

## CLIMATE CHANGE AND THE AUSTRALIAN ALPS



Pygmy possum, shaggy snow pea, Mt Feathertop

### *What are the things you value about the Alps?*

They may include winter landscapes, snowsports, mountain views, solitude, spring flowers, snowgums, mountain huts, cascading waterfalls and alpine streams, walks, wildlife and cooler weather.

The Alps has even more special natural values, in that it is the only area of mainland Australia with reliable snow cover. As well as being a spectacular and variable landscape, the snow cover provided by the Alps has been responsible for the evolution of plants and animals found nowhere else in the world. The Alps have the only glacial lakes in Australia. The snow cover also defines the Alps as a critical area for producing water that we use in our homes, cities and agriculture.

### *Is climate change going to affect these values?*

It may appear undetectable to some, but a steadily warming climate is already changing, and will continue to change, many of the things that we value and take for granted in the Alps. Some of the more obvious changes that are being observed by visitors to the Alps include:

- plants and animals that normally don't belong in the Alps,
- less snow, or fewer snow covered days over winter,
- less rainfall, reducing flows in alpine streams and further downstream, and
- evidence of large-scale bushfires.

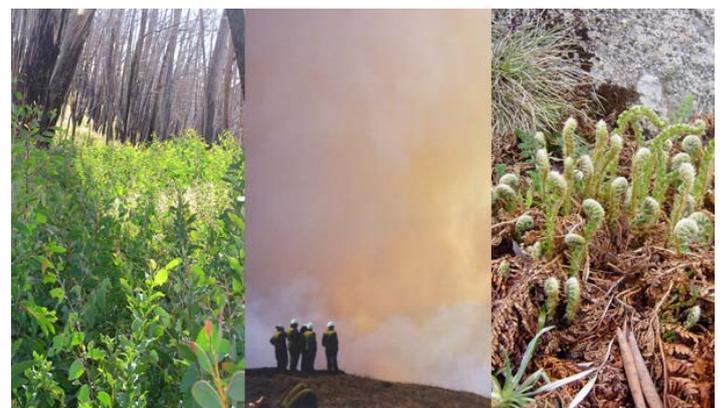
While all these may not be directly or totally attributable to climate changes, there are many less obvious changes that are occurring due to climate change and being measured carefully by alpine scientists and land managers. For example, scientists are seeing:

- declines in threatened alpine fauna species numbers,
- increases in weeds and introduced animals,
- changes in seasonal occurrences and timing of flowering and migration events,
- changes in composition of specialist vegetation communities,
- changes in soils and hydrology,
- changes in duration and depth of snow cover and ice cover on alpine lakes, and
- loss of ecosystem services.

These things we are measuring are showing us that over time, climate change will affect the values we cherish and will result in a different Alps environment.

In the future we expect to see:

- less reliable snow cover and a shorter or irregular winter, with long-lasting snow retreating to only the highest mountains,
- loss of unique species that cannot adapt,
- plant and animal species more familiar to us from other environments, and
- higher potential for destructive bushfire.



Fire in the alps: bush regeneration, fire fighters, fern regeneration

## Some Climate Change Impacts

### Species and biodiversity

Biodiversity as we see it today may look very different in the future. Some species dependent on snow cover, wet soils and cool temperatures may not persist as warming occurs. Warmer temperatures will allow many species to move to higher elevations. As species shift in altitude, plant and animal communities will change in composition and include not only a higher incidence of weeds but native species now commonly found at lower elevations.

### Water

Water and hydrology regimes in the future will change as the alpine system goes through periods of drying out in drought years followed by extreme wet. The alpine and sub-alpine areas of the Alps function like a giant sponge that releases water slowly back into rivers and streams. If the sponge dries out, heavy rain causes rapid run off that can be damaging to soils.

### Human use of the Alps

Climate change may also affect human visitation patterns to the Alps although ski resorts have been responding to the visitors' expectations by improving infrastructure including snowmaking. Australia's population is growing, so there are many people yet to discover and partake in the diverse natural and recreational values of the Alps.

While less snow in winter may bring fewer skiers, the coolness of the Alps in a warming environment may entice many more visitors. Currently in winter, snow cover protects the mountain environment from most direct disturbances by snowsports. However, a large increase in summer visitation may require further management of the impacts on the natural environment, such as trampling of sensitive alpine plants, invasion of new weeds, increased litter and greater use of roads, tracks, water and existing infrastructure.

### Management of the Alps

Alpine managers will need to respond to these changes and a challenge of this will be to provide sustainable management to reflect an increasing year round market and consumer expectations. Scientists will play a vital role in providing managers with information about impacts of visitation and climate change on the natural alpine environment. Some changes, such as the movement of native species, may require monitoring and new solutions for management. However, others such as invasion by new plants and animals may be prevented with vigilance and resources. Ultimately, scientific information will underpin how we adapt our policies and planning for protection of natural assets, and visitation and recreation planning for the future, so that everyone can continue to enjoy the Alps.



### Further reading

Protected Areas: Buffering nature against climate change. Proceedings of a WWF-Australia and IUCN World Commission on Protected Areas symposium, Canberra 18-19 June 2007.

Pickering C. M., Good R. A. & Green K. (2004) The Ecological Impacts of Global Warming: Potential Effects of Global Warming on the Biota of the Australian Alps. Australian Greenhouse Office, Commonwealth of Australia, Canberra.

