

Background The Alps are particularly affected by climate change. Temperatures in this region increased at more than twice the global average rate in the last century, and further warming is already unavoidable. Consequences may include thawing of permafrost, melting glaciers and extreme events

such as heavy precipitation and long periods of drought. Climate change will bring major changes to your economy, environment and society. Adverse consequences can be reduced or avoided, and future development potential safeguarded, through adaptation. It's time to take action now!



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WHY?

Climate change is happening, and further warming is already unavoidable today. The Alps as a unique and very sensitive area are more vulnerable to changing climatic conditions than other European regions. Inaction will inevitably increase future vulnerability and cause high damages and costs. Adapting to climate change is therefore indispensable to guarantee a balance between economic interests, local population needs and environmental concerns.

Be aware that climate change affects all sectors

- All economic sectors, natural systems and their life-sustaining ecosystem services will be increasingly affected by climate change: rapid and foresighted interventions are urgent for adaptation
- Develop multi-sectorial and coherent adaptation strategies and coordinate actions across sectors and levels

HOW?

Exploit opportunities by well-planned adaptation

- All adaptation measures need to be tailored to local climate change impacts
- Put emphasis on adaptation measures that generate benefits independent of climate change ("win-win"), are robust under different climatic futures ("no regret"), and allow multiple options for development.

Cooperate, participate and engage

- Implementing adaptation requires inclusion of stakeholders and cooperation of relevant actors across sectors, levels and borders
- Integrate adaptation concerns in existing instruments, policies and structures; consider new instruments, where necessary and appropriate



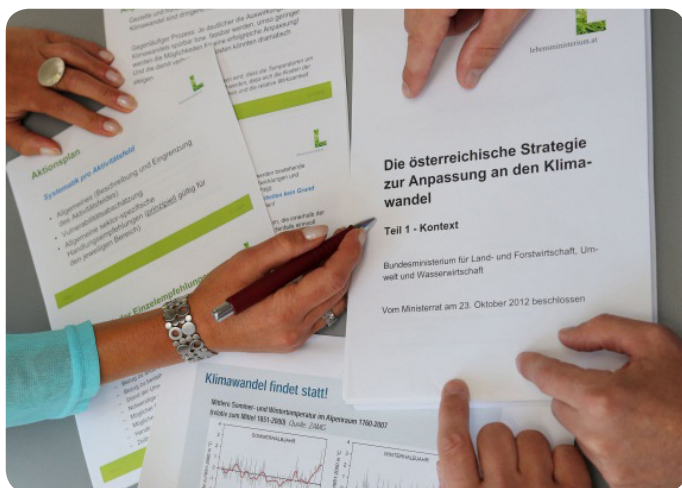


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STAKEHOLDER PARTICIPATION

The development of the Austrian adaptation strategy has been designed as a participatory, multi-sectorial and interdisciplinary process. There has been a breadth and depth of involvement as local authorities, federal states, and NGOs were not only consulted, but also participated in drafting parts of the policy document. Participation included federal ministries and offices, interest groups representing cities and municipalities, NGOs, large business companies, service providers and insurance companies, via “informal workshops”, series of sectorial stakeholder workshops, written consultation rounds, and an online consultation of the public. The intensity level of participation went far beyond consultation, because stakeholders were actively involved in the policy drafting process. [Further information \(de/it/fr/sl\)](#)

COMMUNICATE CLIMATE CHANGE ADAPTATION

Good communication is necessary when informing and persuading people that they are ready to meet the challenges of climate change. Complex correlations however make it difficult to get messages across in a simple, clear manner. The Guideline "Overcoming Communication Challenges" offers seven steps to show how these challenges can be mastered in practice, and how all stakeholders can be motivated to take action. [Further information \(en\)](#)

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Together with

- National and regional administration
- Researchers and experts on climate change adaptation
- Civil society organizations such as NGOs
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Energy

WHY?

Changes in temperature, precipitation and the frequency of extreme weather events will affect future energy production, transmission and consumption in the Alps. Therefore climate change adaptation measures are required to increase the resilience of the energy sector at both the large-scale and household levels to changing climate conditions. The measures in this direction are energy independence through the production of sustainable energy, de-risking of energy supply chains and keeping energy infrastructure climate resilient.

Crafts are crucial - develop skills

- Support regional building culture in material and knowledge flows
- Develop skills and abilities to transfer re-gained vernacular techniques and materials to new construction

HOW?

Energy efficiency: Planners need to take climate change adaptation into account

- Develop sustainable and situational planning instead of standardised operations
- Reduce energy demand through higher energy efficiency

Safeguard the resilience of energy infrastructure

- Carry out resilience and climate risk assessments for the existing energy production and delivery facilities, develop risk management plans for the sector in coordination with other disaster risk management plans
- Take into account present and future climate risks, when developing new energy infrastructure





ENERGY-EFFICIENT CONSTRUCTION

The municipality of Saint-Jean-d'Arvey in the French Alps is showing how to combine support for the regional economy with the needs of climate protection. Its new multi-purpose community centre consumes almost zero energy and is the first to be built with certified timber from the French Alps. That saves on transport energy and supports the regional economy at the same time. Compared with conventional construction, the additional costs are recouped over the service life of the building as the electricity and heating bills are minimal. The centre houses a kindergarten, library and the town hall, while its open architecture makes it an ideal place for social encounter. [Further information \(de/en/fr/it/sl\)](#)

SUSTAINABLE ENERGY ACTION PLANS

A so called „Action Tool“ developed in the project SEAP helps cities and municipalities with the preparation and implementation of action plans for sustainable energy. A special focus is on how adaptation to climate change can be integrated in energy action plans. The measures also take a concept of public-private investment partnerships into account. [Further information \(en\)](#)

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Health

WHY?

Weather and climate play a significant role in people's health. Warmer temperatures and heat waves could increase the number of heat-related illnesses. Extreme weather events such as storms or floods can cause direct threats to people and infrastructure. Another important threat to health is changes in the incidence of diseases transmitted by insects, or changes in water and air quality. Therefore communities' public health and safety systems have to be adapted to changing circumstances.

Raise awareness and build knowledge within society

- Enhance knowledge about how to handle infectious diseases
- Raise awareness of general public about health risks

HOW?

Prepare health spaces for a change in climate

- Emergency services: The positioning of emergency service stations will be out of the flood zone and well protected against surface water flooding, to ensure they can operate in a flood.
- Trees for shade: Providing natural shading for workers and residents and helping to cool the urban heat island effect

Enhance monitoring- and early warning systems

- Manage risks concerning increasing numbers of allergen and poisonous species
- Create a "Health-Climate" monitoring group





RESEARCH PROJEKT V.E.I.T.

The project investigated in the presence and distribution of disease vectors (insects, ticks) and infectious agents (viruses and bacteria) in the study area and built a registry of disease incidence for vector borne diseases. The project showed that a cooperation between different stakeholders like the health-care sector, public health and experts from the ecological sector leads to success. [Further information \(de\)](#)



STOPHOT

This project deals with challenge of “Cool towns for the elderly – protecting the health of elderly residents against urban heat”. It is singular in also seeking to include the elderly as a highly susceptible group as active contributors in the project. Their needs, wants and perceptions were collected by questionnaires and intensive personal interviews. It brought together experts from the University of Vienna, the Vienna Medical University, the University of Natural Resources and Life Sciences in Vienna and the University of Applied Sciences in Fulda in addition to social and health care workers and employees of the city of Vienna. [Further information \(de\)](#)

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Spatial Planning

WHY?

Spatial planning organizes, coordinates and manages socio-economic activities of all sectors in space. Because of its cross-cutting steering capacity, spatial planning has fundamental influence on adapting spatial development to climate change. Extreme weather events like longer periods of heat or floods caused by heavy precipitation increasingly threaten settlements, agricultural land, infrastructure, lives and future development in the Alps. Due to the longevity of the built environment and other land uses, it is therefore necessary to fully consider climate change in the planning decisions of today.

Incorporate climate change adaptation into spatial planning

- Check if your planning policies, regulations, instruments, and procedures are fit to cope with climate change
- Provide practice-relevant information, data, planning guidelines and work aids, raise climate-awareness, and enhance cooperation with sector planning and stakeholders

HOW?

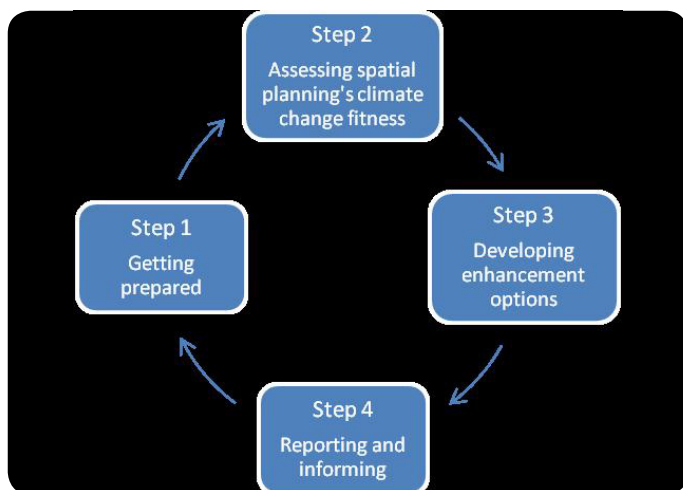
Take account of changing risks

- Secure flood retention, river runoff spaces and enforce stricter zoning and building restrictions
- Do not designate building land or permit constructions in flood risk and other hazard areas

Consider heat and other bioclimatic stresses in urban development

- Preserve air circulation corridors and open spaces for cold and fresh air supply of settlement areas
- Maintain, create and network open, green and blue spaces in urban areas





GUIDE FOR SPATIAL PLANNERS

The CLISP-Project (Climate Change Adaptation by Spatial Planning) developed first approaches how spatial development can be climate-proofed. A tool for spatial planners for assessing the climate change fitness of their spatial planning policies gives guidance, and offers an easily understood, step-by-step approach to reviewing whether the planning instruments in place are able to cope with the expected impacts of climate change and, if necessary, to identify appropriate enhancement options. [Further information \(en\)](#)

GREEN NETWORK GRAZ

The so-called urban climate effect, characterized inter alia by higher average temperatures and pollution levels, will be further reinforced by climate change. Green and open spaces serve an important function in climate regulation and can counteract the temperature rise in cities. The project “Green Network” in the city of Graz is an effort to improve the urban climate and the quality of life of the city’s residents. Its aim is to link existing green and open spaces by means of connecting paths and green elements. The Green Network is not only a strategy paper on urban development, it also serves as the basis for urban planning, zoning, and for opinions on building applications. [Further information \(de\)](#)



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Nature-Biodiversity

WHY?

Climate change will put strong additional pressure on alpine biodiversity, because mountain areas are particularly sensitive. Changes in ecosystem structure and unexpected interactions between species can become more common in the future and lead to loss of genetic resources. Conservation and restoration of biodiversity and ecosystems can be successful measures to help biodiversity and societies to adapt to climate change.

Raise awareness on the significance of biodiversity for climate change adaptation

- Improve understanding of how climate impacts will affect ecosystems
- Improve understanding of how actions in other sectors (including adaptation) may affect species, ecosystems and the services they deliver

HOW?

Integrate climate change in environment protection concepts

- Protection plans to enhance biodiversity when the climate is changing are only successful when we take dynamic changes in nature into account
- Improve migration possibilities, e.g. through linking biotopes

Improve knowledge through researching the effects of climate change on ecosystems and biodiversity

- Improve knowledge and exchange of knowledge about the effects of climate change on the three levels of biodiversity (diversity of genes, species and living environment)
- Study the current and potential future consequences of climate change for biodiversity by pursuing and promoting the approaches already initiated in networks of protected areas





RESTORATION OF THE ÖDMOOS PEAT BOG

Peat bogs are particularly varied biotopes. They support highly specialised species of flora and fauna like hawker dragonflies and the fen orchid, which could hardly survive without such ecosystems. In addition to their relevance for biodiversity, these biotopes also play a positive role through their ability to bind large quantities of greenhouse gases and store water. Peat bogs absorb precipitation like a sponge and then gradually release the water into the surrounding area. They accordingly play an important role in the context of flood protection. At Ödmoos, a heavily degraded peat bog in Bavaria, the land is being cleared of trees and shrub cover so as to restore the wetland and its key functions.

[Further information \(de/en/fr/it/sl\)](#)



MOUNTAIN FOREST INITIATIVE

The central aim of the “Mountain Forest Initiative” is to stabilize and sustainably adapt the Bavarian mountain forests to climate change. For this purpose, 30 projects were identified in areas with special climatic risks. Integrated master plans were developed for these projects, which include different silvicultural measures like thinning, planting and natural regeneration and hunting and pasture management for the reduction of browsing damage. The pilot measures are planned and initiated in agreement with the land owners and local stakeholders. This strong focus on participation renders the process transparent – a crucial factor for the success of the projects. [Further information \(de\)](#)

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Natural Hazard & Risk management

WHY?

Climatic changes documented to date in the Alps will play a role in the occurrence of natural disasters that will affect both communities and the environment. Impacts can vary in magnitude and effects; the issue is expected to be greater in the future, affecting all economic sectors and the society. Therefore it is necessary to develop adaptation strategies and practical approaches to be prepared for disasters like floods, landslides and debris flows.

Collect knowledge, develop tools and get to action

- To harmonize the knowledge and the know-how into a "common language" and encourage cross-border networking (e.g. in the creation of hazard maps) all over the alps would greatly improve the effectiveness of natural hazard management.
- Tools smart and specifically crafted for risk management will prove useful in enabling adaptation measures and exploring their social and economic consequences.

HOW?

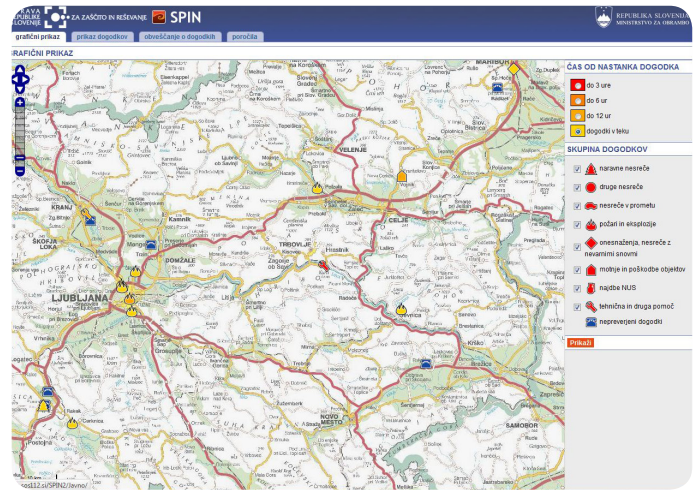
Meeting the risk - Foster efficient risk communication and cooperation

- To improve public preparedness and personal responsibility by informing people about hazards and risks and encouraging participation in emergency planning.
- To foster long-lasting motivation to participation among the stakeholders by talking frankly and openly about any doubts and uncertainties.

Take actions to prevent natural hazards

- To incorporate climate change adaptation into spatial planning and to think of flood risk management in terms of an entire river basin.
- Promote water retention, the reactivation of natural flood plains, increase the size of floodwater, conduits and basins.





ALPINE RHINE: SAFETY AND RECREATION

The Austrian and Swiss authorities are collaborating on a project to improve flood protection along the last 26 kilometres of the Alpine Rhine, where the 300,000 people who live there are exposed to a pronounced risk of flooding. The plan is to increase the river's run-off capacity in line with peak flows from the upper reaches in the light of some higher levels of precipitation in recent years. All the works have to satisfy the legal requirements in both countries, including ecological improvement and the sparing use of resources. The cost of the works totals about 490 million euros, while the flood damage potential is put at 4-6 billion euros. [Further information \(de\)](#)

FLOOD WARNING TEXT MESSAGES

Flooding can cause damage involving very high costs. The Slovene Ministry of the Environment has accordingly developed an early warning system for floods. The relevant data relating to precipitation and draw-off are collected and imported into a hydrological model. A user-friendly web-site with online maps shows the hazard zones in real time. The system also permits rescue services to be warned of imminent dangers via text messages, which ensures a very fast response. The system could also be adapted for use with other natural hazards. [Further information \(sl\)](#)

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WHY?

The agricultural sector is directly dependent on weather conditions like precipitation and sunshine. Therefore this sector is adversely affected by climate change. Changing circumstances make plants more vulnerable to pests and diseases or can lead to considerable crop losses. A sustainable strategy to adapt to climate change in order to ensure food production in the alpine region is necessary.

HOW?

Promote the cultivation of resistant species

- Cultivate water saving and heat resistant plants
- Strengthen crop rotation and broaden crop selection change of crop spectra

Strengthen sustainable soil structure and the protection of soil fertility/stability

- Check the location suitability based on climate change and develop suggestions for proper crop
- Consider integrative landscape planning to promote soil security and better agroecology

Enhance the adaptation of sustainable fertilizers and plant protection

- Promote environmentally friendly and sustainable use of pesticides
- Optimize adaptation strategies for new diseases and pest





FROM WASTE TO PROTECTION

The Wiener Neustadt Public Works Department runs a municipal farm with some 340 hectares of land. Since the fields are all located in a groundwater protection zone, the use of mineral fertilisers is largely avoided. Instead the PWD uses compost produced from organic waste in its own waste treatment plant. A ton of this organic fertiliser costs the local authority about 4 euros. In addition to the benefits in terms of ground water protection, the result is healthier crops with an enhanced capacity to adapt to changes in temperature. [Further information \(de\)](#)

WATER SAVING CROPS

From 2006-2009, scientists experimented with water efficient and drought-resistant crops in the Rhône-Alpes region. The “Chambre d’agriculture de la drome” facilitated the planting of meslin in the plain and mountain region. The objective was to diversify fodder resources to secure food supplies for animal herds. The pilot project found that meslin is a good grain to plant during times with less water and it increases the autonomy of farmers to avoid having to export grains in the winter and during drought periods. [Further information \(fr\)](#)

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Water Management

WHY?

Climate change will directly affect water resources in the Alpine arch. This has consequences to the vulnerability of ecosystems, socio-economic activities and human health. The change of water regime due to various reasons like earlier snow melting together with heavy precipitation can lead to floods. On the other hand the demand of the natural resource will increase accordingly, as will competition between the various user groups.

Improve co-operation and water governance in order to manage water conflicts and to implement integrated solutions

- The parties responsible for the implementation and operation of Early Warning Systems should be clarified.
- Set up awareness-raising measures to avoid resource user conflicts

HOW?

Enhance ecosystem storage capacity, reduce risks of flooding

- Support the development of activities and land use which are compatible with locally available water resources.
- To adapt appropriately to future climate flood management strategies have to be adapted.

Enhance water efficiency

- Assess the need for further measures to enhance water efficiency in agriculture, households and buildings.
- Improve the coordination and information concerning the use and need of water





WATER IN A GOOD DROP

In the Italian wine-growing communities of Faedo and Pilcante, computers keep the vines supplied with just the right amount of water with the help of a geo-information system and sensors to measure the moisture in the soil. Delivering the water in small amounts at frequent intervals enables it to penetrate into the ground and reach the deep roots of the vines. That permits the system to be operated with just the rain water collected in the ponds, which avoids conflict with the regional water authority at times of drought. The introduction of computerised irrigation has led to savings in water consumption of fifty percent and more, and there has also been an improvement in the quality of the vines.

[Further information \(de/en/fr/it/sl\)](#)



GOOD GIFT FROM ABOVE

Rainwater is suitable for replacing almost half of all water used in the home, so rainwater collection is an efficient way of reducing potable water consumption. In the city of Linz, financial support is available for the installation of private rainwater harvesting systems for watering the garden and flushing toilets as long as certain requirements are met in terms of hygiene and environmental protection. The amount of the subsidy can be as much as 12 percent of the cost of the installation depending on the size of the tank.

[Further information \(de\)](#)

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Background The Alps are particularly affected by climate change. Temperatures in this region increased at more than twice the global average rate in the last century, and further warming is already unavoidable. Consequences may include thawing of permafrost, melting glaciers and extreme events

such as heavy precipitation and long periods of drought. Climate change will bring major changes to your economy, environment and society. Adverse consequences can be reduced or avoided, and future development potential safeguarded, through adaptation. It's time to take action now!



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General

Energy

Health

Spatial
Planning

Biodiversity

Natural
Hazard

Agriculture

Water

Forestry

Tourism

Forestry

WHY?

Changing climate conditions have a significant impact on mountain forests. They directly and indirectly affect the productivity of forests. Increasing temperatures can cause infestation by bark-beetle and lead to economic loss. Natural hazards like heavy precipitation can lead to substantial damages or mudslides, which threaten infrastructure and society. Extreme storm events and forest fires are also expected to be more frequently. The development of a sustainable management plan for the forest sector to adapt to climate change is therefore necessary.

Protect forests

- Reduce possible stress factors like forest fires, storm, erosion or pest infestations
- Update forestry strategy and launch debate on options for an EU approach on forest protection and forest information systems

HOW?

Advance diversity

- Promote the adaptation of tree species, including a focused promotion of diversity through adequate forest management
- Conserve, adapt and diversify forest genetic resources

Pursue and increase research and development on adaptation

- Develop forest adaptation concepts
- Develop innovative and adapted techniques for wood processing, considering possible changes in wood quality





GROWING IN THE GAP

Seven years ago, a logging operation was performed with a cable crane to remove mature fir trees from the forests in the area of the Bregenzer Ache, the main river of the Austrian province of Vorarlberg. That was done to create space and light for deciduous trees to grow and make the forest less dense. The young trees – mainly beech, sycamore and ash – have responded well to the new conditions. In a warmer climate, the higher proportion of deciduous trees will have a stabilising effect on the forest as these species are more adaptable. [Further information \(de/en/it/fr/sl\)](#)



FOREST FIRE CAMS

With climate change bringing longer periods of hot weather, the risk of forest fires is also increasing. In the karst area of Slovenia, where the fire hazard is very real, the response has been to install a video monitoring system, which also works well in poor light conditions. Twenty cameras are being used to monitor 7.068 square kilometres of land so as to permit a rapid response in the case of a forest fire. That also reduces the economic and ecological follow-up costs.

[Further information \(en/sl\)](#)

WHO?

You can take action now!

Together with

- National and regional administration
- Researchers and experts on climate change adaptation
- Civil society organizations such as NGOs
- Entrepreneurs



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Service Further measures, tools, practical examples and information on how to adapt to climate change can be found at www.c3alps.eu

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This Factsheet has been produced by CIPRA International
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LIVING IN
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WHY?

Tourism in the Alps is highly dependent on attractive scenery and appropriate land use. The consequences of climate change, such as melting glaciers, storm damage and lack of snow, can have a strong impact on natural attractions and the economic prosperity of tourist regions. The tourist industry therefore has to adapt to shifting basic conditions and contribute to preserving the natural and cultural landscape by developing sustainable tourism products.

Assess your vulnerability

- What are the consequences of changing weather conditions for your tourism products?
- Which service providers are affected?

HOW?

Promote new tourism strategies

- Offer more flexible, diverse and weather independent tourism activities
- Enhance touristic attractiveness by focusing on regional characteristics
- Sponsor only sustainable and climate friendly tourism activities

Be prepared for the shifting of the tourist season

- 1st strengthening of the summer tourism promises future seasonally-related revenue increases
- 2nd guests need to be sensibilized to high-quality and environmentally friendly products
- 3rd the factors individuality and regionality should be focused upon in product development





ALTERNATIVE TO SNOWGUNS

The Stockhorn Ski Area in the Bernese Oberland closed in 2005. Growing problems with inadequate snow cover were confronting the management with the need for a major investment in artificial snowmaking so as to maintain a ski trail all the way down to the valley bottom. But they decided to develop a new business model instead, with the focus on a natural winter experience at 2000 metres above sea-level, including winter walks, snow-shoe outings and even ice fishing. The food and drink offering was also improved and a programme of events initiated. The turnaround has been a success, with a new record visitor total of 82,000 in 2011.

Further information (de/en/fr)

WEISSENSEE NATURE PARK

The Weissensee lies like a fjord at the foot of the Gailtal Alps in Carinthia. Two thirds of the lakeshore have no buildings and are a nature and landscape protection area. The region itself was declared a Nature Park in 2006, with sustainable land use requirements put in place to protect the area's diversity and natural beauty. The park's tourism management approach is designed to promote qualitative development, using such tools as visitor flow management, regionality and nature protection contracts. The region is also affiliated to Alpine Pearls, a cooperative venture for green holiday mobility. All that is being done in support of tourism as a holistic experience.

Further information (de)

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