, as a society, adapt and protect ourselves?

The impacts of climate change are already being felt across Switzerland, affecting a wide range of sectors. Under the measures currently planned worldwide to reduce emissions, the world is heading for an increase in global temperatures by almost 3 °C by the end of the century. To meet the challenges of climate change and develop effective adaptation strategies and targeted measures, decision-makers at federal, cantonal and local level, as well as in the private sector, need sound scientific evidence and practical tools.

Thanks to national and international research, collaboration between academia, government and practitioners, and coordinating bodies such as the Intergovernmental Panel on Climate Change (IPCC), we now have a broad understanding of how the global climate is changing. For Switzerland, the nationally consolidated climate scenarios – most recently *Climate CH2025*, **www.climate-scenarios.ch** – provide robust data on the future development of key climate variables such as temperature, precipitation and, increasingly, extreme events. A growing body of research is also shedding light on the impacts of climate change. The report *Brennpunkt Klima Schweiz 2026* provides an up-to-date overview of these impacts. Published in 2025, the *Climate Risk Analysis for Switzerland* assesses the country's most significant climate-related risks (see ➔ **Further key resources**).

Against this backdrop, the nationwide NCCS-Impacts programme brought together consortia of researchers and practitioners to develop cross-sectoral knowledge and practical foundations for understanding the impacts of climate change. The projects focused on the following key areas: socioeconomic scenarios, ecosystem services, human and animal health, supply chains, costs of climate change, and resilience of critical energy infrastructure. An overview of the projects and their products can be found in the ➔ **programme overview**.

To maximise their value for different audiences, the results and climate services were tailored to practical needs through an ongoing, transdisciplinary dialogue with practitioners. The aim is to ensure that the information and services developed provide the greatest possible benefits when planning measures to adapt to climate change.

This document serves as a guide, offering a concise overview of the results of the NCCS-Impacts programme. It highlights selected project results and points to the tools developed as part of the programme. Links provide direct access to the project websites, where readers can explore the findings in greater depth.

The results are presented from three different perspectives. However, the boundaries between these perspectives are fluid, as climate impacts overlap and create complex interactions across sectors.

The perspectives at a glance

1 **Ecosystems**

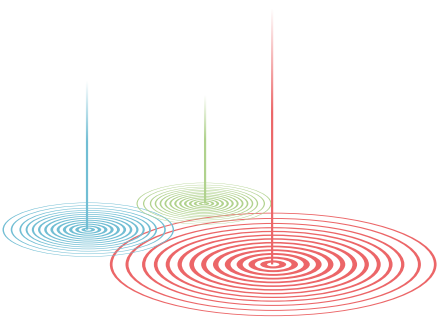
Impacts on agriculture, forestry and water bodies

2 **Infrastructure and the economy**

Impacts on the economy, buildings, and transport and power infrastructure

3 **Health**

Impacts on health and the health system



Methodological note: climate scenarios

The foundation for NCCS-Impacts
NCCS-Impacts is based on the CH2018 climate scenarios. The focus is primarily on the impacts under the high-emission scenario RCP8.5, described as the "*scenario without global climate change mitigation*". RCP8.5 is now considered unlikely, as renewable energy is becoming more affordable, measures to reduce greenhouse gas emissions are being implemented, and emissions are rising less sharply than previously assumed. At the same time, very low-emissions scenarios are also considered outdated in light of observed developments (see the **MeteoSwiss blog**).

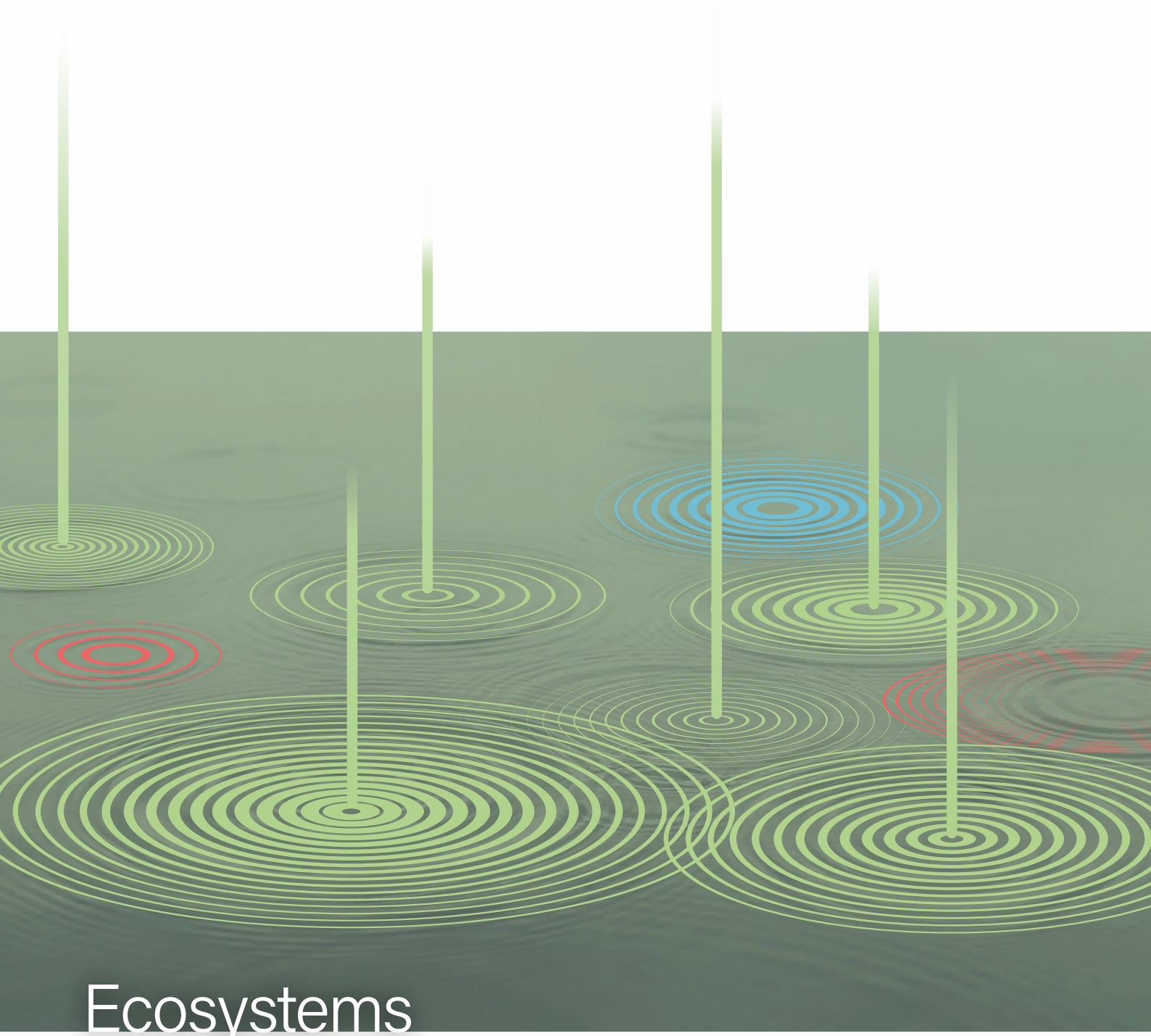
Nevertheless, the impacts discussed here remain relevant for the following reasons:

1. 2060 time horizon
NCCS-Impacts focuses on the period around 2060. For this time frame, the choice of emission scenario is of relatively minor significance. The average changes projected for 2060 under RCP8.5 fall within a range that could also be reached under a more moderate emission pathway.

2. Comparison with Climate CH2025
With its focus on 2060 under RCP8.5, NCCS-Impacts considers a world that is around 3 °C warmer than in pre-industrial times. Under the measures currently planned worldwide to reduce emissions, we are on track to reach such a 3-degree world by the end of the century. The climate changes projected for Switzerland around 2060, as set out in CH2018, are broadly in line with those calculated for a 3-degree world under the latest generation of scenarios, Climate CH2025. However, the projected warming is slightly lower in the CH2018 climate scenarios.

3. Robust risk management
In the risk assessments, scenarios serve as tools to illustrate the range of plausible developments. Decision-makers can then tailor their planning to the appropriate point within this range, depending on the specific level of protection required.

Interpreting the results
As a general point, it is important to note that the future changes discussed here should not be interpreted as precise forecasts. Rather, they are projections based on specific assumptions and conditions, particularly regarding future trends in global emissions. While the results are often presented in clear and definitive terms for ease of reading, all findings are naturally subject to scientific uncertainty.



Ecosystems

Ecosystems

Agricultural land, forests and bodies of water are of great value to people in Switzerland, providing a wide range of ecosystem services such as nutrient cycling, pollination and climate regulation. Climate change will not only have a major impact on these ecosystems and the services they provide, but also on areas that are directly dependent on them, such as food security. This section highlights selected NCCS-Impacts findings on how climate change will affect key areas of agriculture and forestry as well as water bodies.

Impacts on agriculture and food security

Agriculture in Switzerland is already being affected by climate change, as the summer of 2026 has made all too apparent. These impacts are expected to intensify over the coming decades. Rising temperatures, more frequent and prolonged droughts, heavy precipitation and hail events will pose mounting challenges for agriculture and also affect food supply.

According to NCCS-Impacts, winter crops such as winter wheat and winter barley tend to yield higher returns due to higher temperatures during the growing season. At the same time, more frequent and prolonged summer droughts are expected to result in increasing crop losses in many parts of Switzerland. Changing weather conditions will also affect the occurrence of pests and plant diseases, hitting the stability of domestic crop yields. Stable yields in crop production are, however, essential for the economic viability of farms and for food security.

The CLIMAGS app, developed as part of NCCS-Impacts, shows whether and to what extent annual yields, yield fluctuation and key ecosystem service indicators – such as soil carbon and pollination potential – will alter with climate change in different regions of Switzerland. The app can, for example, be used to identify where and to what extent strategic crop choices can help minimise yield risks.

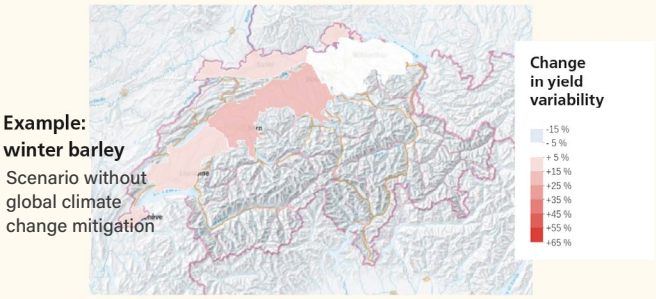


Figure 1
Illustration from the CLIMAGS (CLimate IMpacts on AGriculture in Switzerland) app.
Climate change is expected to increase yield variability for arable crops and grassland in the future.

Factsheet

Climate change is creating new health risks for livestock. NCCS-Impacts examined the impacts of heat stress on pigs and poultry. The findings show that in particular the combination of high temperatures and high humidity places severe stress on the animals. This negatively affects their welfare and can reduce productivity and production quality. To help address these risks, various measures were assessed and recommendations developed – including ways to monitor animals for signs of heat stress and to provide shade and cooling in livestock housing. Heat stress is also a major concern with cattle, as the summer of 2026 has demonstrated. High temperatures place stress on animals and can increase their susceptibility to disease.

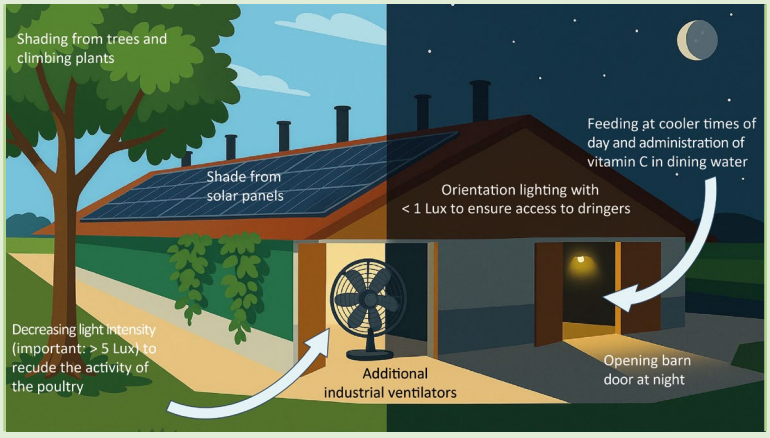


Figure 2
Possible measures to reduce heat stress in livestock housing.

Factsheet

Beyond the direct impacts of climate change, NCCS-Impacts also examines its indirect effects on international food and feed supply chains. Switzerland's established reliance on imported feed for cattle, pigs and poultry could be increasingly disrupted by climate change. Other imports that are crucial for the agricultural sector, such as fertilisers and fossil fuels, are also exposed to significant global climate risks.

For imported foods such as rice and coffee, which are vital to Switzerland's food and supply security, climate-related disruptions will raise the risk of supply shortages. Even though yields are currently stable in many producing countries, climate risks will increasingly affect yields in these countries in the future and lead to disruptions in supply chains. Mounting supply risks can be mitigated by further diversifying suppliers and sourcing regions and countries, or by substituting certain food products.

Impacts on forestry

Forests, too, are affected by climate change. Increasing drought, storms and pest infestations are changing ecological conditions in Switzerland's forests. According to NCCS-Impacts, certain tree species will no longer be suitable for their current locations in the future. This threatens not only forest stands, but also the ecosystem services they provide – from timber production and protection against natural hazards to the creation of habitats for native biodiversity. Without targeted support for climate-resilient tree species, the stability and productivity of forests are likely to decline. Tree species diversity also plays a key role in forest stability: mixed forests are more resilient than species-poor forests, as they can better utilize water and nutrients under unfavourable conditions.

Two complementary apps developed through NCCS-Impacts support forestry professionals and authorities in making informed decisions:

The ForClim (Forests in a Changing Climate) app
simulates how forest stands could develop in the face of climate change. This enables more informed planning of forest management measures, complementing the existing Tree App.

Factsheet

The FORTE (Forest Tree Explorer) app
provides a map-based overview of how climate change could affect forest multifunctionality and the associated ecosystem services across Switzerland.

Factsheet

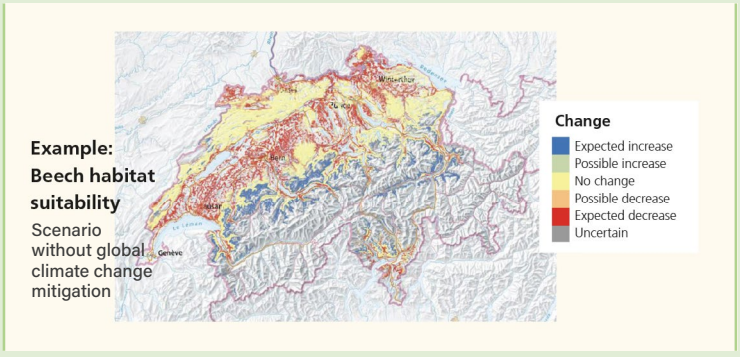


Figure 3
Illustration from the FORTE app. Climate change is making conditions less favourable for beech trees across many parts of the Swiss Plateau.

Impacts on water bodies

Climate change is having a major impact on the ecosystem services provided by Switzerland's water bodies. Rivers and lakes are warming, with water temperatures during hot spells reaching levels that are harmful to aquatic life and ecosystems. Increasing summer drought is leading to lower seasonal water levels in rivers, lakes and groundwater, with small streams and wetlands at risk of drying up altogether. This has adverse consequences for ecosystems.

Bodies of water are not only significantly affected by the amount of precipitation over the year, but also by the temporal distribution of precipitation and the associated indirect consequences. For example, heavy rainfall can lead to greater soil erosion and cause more nutrients to be leached out of the soil. This increases nutrient and sediment loads in surface waters. In lakes, excessive nutrient inputs can trigger algal blooms, deplete oxygen levels and ultimately harm biodiversity. These effects are further amplified as rising lake temperatures reduce vertical water mixing and promote algal growth. These changes can affect drinking water supply and limit the use of water bodies for recreation and agriculture.

The AquaREL app, newly developed as part of NCCS-Impacts, visualises how climate change could affect nutrient and sediment loads, as well as water runoff and availability, across different regions of Switzerland. The maps provide insights into potential long-term changes and help identify broad regional trends.

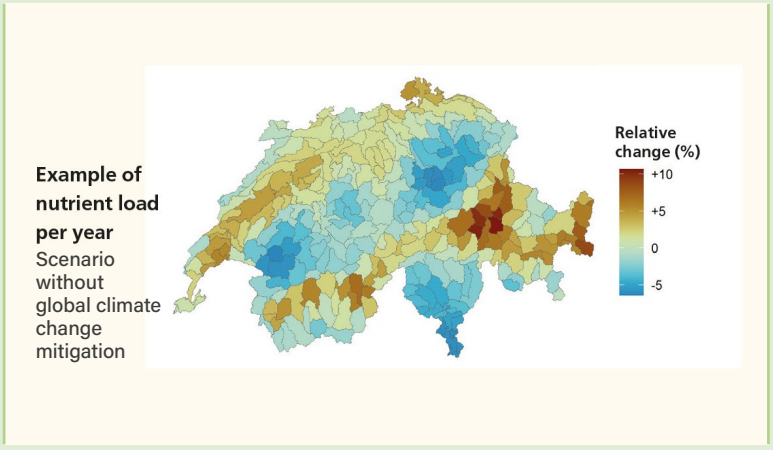


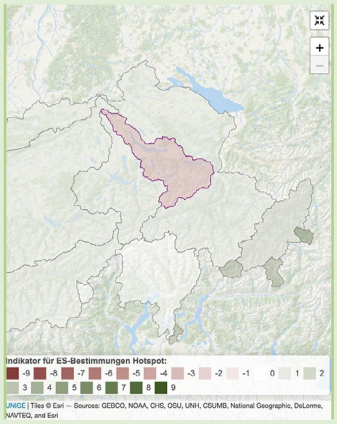
Figure 4
Illustration from the AquaREL app. Nutrient loads in lowland water bodies are expected to increase, while those at higher elevations are likely to decrease.

Factsheet

A cross-sectoral analysis of ecosystem services

Increasing nutrient leaching due to more frequent heavy precipitation is one example of how climate change can affect ecosystem services across sectors. Whilst agricultural soils are losing productivity due to declining soil fertility, the nutrients entering water bodies are leading to a deterioration in water quality and ecological functions. This example illustrates the fact that the impacts of climate change do not stop at sectoral boundaries, but can affect several sectors simultaneously – in this case, agriculture, water bodies and forests.

This calls for cross-sectoral management of multiple ecosystem services – a challenge for authorities and decision-makers whose responsibilities are traditionally organised on a sectoral basis. A new cross-sectoral dashboard developed as part of NCCS-Impacts shows how ecosystem services across different sectors may change over time and under different climate scenarios. This approach provides an initial rough assessment of how climate change will affect agricultural, forestry and aquatic ecosystem services in Switzerland.



Limmat

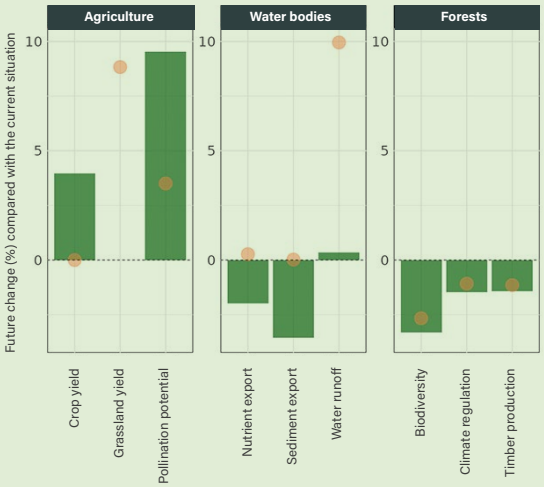


Figure 5
Illustration from the cross-sectoral dashboard showing climate change impacts on ecosystem services provided by agriculture, forests and water bodies – using the Limmat catchment as an example. The map on the left shows whether multiple ecosystem services in a region increase or decline at the same time. Red areas indicate a concentration of declining ecosystem services, while green areas denote a concentration of increasing ecosystem services.

The bar chart on the right shows the percentage change in individual ecosystem services for the period 2045–2074 compared with the current situation. The orange dot indicates the average value for Switzerland as a whole.

Cross-sectoral dashboard

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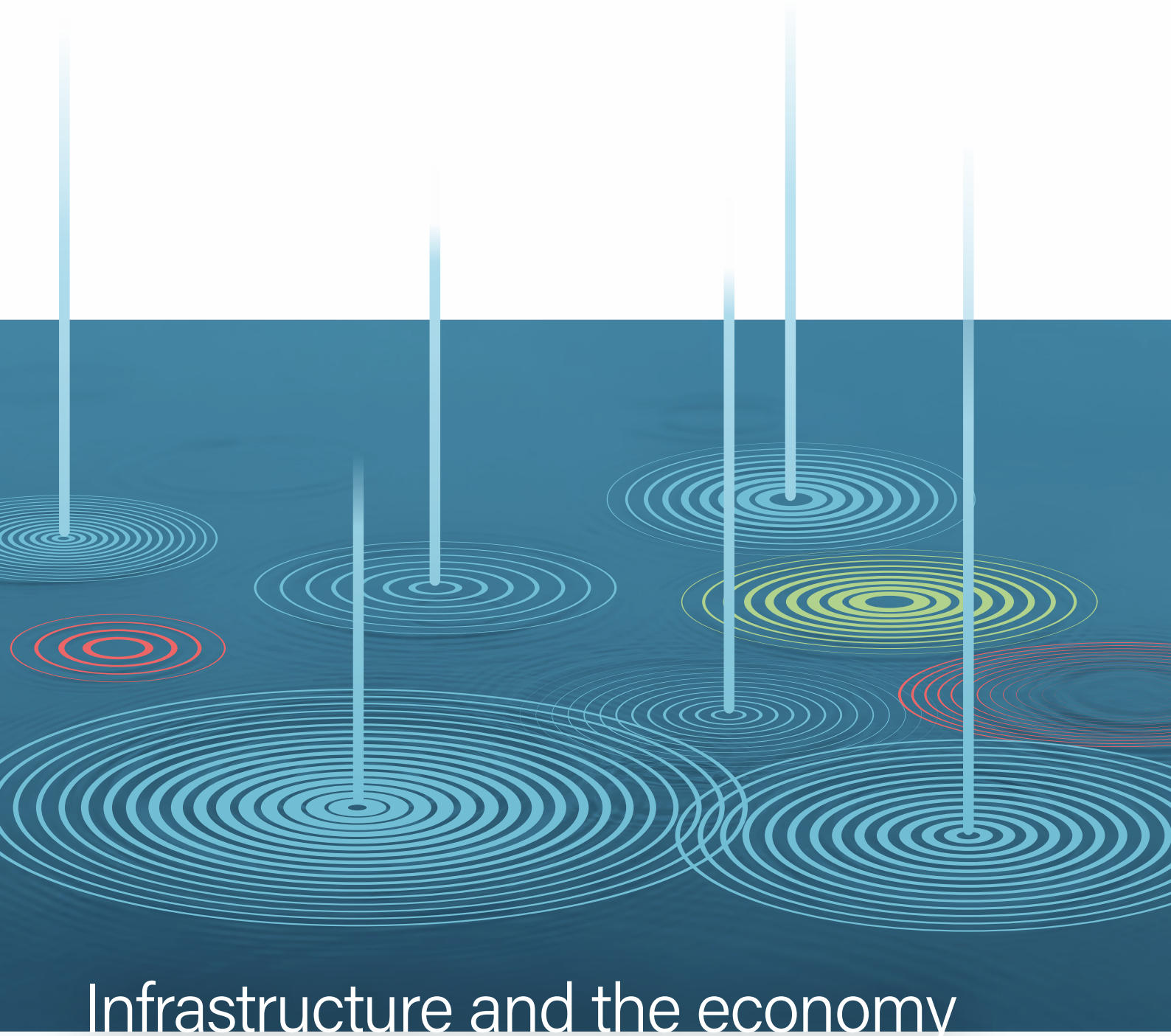
Impacts



Infrastructure and the economy

Infrastructure and the economy

Climate change will increase risks to Switzerland's built infrastructure and economic system. The impacts range from physical damage and operational disruptions to economic effects along national and international value and supply chains.
At the same time, long-term climate change will affect the performance, use and planning of infrastructure and economic activities. This section highlights selected NCCS-Impacts findings on the impacts of climate change on infrastructure and the Swiss economy.

Impacts on infrastructure

As climate change progresses, short-duration heavy precipitation events in particular are becoming more frequent and intense. These events can trigger flooding (including flash floods), landslides and debris flows, increase surface runoff in built-up areas and on transport routes, and cause significant damage to buildings, production facilities, and transport and power supply infrastructure. Switzerland's topography makes it particularly vulnerable to these impacts. Settlements in valleys, transport routes and critical infrastructure – often located in exposed areas – face greater risks.

Storms and hail events, too, regularly cause significant property damage across Switzerland. Climate change is increasing the intensity and frequency of hail events. The latest high-resolution climate models suggest that this hazard is likely to increase across Switzerland in the future. Densely populated areas and economically significant regions are particularly affected by these developments, which will potentially lead to rising damage costs.

Alongside climate change, ➔ **socioeconomic developments** are another factor behind mounting losses from natural hazards. In particular, the growth in asset values – often in exposed locations in Switzerland – increases the potential for damage and leads to a rising climate risk.

Infrastructure is affected not only by individual natural hazard events, but also by gradual changes in the climate such as the steady increase in temperatures.
For example, NCCS-Impacts shows that the rising snowline will require the viability of existing winter sports infrastructure to be continually reassessed, as facilities at low and medium elevations will no longer be economically viable in the long term.

Impacts on the economy

Climate change in Switzerland is affecting the national economy with its complex interdependencies. Figure 6 from NCCS-Impacts illustrates a typical pattern of impacts, using heavy rainfall as an example. The resulting flooding and debris flows cause damage to buildings, production facilities and other critical infrastructure. This results not only in direct financial losses, but also in supply chain disruptions and production stoppages at the affected companies themselves. All of this may lead to lower revenues and job losses, as well as reduced investment by businesses and the public sector and lower household consumption.

However, some sectors may benefit economically, at least temporarily and when considered in isolation. The construction sector, for example, benefits from contracts for protective measures or the repair of damage. Demand for healthcare services will also increase (➔ **Impacts on the health system**). Overall, though, these additional climate-related costs will be borne by society, and weaken the economy as a whole.

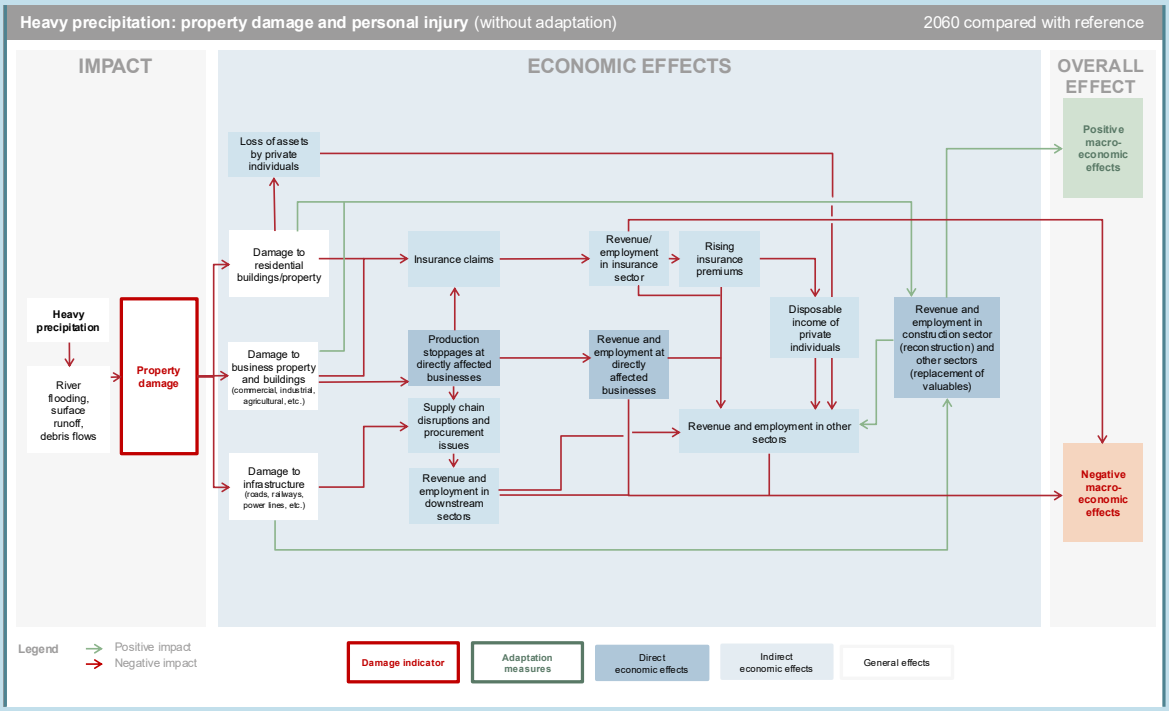


Figure 6
Impacts of climate-related extreme events on the Swiss economy: the example of heavy precipitation. Green arrows and the green box indicate positive economic effects, while red arrows and the orange box denote negative economic effects.

Technical report on climate costs (in German)

Extreme weather events may also place a significant burden on the economy by disrupting critical infrastructure. The *Critical Energy Infrastructure project* (**RECIPE**) is investigating the potential impacts on the economy and society, for example as a result of more frequent power outages. The project, which runs until 2030, is part of a joint initiative between NCCS-Impacts and the Swiss Federal Office of Energy's SWEET programme.

Climate change may affect the economy not only through sudden disruptions caused by extreme events, but also through gradual changes. For instance, the continuous rise in temperatures and the longer and more intense hot spells are reducing labour productivity. The impacts vary across regions, with some areas affected more severely than others (Figure 7).

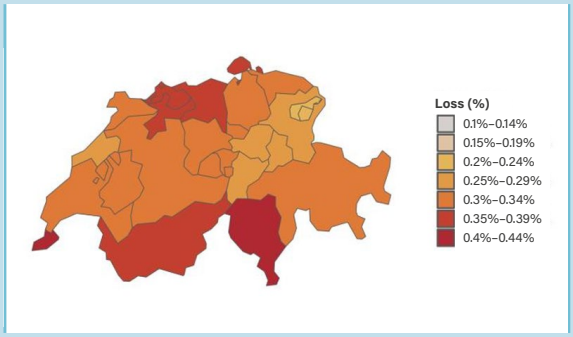


Figure 7
Annual losses in labour productivity relative to overall productivity by canton around 2060, under a scenario without global climate change mitigation.

Technical report on climate costs (in German)

Adaptation measures, such as installing cooling systems, can also have negative consequences. While they help reduce the impacts of climate change, they also increase costs and energy consumption. They can also raise outdoor temperatures and potentially lead to higher greenhouse gas emissions, which runs counter to Switzerland's climate goals. In many cases, there are much more cost-effective ways to adapt. For example, installing relatively inexpensive shading systems on an office building can help avoid the need for costly cooling systems later on, and prevent losses in employee productivity.

As a traditionally open and highly interconnected economy, Switzerland is also heavily affected by climate change abroad. Mounting risks from natural hazards, periods of drought and sea level rise in manufacturing countries may disrupt or even cut off upstream supply chains, indirectly affecting businesses in Switzerland. If global climate change slows economic growth in key markets around the world, Switzerland's export opportunities will also be reduced.

Focus: Socioeconomic Scenarios for Switzerland (SSP-CH)

Over the coming decades, the climate will change – but so too will society, the economy and technology. These changes must be taken into account when assessing how climate risks may evolve in the future. As part of NCCS-Impacts, five possible future pathways for Switzerland (Shared Socioeconomic Pathways, SSP-CH) up to 2100 were developed. These scenarios are based on focus group discussions with 59 scientists from 20 Swiss scientific institutions, as well as five workshops with residents from the German-speaking and French-speaking parts of Switzerland.

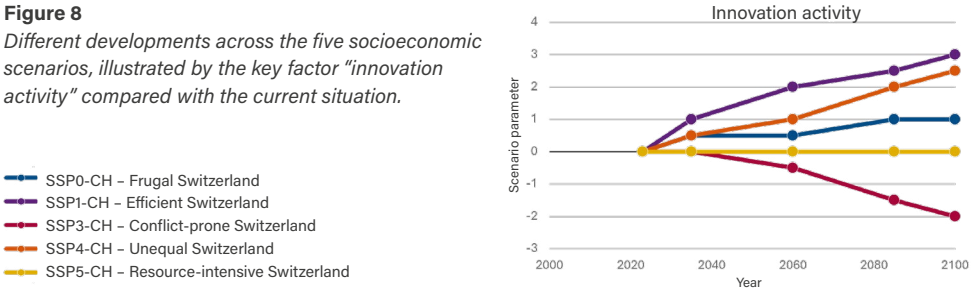
The scenarios describe coherent developments in key factors such as population, GDP, innovation activity, levels of protectionism and consumer behaviour. SSP0-CH (Frugal Switzerland) and SSP1-CH (Efficient Switzerland) focus on sustainability: SSP0-CH achieves this through lower consumption and greater redistribution, while SSP1-CH is geared towards efficiency, technological innovation and sustainable growth. SSP3-CH (Conflict-prone Switzerland) assumes low social cohesion across society and limited international cooperation. The economy contracts, while innovation stagnates. SSP4-CH (Unequal Switzerland) is characterised by an innovative economy but high levels of inequality, with only high-income groups benefiting. SSP5-CH (Resource-intensive Switzerland) is based on resource-intensive, fossil-fuel-driven growth that initially creates prosperity, but ultimately leads to declining economic output due to high environmental costs and resource scarcity.

Considering these different possible pathways provides a basis for planning adaptation measures and climate mitigation strategies under a range of future scenarios.

For example, an innovation-friendly pathway can enable more efficient solutions for decarbonisation and climate adaptation than a societal pathway with lower innovation capacity.

SSP-CH

Figure 8
Different developments across the five socioeconomic scenarios, illustrated by the key factor "innovation activity" compared with the current situation.



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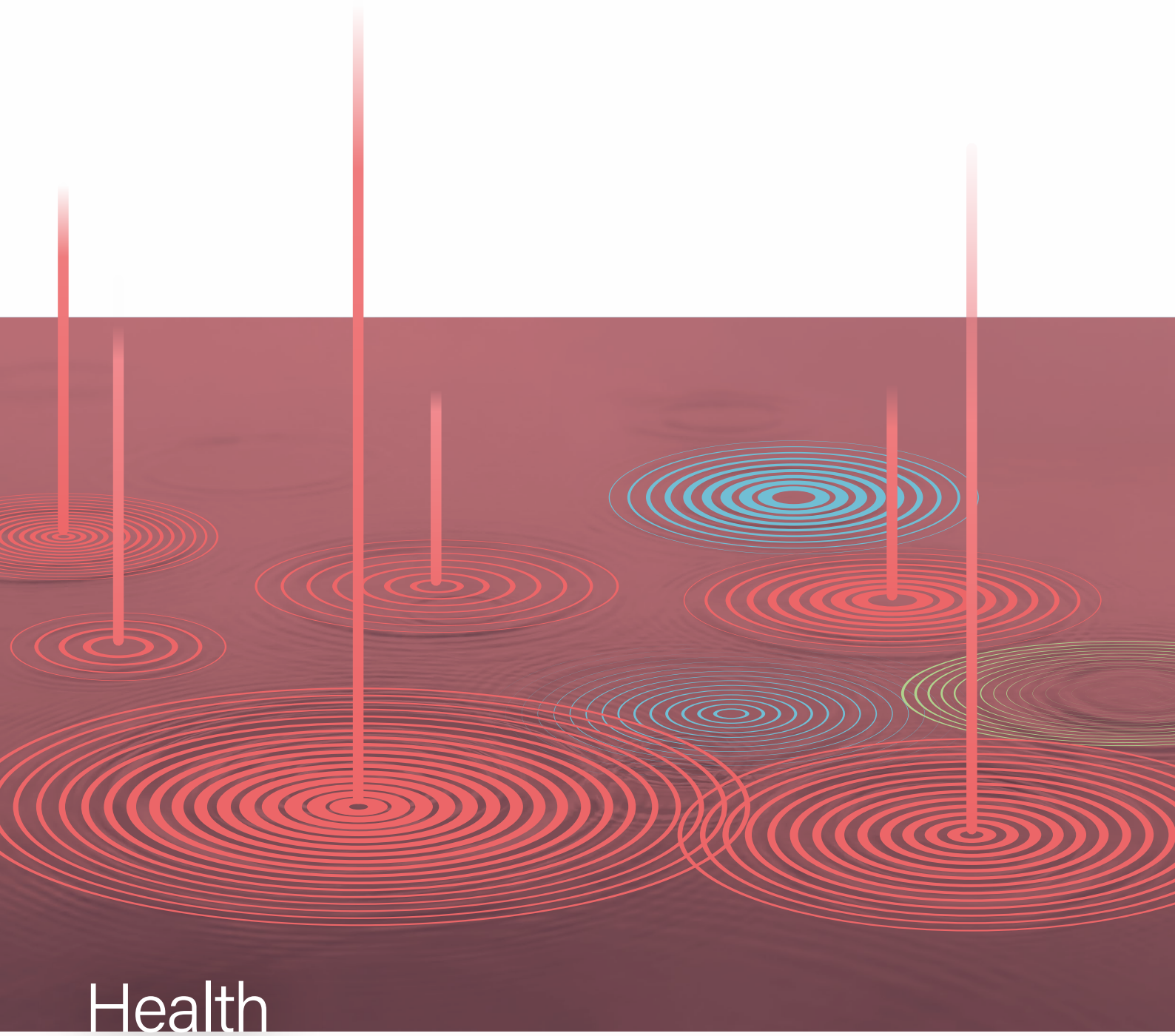


Health

Health

According to the federal government's 2025 Climate Risk Analysis, the health impacts of increasing heat are the greatest climate risk facing people in Switzerland. The One Health approach recognises that human health is closely linked to that of animals and the environment. As illustrated by the example of pigs and poultry in the Ecosystems section, heat stress reduces animals' well-being and resilience. Climate change also favours the emergence and spread of pathogens, creating indirect health risks for people. Against that backdrop, this section presents selected NCCS-Impacts findings and tools on the impacts of climate change on health and the health system.

Impacts on health

Climate change is leading to increasing heat stress in Switzerland and is therefore posing a threat to public health. According to NCCS-Impacts, heat-related mortality is expected to be significantly higher by around 2060. This increase will be driven not only by rising temperatures, but also by demographic change and the growing proportion of older people, who are particularly vulnerable to extreme heat. Furthermore, there are gender-specific differences. For example, men aged 65–85 are at greater risk of emergency hospital admission due to heat than women of the same age. Pre-existing health conditions also increase vulnerability.

To reduce the health impacts of heat stress, many cantons have introduced heat action plans. These have been in place in the western and southern parts of Switzerland for many years and are now also increasingly common in the German-speaking parts of the country. Heat action plans form part of a long-term approach to managing heat risks. A systematic approach to heat-health planning involves both cross-sectoral collaboration and heat warning systems, as well as measures and information to protect public health and monitor the impacts.

The 'Urban Heat Vulnerability' web tool developed within NCCS-Impacts uses current climate data to show on maps where heat coincides spatially with the homes and places of residence of particularly vulnerable population groups. Figure 9 shows how heat will affect people in different neighbourhoods of the city of Bern to varying degrees. Such maps can, for example, help public authorities identify high-risk areas and develop targeted measures to protect people's health.

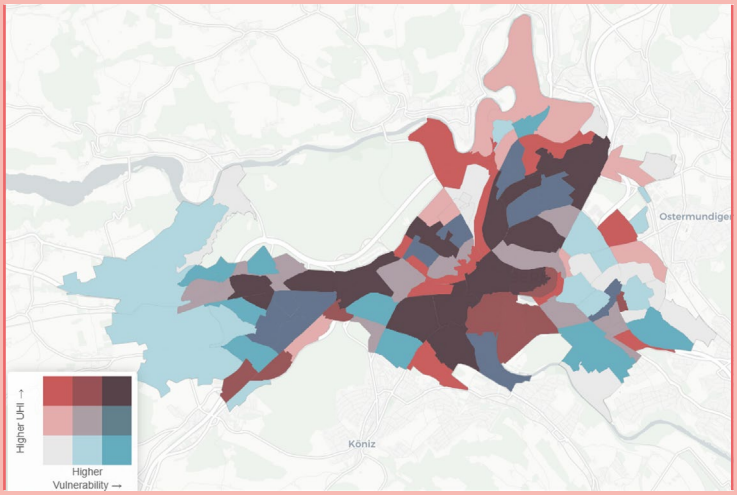


Figure 9:
Urban heat vulnerability in Bern
Illustration from the Urban Heat Vulnerability web tool. Urban heat island (UHI) effect overlaid with the residential density of potentially vulnerable people in Bern. The darker the blue, the higher the vulnerability. The darker the red, the stronger the UHI effect. The map shows how the combination of a high proportion of older and more vulnerable residents and increased heat exposure contributes to a higher risk of heat-related impacts in areas such as Mattenhof.

Urban Heat Vulnerability web tool

Alongside heat-related impacts, vector-borne diseases are becoming an increasingly important concern for the health of both humans and animals. Together with other key factors such as globalisation and increased mobility, climate change is contributing to this trend. Invasive mosquito species, such as the Asian tiger mosquito, have now become established in Basel, Geneva, the Italian-speaking part of Graubünden and Ticino. They can transmit diseases such as dengue, chikungunya and Zika to humans. So far, no locally acquired cases of these diseases have been reported in Switzerland. However, modelling by NCCS-Impacts indicates that climate change will favour the spread of the Asian tiger mosquito and will substantially increase the risk of local disease outbreaks by 2070. Animal health is also affected by vector-borne diseases. The emergence of a novel virus (Orthobunya) in Swiss cattle in summer 2026 highlights that these risks are already relevant today.

Together with analyses of the current situation and of the existing measures taken by cantonal authorities in the fields of health, veterinary medicine and the environment, the findings from NCCS-Impacts provide an important basis for forward-looking prevention and preparedness at different levels. Harmonised surveillance of vector-borne pathogens in humans, animals and vectors, the elimination of breeding sites (stagnant water) and the rapid development of effective vaccines for humans and animals are central to this.

Impacts on the health system

Funding constraints and shortages of skilled professionals are already putting pressure on Switzerland's health system. These challenges will intensify in the coming decades as a result of demographic change. Climate change will act as an additional factor, exacerbating the challenges facing the healthcare system. In particular, prolonged hot spells will increasingly affect population health, driving up demand for healthcare services. In addition to more heat-related deaths, the frequency of emergency hospital admissions is also expected to increase. Figure 10 illustrates the annual trend in emergency hospital admissions in the canton of Zurich under different emissions scenarios.

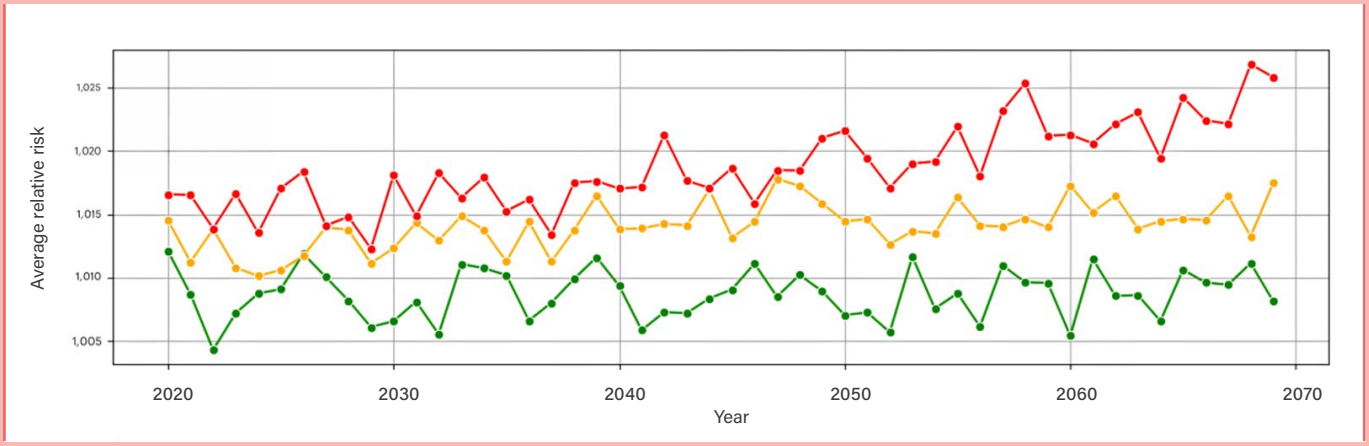


Figure 10:
Projected relative risk of emergency hospital admissions in Zurich
Projected relative risk of emergency hospital admissions in Zurich, 2020–2069. The relative risk compares the risk of heat-related hospitalisation on a typical warm day in the future with that during the 2000–2019 reference period **Vaghefi et al. 2026**). *A higher value indicates a greater risk of emergency hospital admissions due to climate change. Population growth and demographic change are not taken into account in this model. As a result, the pressure on the healthcare sector is underestimated, as an ageing population means that more people will belong to age groups particularly vulnerable to heat.*

Technical report on climate costs (in German)

These trends will not only affect the physical, mental and emotional well-being of patients and their families, but also increase the demand for hospital staff. This will exacerbate the already existing shortage of skilled healthcare professionals and add to the strain on healthcare workers. A forecasting tool developed within NCCS-Impacts for the Inselspital in Bern enables short-term forecasts of the expected number of patient visits. It helps hospital managers plan resources more effectively during heatwaves and maintain high-quality care (**Di Domenico et al. 2025**).

Beyond its direct health impacts, global climate change also has indirect consequences for healthcare provision. Currently, the production of many pharmaceuticals is concentrated in a few global centres. This makes the supply of essential ingredients and the import of finished medicines vulnerable to disruption, particularly when extreme weather events affect these production hubs or transport routes (➔ **Infrastructure and the economy**). For example, a significant share of the ingredients used to make painkillers comes from India, a country that is highly exposed to climate change.

Conclusion

Human-induced climate change is already having an impact on a wide range of weather and climate extremes in all regions of the world. This leads to adverse effects, as well as associated losses and damage to ecosystems, economies, infrastructure and people.

Against this backdrop, NCCS-Impacts paints a diverse picture of climate impacts in Switzerland. The health burden on the population is increasing, particularly for vulnerable groups. At the same time, climate change is affecting soils, forests and water bodies, with implications for agriculture and other essential ecosystem services that underpin society and the economy. Risks to buildings and critical infrastructure, including transport routes and power supply networks, are also increasing. Overall, the economic costs of climate change are rising, driven both by direct impacts in Switzerland and by the effects of climate change along international supply chains.

To address these complex climate risks effectively, the four-year NCCS-Impacts programme has developed a strong scientific evidence base, together with information and climate services tailored to different audiences. The report's main findings can be summarised in the following key messages:

NCCS-Impacts provides a scientific knowledge base and practical tools to enable a well-informed assessment of climate change impacts and support the planning of measures.

The NCCS-Impacts programme examined selected impacts of climate change on Switzerland in a series of cross-sectoral projects. The knowledge gained and tools developed by the programme will help decision-makers assess climate impacts and plan adaptation measures.

The projects also highlight gaps in our current scientific understanding of the impacts of climate change. For example, in many sectors, reliable quantitative data on the expected scale of climate impacts, particularly climate extremes, is lacking. This includes information such as damage functions and the costs associated with climate-related damage or adaptation measures. The findings show that there are still significant knowledge gaps in several areas, highlighting the need for a robust national analytical basis to support quantitative, economically informed planning.

Climate change affects all sectors simultaneously – a focus on individual sectors alone is not enough.

Analysis of climate change impacts shows how closely intertwined the affected sectors are, and what important roles indirect effects and mutually reinforcing factors can play. For example, more frequent heat events not only affect health but also reduce labour productivity, which in turn weakens the economy. Conversely, climate-related disruptions to pharmaceutical supply chains abroad can affect healthcare provision at home.

That is why NCCS-Impacts placed a strong emphasis on cross-disciplinary and cross-sectoral analysis. Through co-production and stakeholder workshops, the interdisciplinary and transdisciplinary project teams brought together practitioners, non-governmental organisations and industry, seeking to integrate perspectives from different sectors.

Climate impacts are already relevant today and will intensify over the course of this century.

Climate change is already being felt today in many places. By 2060, climate risks are expected to increase to varying degrees, depending on socioeconomic developments, the effectiveness of climate mitigation measures and the trajectory of global greenhouse gas emissions. Without sufficient global climate action, climate change and its negative consequences will continue to accelerate beyond 2100.

As these changes unfold, new risks will emerge and existing risks will be amplified. Some of these risks still seem relatively minor today or have so far received limited attention. These include additional challenges for critical infrastructure, as well as vector-borne infectious diseases affecting both humans and animals.

Beyond analysing these risks in depth, NCCS-Impacts has shown that considering different socioeconomic scenarios is essential for planning for climate change, strengthening society's capacity to adapt in a targeted way and proactively reducing future risks. These scenarios provide the foundation for effective, cross-sectoral and long-term risk management.

Every tenth of a degree counts.

The impacts of climate change and the costs of adaptation will pose significant financial challenges for the economy, households and the public sector. The most important and efficient way to counter this trend remains the reduction of global emissions. To meet the goals of the Paris Agreement, the global community must cut emissions rapidly and substantially. According to the federal government's climate scenarios Climate CH2025, every reduction in emissions helps limit climate impacts – including in Switzerland. Stringent climate change mitigation remains an urgent priority.

Nationally coordinated interdisciplinary and transdisciplinary research and development activities provide a cross-sectoral basis for dealing with the impacts of climate change.

The first national programme of its kind, NCCS-Impacts enabled various federal institutions, universities and private companies to work together closely. This collaboration involved a systematic, cross-sectoral and transdisciplinary investigation of the climate change impacts most relevant to federal, cantonal and local government, business and society, based on interaction between science and practice.

Vital climate services were also further developed, helping decision-makers to better manage climate risks. This has laid a broad foundation and provided practical tools for addressing the impacts of climate change in Switzerland. The results and climate services are now available for use and practical application. However, for them to remain relevant in the long term to a resilient Switzerland, they must be regularly reviewed and adapted to new findings and insights.

Inter- and transdisciplinary

20+ organisations involved

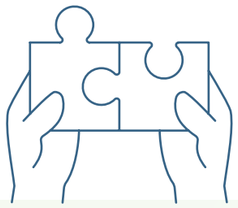
NCCS-Impacts

Programme & Projects

www.nccs-impacts.ch/en

NCCS **Impacts**

Between 2022 and 2026, the NCCS programme *Decision Support for Dealing with Climate Change in Switzerland: a cross-sectoral approach ("NCCS-Impacts")* developed actionable climate services for the environment, the economy and society. These services are intended to support decision-making in planning for climate change mitigation and adaptation. The programme was jointly supported by all NCCS members. A number of cross-sectoral projects were funded. Each project was carried out by a consortium -comprising research and practice partners – through co-production.



Project "Socioeconomic Scenarios"

Socioeconomic scenarios for Switzerland including modelling of greenhouse gas emissions and land use changes

Highlights

- ✧ *"Shared Socioeconomic Pathways"* for Switzerland (SSPs-CH)
- ✧ Swiss *"Shared Policy Assumptions"* (SPAs)
- ✧ Greenhouse gas emissions for selected SSP- and SPA-combinations

Project lead: Lena Gubler (WSL)
Consortium leads: Quirin Oberpriller, Jürg Füssler (INFRAS)
Project partners: WSL, INFRAS, Prognos, Zoï Environment Network



www.nccs-impacts.ch/en/ssp-ch

Project "Costs of Climate Change"

Climate and adaptation costs under different climate scenarios

Highlights

- ✧ Costs of climate change for ten selected risks
- ✧ Catalogue of adaptation measures for each risk
- ✧ Macroeconomic impacts

Project lead: Vincent Roth (FOEN)
Consortium lead: Denise Fussen (EBP)
Project partners: EBP, University of Zurich, Ecoplan, Sustainaccount, UW Consult



www.nccs-impacts.ch/climate-costs

Project "Ecosystem Services"

Impacts of climate change on ecosystem services in forestry, agriculture and water bodies

Highlights

- ✧ *ForClim* & *FORTE* apps for analysing the impacts of climate change on forests and ecosystem services
- ✧ *CLIMAGS* app for ecosystem services in agriculture
- ✧ *AquaREL* app for water runoff, nutrient and sediment loads
- ✧ Cross-sectoral dashboard

Project lead: Astrid Björnsen (WSL)
Consortium leads: Remo Röthlin, Andreas Zysset (EBP)
Project partners: EBP, WSL, Agroscope, ETH Zurich, University of Geneva



www.nccs-impacts.ch/ecosystems

Project "Supply Chains"

Impacts of global climate change on the Swiss economy and its supply chains

Highlights

- ✧ Visualisations of current and future supply chain risks for selected hazards
- ✧ Indirect supply chain impacts on Swiss industries
- ✧ Future impacts of sea level rise

Project lead: Vincent Roth (FOEN)
Consortium lead: Samuel Brown (CelsiusPro)
Project partners: CelsiusPro, Correntics, EBP, Stiftung Risko Dialog, ETH Zurich



www.nccs-impacts.ch/supply-chains

Project "Human and Animal Health"

Impacts of climate change on human and animal health and well-being

Highlights

- ✧ App for assessing heat stress and vulnerability in three cities
- ✧ Projections of temperature-related mortality
- ✧ Tool for forecasting emergency hospital admissions during hot spells
- ✧ Heat stress in poultry and pig housing
- ✧ Risk of mosquito- and tick-borne diseases

Project co-leads: Nina Huber, Esther Walter (FOPH), Arlette Szelecsenyi (FSVO)
Consortium lead: Ana Maria Vicedo Cabrera (University of Bern)
Project partners: University of Bern, Unisanté, EBP, FSVO

www.nccs-impacts.ch/health
www.nccs-impacts.ch/animal-health

Project "Critical Energy Infrastructure"

Transformation and vulnerability of the Swiss energy system in relation to climate hazards (ongoing project as a joint initiative between NCCS-Impacts and the SFOE's SWEET programme)

Consortium lead: Giovanni Sansavini (ETH Zurich)
Project partners: ETH Zurich, EPFL, FHNW, HSLU, INFRAS, Swisscom, Zoï Environment Network

sweet-recipe.ch

30+ products developed

Further key resources

Swiss climate scenarios: Climate CH2025

The latest climate scenarios were developed by the Federal Office of Meteorology and Climatology MeteoSwiss in collaboration with ETH Zurich and the Center for Climate Systems Modeling (C2SM).

www.climate-scenarios.ch

Climate Risk Analysis for Switzerland

The risk analysis carried out by the Federal Office for the Environment (FOEN) highlights the key impacts of climate change in Switzerland, both now and in the future. It forms the basis for Switzerland's adaptation strategy.

www.bafu.admin.ch/en/climate-risk-analysis-2025

Brennpunkt Klima Schweiz 2026

The latest report from the Swiss Academy of Sciences (SCNAT) assesses future risks associated with climate change and presents a wide range of scientifically proven, effective options for action related to climate change mitigation and adaptation.

brennpunkt-klima.scnat.ch

Intergovernmental Panel on Climate Change

The Intergovernmental Panel on Climate Change (IPCC) produces regular assessment reports summarising the current state of knowledge regarding climate change. This provides the basis for science-based policy decisions on climate change mitigation and adaptation.

www.ipcc.ch

Imprint

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The National Centre for Climate Services (NCCS) is the Swiss Confederation's network for developing practical, user-oriented climate services for the environment, the economy and society. The NCCS is organised as a virtual centre, bringing together eight federal offices and federal research institutions. As a national coordination and innovation hub at the interface between research and practice, the NCCS supports climate-related decision-making.

NCCS members

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- Federal Office for the Environment FOEN
- Federal Office for Agriculture FOAG
- Federal Office for Civil Protection FOCP
- Federal Office of Public Health FOPH
- Federal Food Safety and Veterinary Office FSVO
- ETH Zurich
- Swiss Federal Institute for Forest, Snow and Landscape Research WSL

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