Mountain ecosystem goods and services
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Why focus on mountains?

Worldwide, mountains play an important role for several reasons. About 24% of the terrestrial surface can be assigned to mountain areas and 80% of the global forest grows within these regions. As a result of the large area covered by mountains, about 10% of the world population lives there and more than 50% are depended on water coming from them.

Mountains provide several good and services to humans such as:

- Freshwater (e.g. drinking water, irrigation water and electricity production)
- Protection from natural hazards
- Resources (e.g. grazing and timber)
- Carbon storage
- Tourism
- Biodiversity

When regarding mountainous systems, their peculiarities should be taken into account. One of these important factors is the slope stabilization by plants and by ice.

The ATEAM mountain project approach

In order to assess the vulnerability of European mountain ecosystems, an integrated approach was followed. This included three steps, namely a stakeholder dialogue, the definition of scientific objectives and a modeling approach. The stakeholder dialogue took place before, during and after the vulnerability assessment. Several institutions working on nature conservation, hydropower and tourism were involved to identify the most important services of mountain ecosystems and to express their experiences and concerns.

The other steps of the assessment included the definition of scientific objectives and a modeling approach (Regional Hydro-Ecological Simulation System RHESSys).

The analysis focused on water, carbon, and tourism and was carried out on five case study sites. These sites were relatively representative of the climatic zones found in the central and eastern part of the Alps. Model evaluation took place for run-off, evapotranspiration and net ecosystem C exchange.

Different scenarios concerning temperature, precipitation and forest cover change as driving forces of the potential changes were applied to the study sites. The outputs of the simulations suggest the following:

- Water supply is less affected by land use than by climatic changes.
- Carbon storage is more influenced by land use change than climate change.
- Snow “reliability” is negatively affected by the rising of the snow line caused by climate change.

Conclusions

In assessing the sensitivity of mountain ecosystems and their services under global change, the spatial interdependency of all processes should be considered. This study underlined the significance of the inclusion of stakeholder dialogues to shape the design of a vulnerability assessment. To conclude, the adaptive capacity and vulnerability varies by service and region for the following:

- Water is highly vulnerable with low adaptive capacity
- Carbon has a low vulnerability
- Tourism is characterized by high vulnerability in winter and lower in summer.

Further Information

www.fe.eth.ch
www.pik-potsdam.de/ateam