# Biosphere Reserve, connectivity conservation and climate change in Australia

Presentation, Third World Congress on Biosphere Reserves, Madrid, 4-9th February 2008

by

Dr Graeme L. Worboys

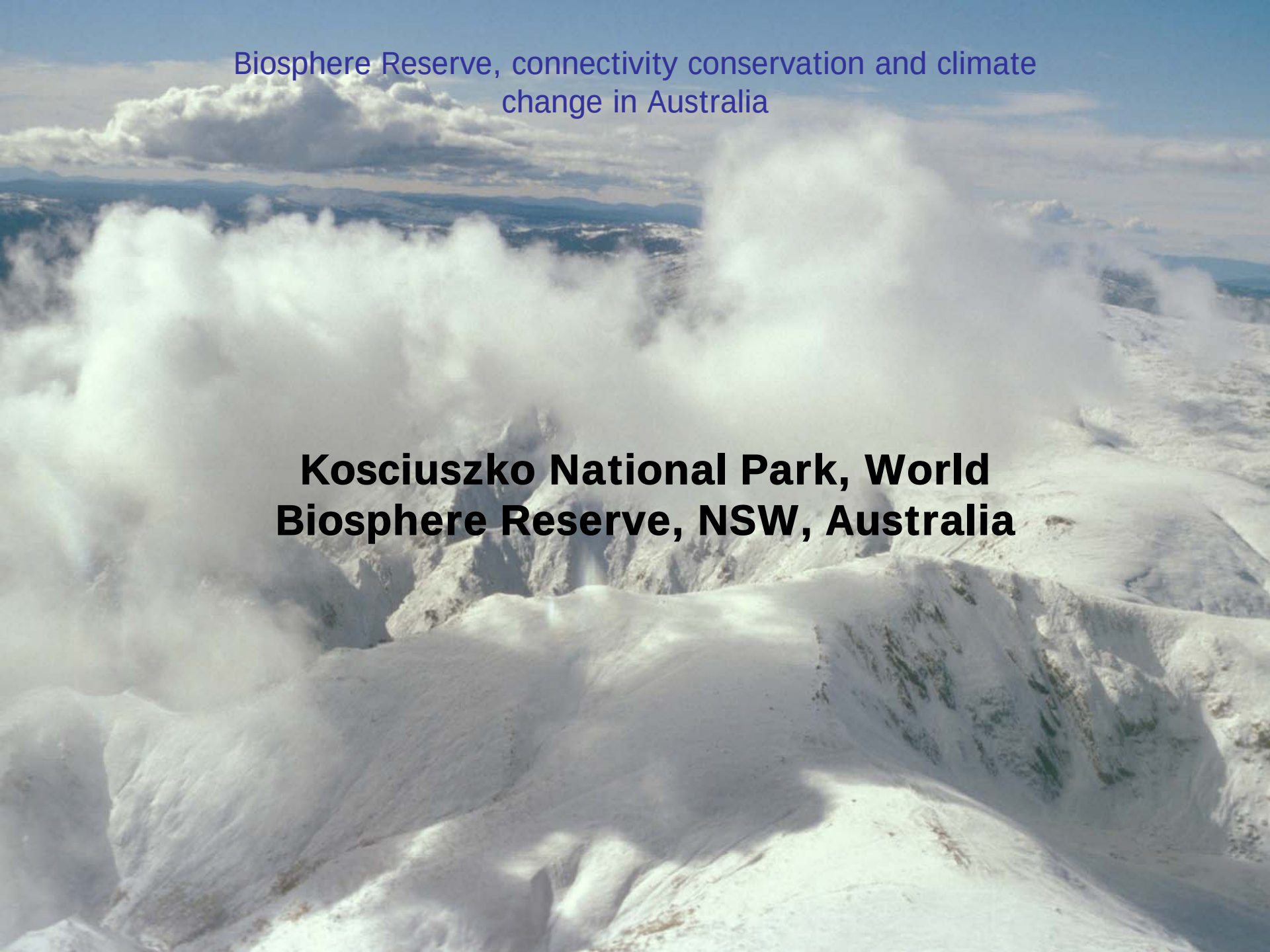
{Vice Chair (Mountains Biome) IUCN World Commission on Protected Areas}

IUCN
The World Conservation Union

# Presentation

1. Introduction
2. Kosciuszko National Park
   - World Biosphere Reserve
   - Climate change impacts
   - Climate change research
   - Adaptation and mitigation responses
3. Connectivity conservation
   - Australian Alps
   - Alps to Atherton
4. Conclusion

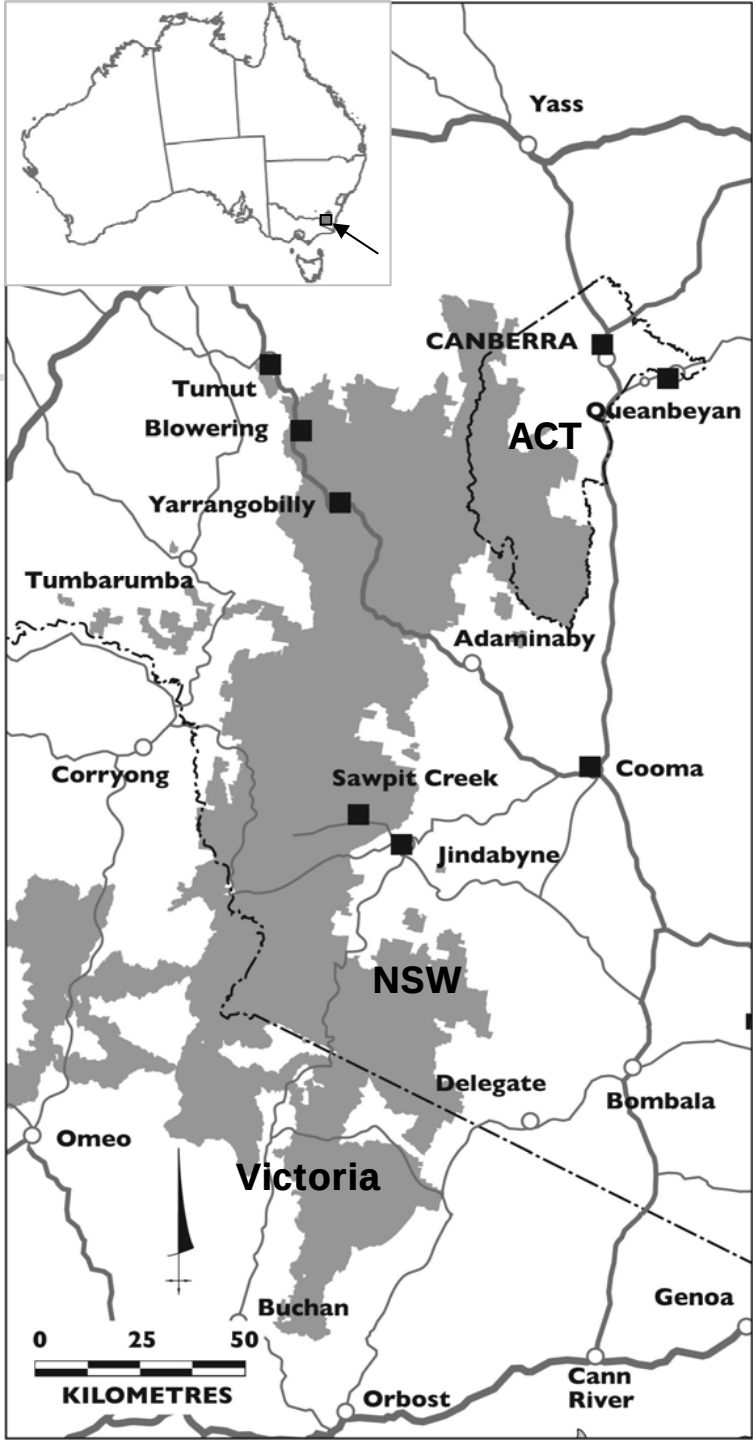
Biosphere Reserve, connectivity conservation and climate change in Australia



**Kosciuszko National Park, World Biosphere Reserve, NSW, Australia**

# 1.1 Kosciuszko National Park: World Biosphere Reserve

- Kosciuszko National Park
- Located in south-eastern Australia
- Size: 673,542 hectares
- NSW's largest national park
- IUCN Category II protected area
- It is a core area of a World Biosphere Reserve

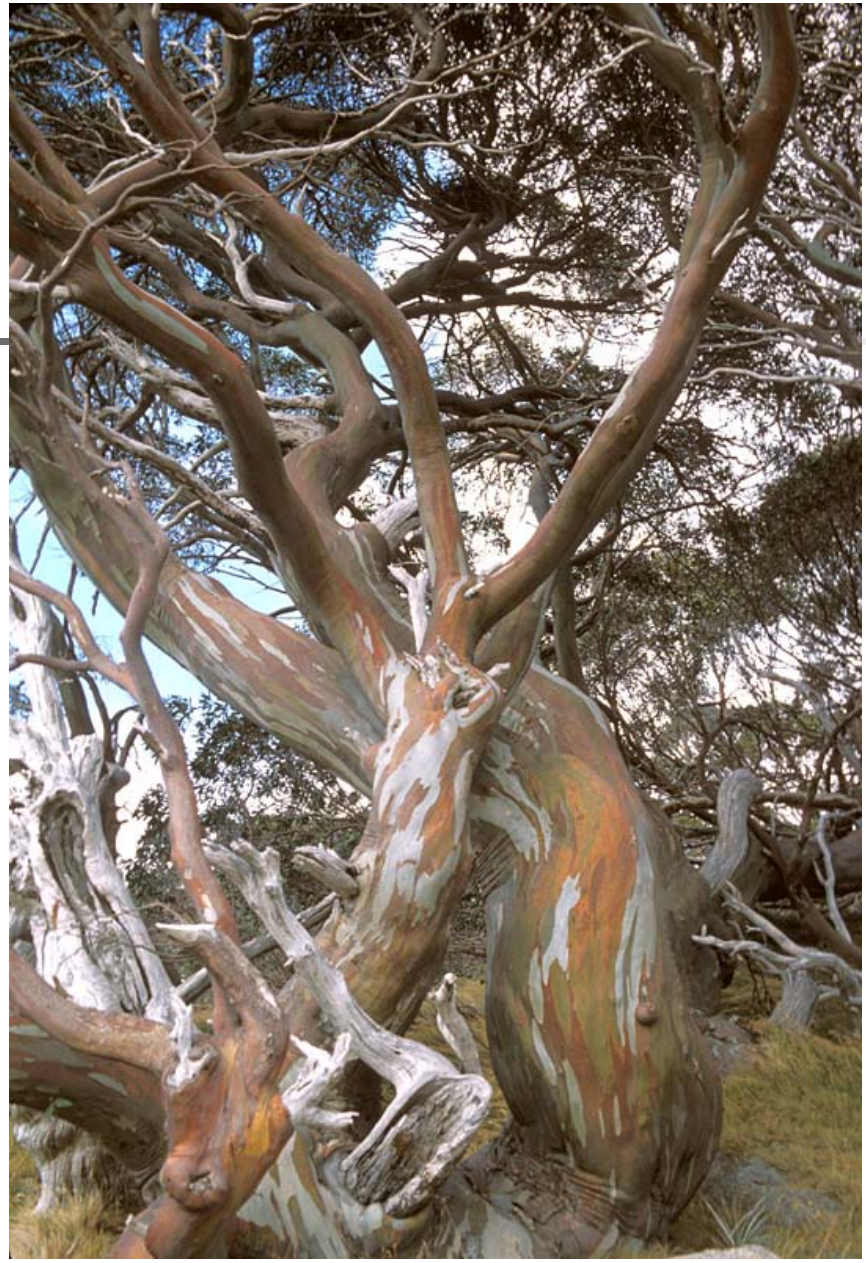


The Biosphere Reserve includes Australia’s highest mountains, including the Main Range and Watson’s Crags

It includes the headwaters of Australia's largest river, the Murray River, and the Snowy River (pictured)

It includes rare (for Australia) evidence of Pleistocene and Holocene glacial action such as the recessional moraines at Hedley Tarn (above)

It contains rich alpine herbfields, with deep humus soils, and in season, large fields of wildflowers, many of which are endemic



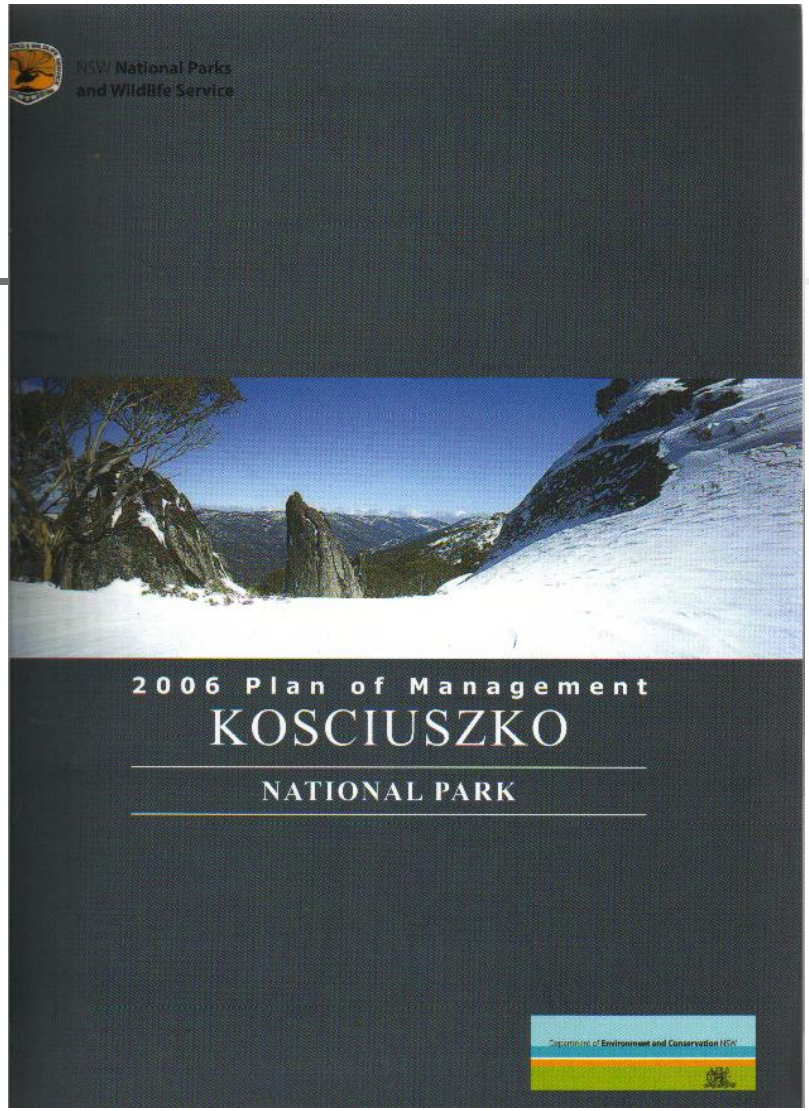
A single tree species, the snowgum (*Eucalyptus pauciflora*) is found at the treeline

It includes a rich array of species including the endangered Corroboree Frog (*Pseudophryne corroboree*)

It includes a wide diversity of marsupials, including the Red-Knecked Wallaby (*Macropus rufogriseus*)

The park is a host to a wide range of summer recreation including mountain biking, hiking, camping, rafting, swimming, and paragliding

Winter sports are popular, and include alpine (down hill) skiing, cross-country skiing, some mountaineering and ice climbing and snow play sports.




It is managed consistent with a statutory plan of management by the NSW National Parks and Wildlife Service, a Branch of the NSW Department of Environment and Climate Change.

# 2.1 Kosciuszko National Park: World Biosphere Reserve

| Biosphere Reserve Characteristics | Kosciuszko National Park |
|---|---|
| Core area | Yes |
| Buffer Area | No (but the park is zoned) |
| Transitional Area | No |
| Conservation function | Yes |
| Sustainable development function | Yes (hydro-scheme and skiing) |
| Environmental education function | Yes |
| Research function | Yes |
| Training function | Yes |

# 2.2 Kosciuszko National Park: Climate change impacts

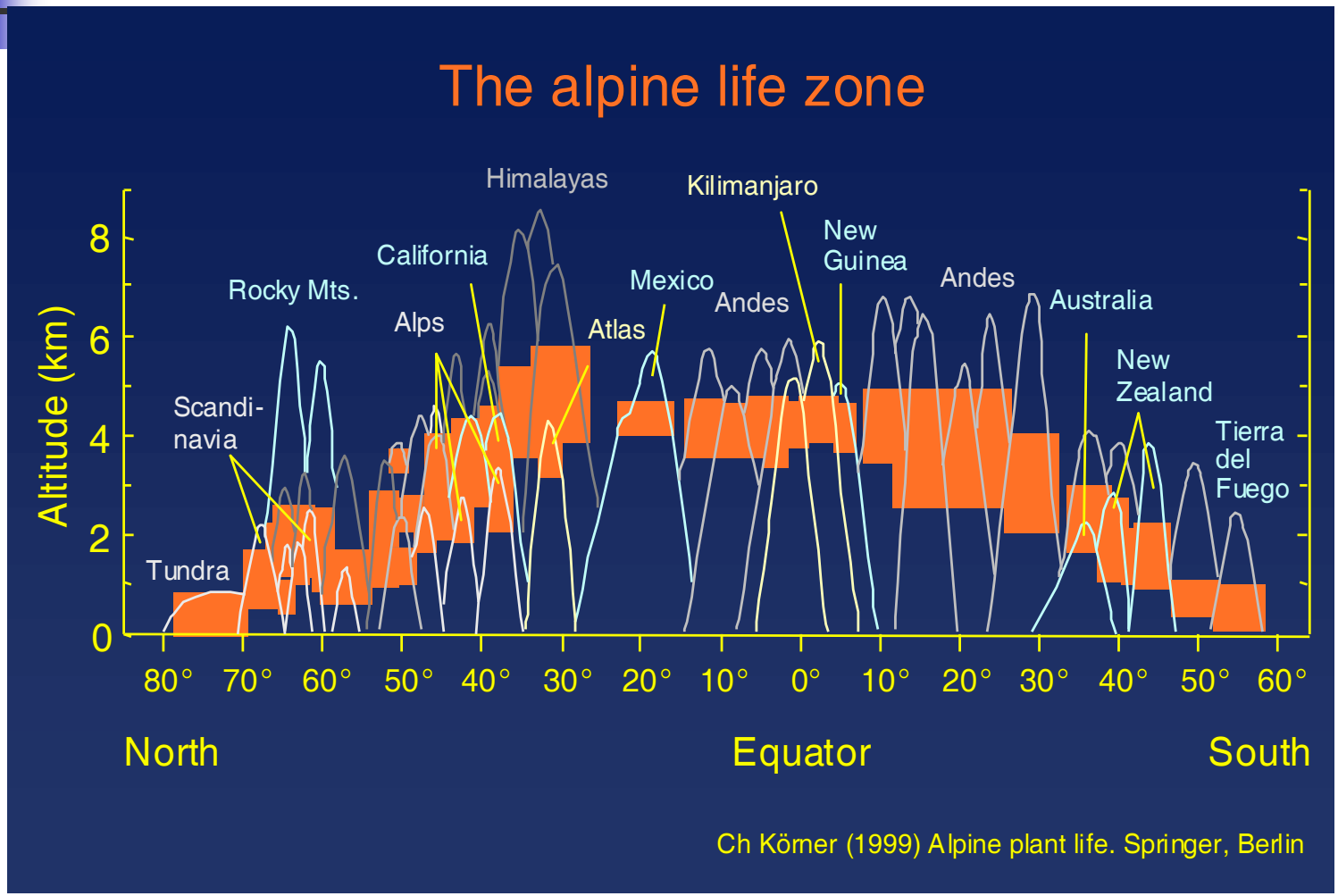


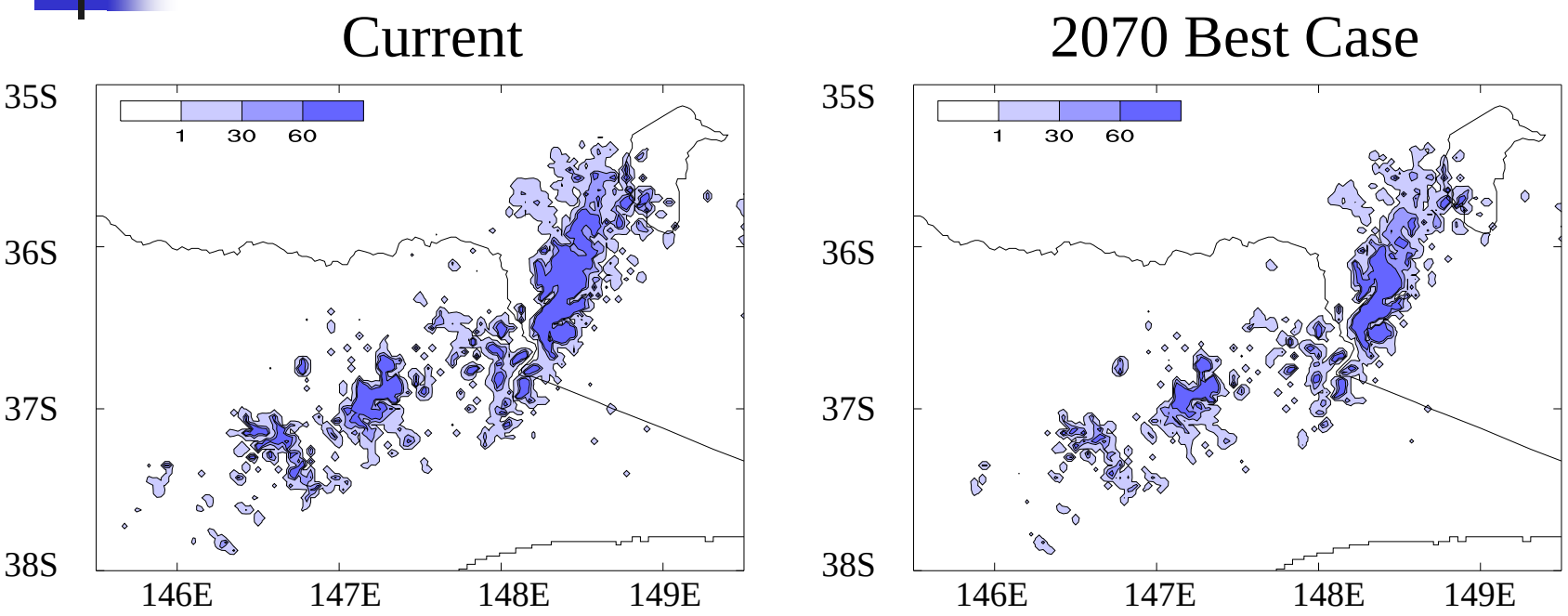

Figure provided courtesy of Dr Ken Green, Alpine Ecologist, Kosciuszko National Park

# 2.2 Kosciuszko National Park: Climate change impacts

- Temperature in the Australian region is projected to increase by 0.3 - 1.3ºC by 2030 and 0.6 - 3.4ºC by 2070
- Projected changes in precipitation amount of
  0 to -20% by 2070
- Scenario most favourable for snow leads to moderate reductions in snow cover by 2070
- Scenario least favourable for snow leads to severe reductions in snow cover as early as 2030

Data provided courtesy of Dr Ken Green, Alpine Ecologist, Kosciuszko National Park

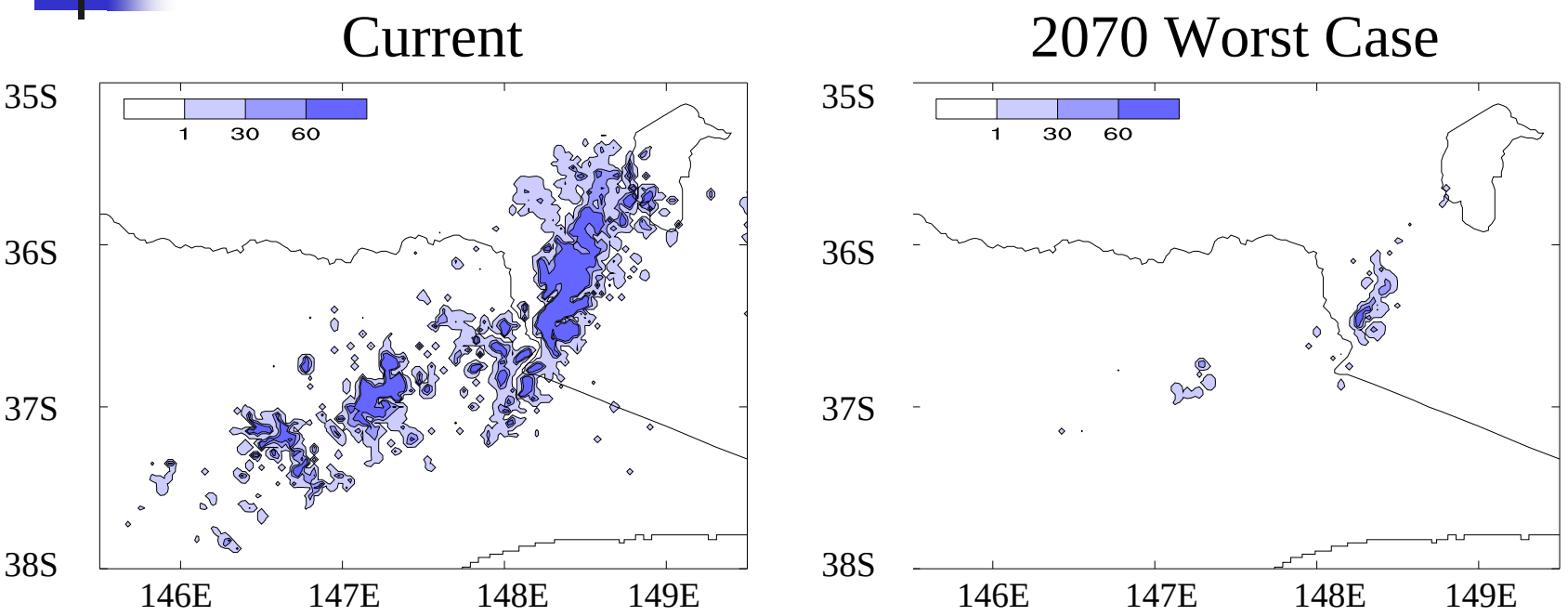
# 2.2 Kosciuszko National Park: Climate change impacts




Snow cover duration (days)

Data provided courtesy of Dr Ken Green, Alpine Ecologist, Kosciuszko National Park

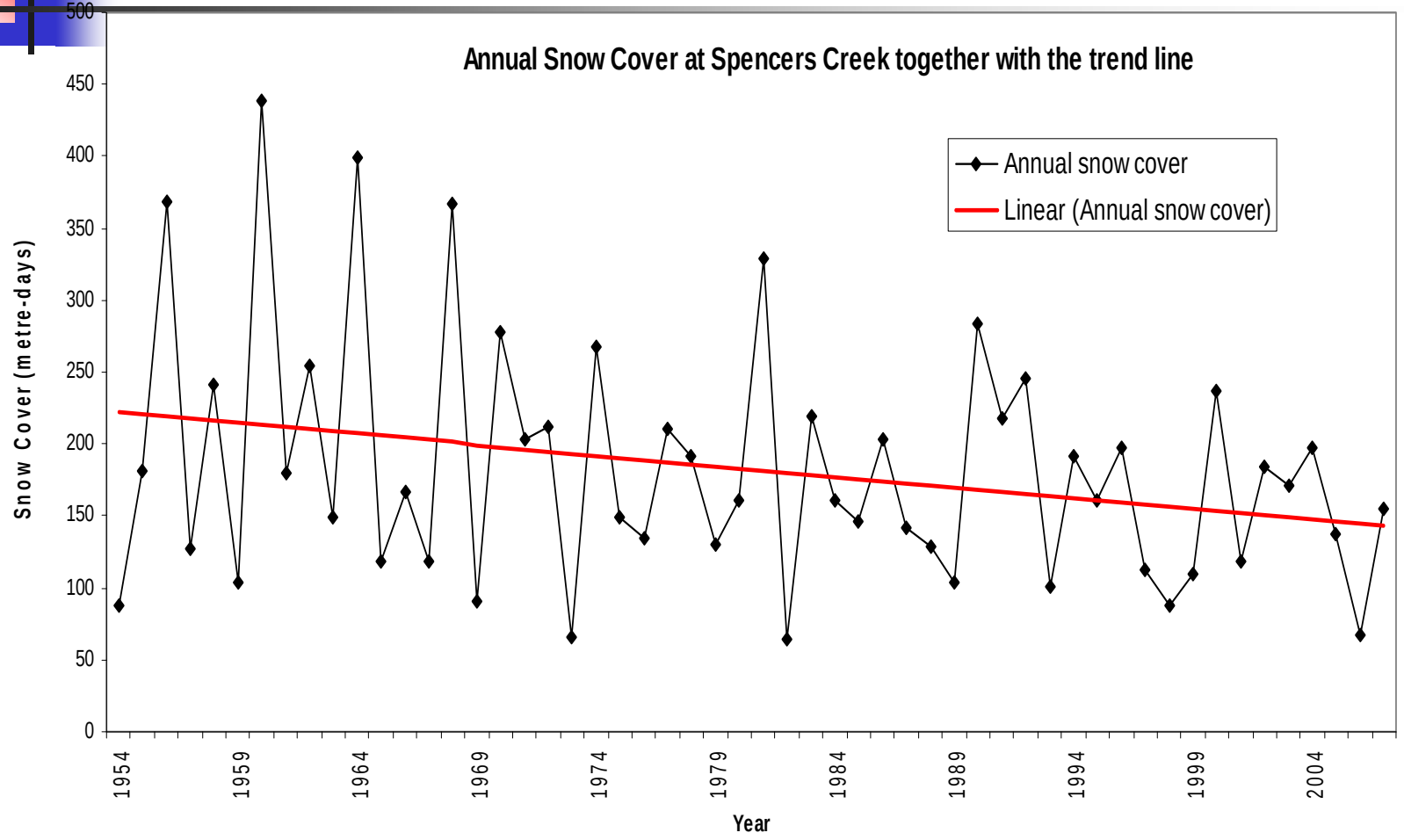
# 2.2 Kosciuszko National Park: Climate change impacts




Snow cover duration (days)

Data provided courtesy of Dr Ken Green, Alpine Ecologist, Kosciuszko National Park

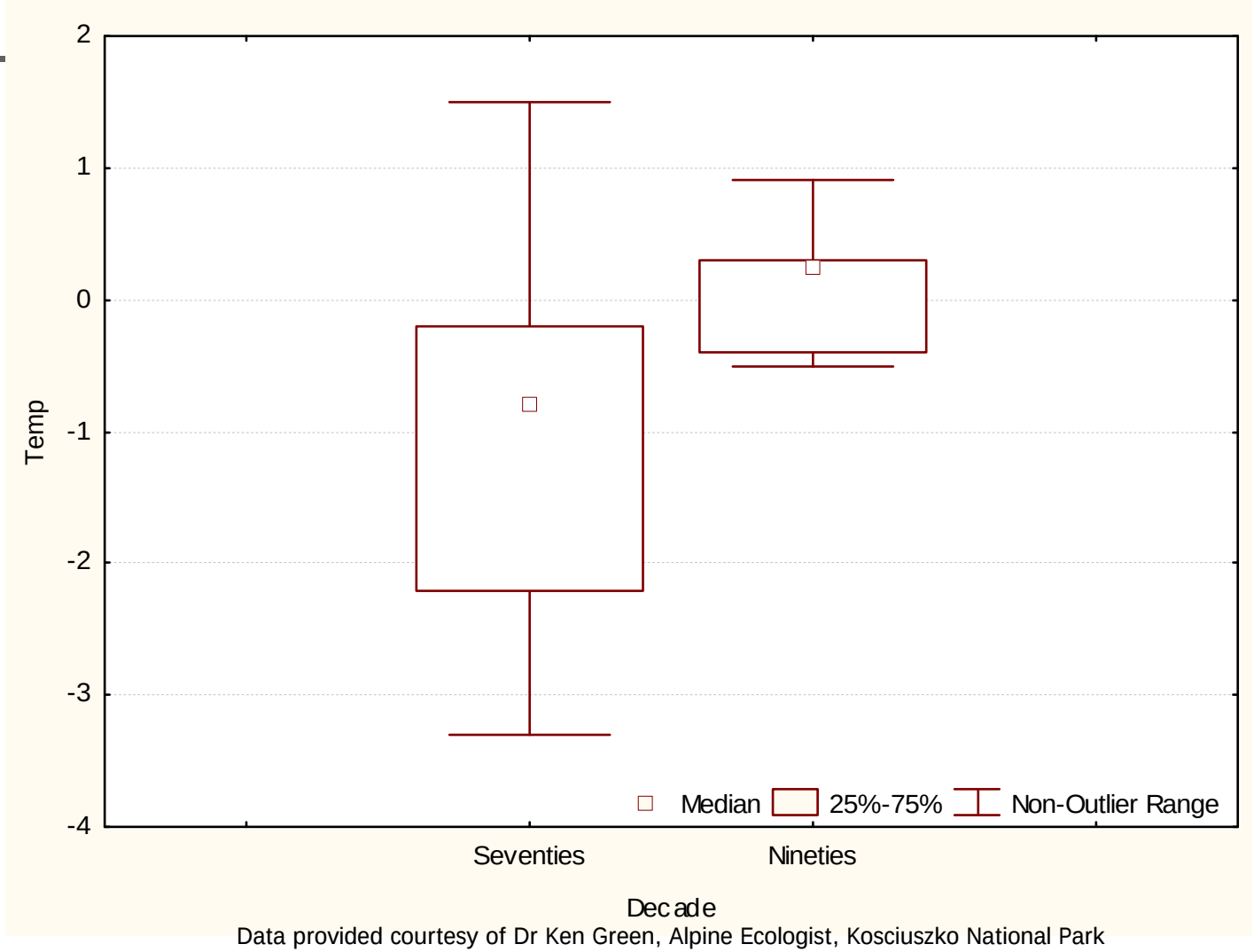
# 2.2 Kosciuszko National Park: Climate change impacts




Data provided courtesy of Dr Ken Green, Alpine Ecologist, Kosciuszko National Park

# 2.2 Kosciuszko National Park: Climate change impacts

Average minimum temperature at Thredbo 1970-1985 and 1996-present ($p<0.05$).




Data provided courtesy of Dr Ken Green, Alpine Ecologist, Kosciuszko National Park

# 2.3 Kosciuszko National Park: Climate change research

Arrival of migratory birds in mountains earlier across 3 decades when snow declined by 30% (Green & Pickering 2002)

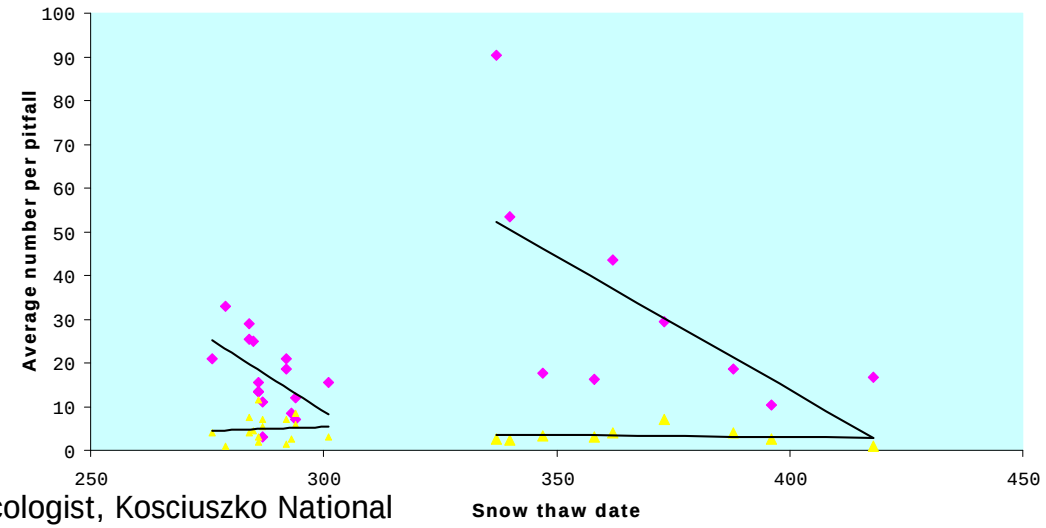
| *Species* | *1970-1979* | *1990-1999* |
|---|---|---|
| **Crescent Honeyeater** | 19 Oct | 12 Sep, |
| **Olive whistler** | 15 Sep | 21 Aug |
| **Flame robin** | 2 Sep | 21 Aug |
| **Striated pardalote** | 16 Sep | 30 Aug |
| **Yellow-faced Honeyeater** | 18 Sep | 12 Sep |
| **Australian Kestrel** | 5 Nov | 30 Aug |
| **Fantail cuckoo** | 25 Nov | 23 Oct |
| **Red wattlebird** | 14 Oct | 20 Sep |
| **Richards pipit** | 16 Sep | 28 Aug |

Data provided courtesy of Dr Ken Green, Alpine Ecologist, Kosciuszko National

# 2.3 Kosciuszko National Park: Climate change research

GLORIA - Global Observation Research Initiative in Alpine Environments

- 5 GLORIA sites on Mt Clarke spur 'summits'
- Vegetation plots set up the same worldwide
- Pitfall traps established at GLORIA sites (left graph)




Slide provided courtesy of Dr Ken Green, Alpine Ecologist, Kosciuszko National

# 2.3 Kosciuszko National Park: Climate change research

| |
|---|
| Snowpatch communities are dependent on long-lasting snow. |
| Permanent transects established to monitor vegetation change. |
| Intensive study of 7 of latest-lying snowpatches completed. (Green & Pickering in prep.) |

Slide provided courtesy of Dr Ken Green, Alpine Ecologist, Kosciuszko National

# 2.4 Kosciuszko National Park: Climate change adaptation and mitigation

- Maximising water yield from high mountain catchments (improving naturalness and resilience)
- Planning (with communities) in anticipation of more frequent and severe wildfires
- Responding to introduced predators, especially at times of early thaw
- Planning for a new (non-snow) type of tourism for the mountains

# 2.4 Kosciuszko National Park: Climate change adaptation and mitigation

Full page media report on climate change impacts to Kosciuszko National Park, April 2008

# 2.4 Kosciuszko National Park: Climate change adaptation and mitigation

- More climate change impact communication
- Publicity for Kosciuszko National Park Biosphere Reserve research
- Critical education information for local communities

# Kosciuszko National Park threatened by climate change

Continued from Page 31

Green, who has been at the forefront of Australian alpine research for three decades, tends to shrug off lack of funding for field work as an obstacle that can be overcome with ingenuity and determination.

"If you wait around for funds and official approval to go ahead and do research, you'll wait forever," he says.

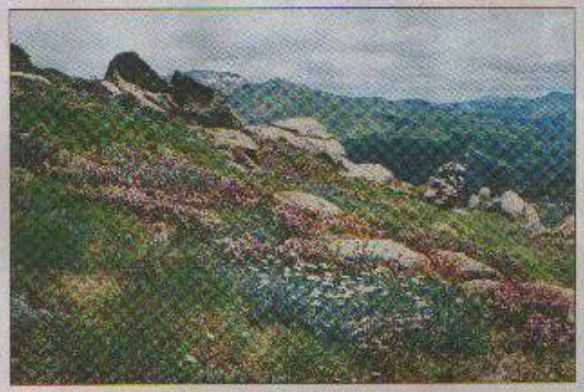
It's a philosophy that's served him well, and earned him a reputation as both "a maverick" (a NSW parks service description) and "one of the best ecologists we've got in this country" (that's iconic alpine ecologist Dr Alec Costin's view). Green's innovative methods for ducking meetings to do essential field research have also led to the nickname Seldom-Seen Green, after the elusive river guide in Edward Abbey's subversive eco-classic *The Monkey Wrench Gang*.

Alpine ecology has been a lifetime's passion for Green. As second-year university students in Canberra in the 1970s, he and Dr Will Osborne co-authoured their first scientific paper on the wildlife of the Kosciuszko snow country. But when the duo began their research, they were brusquely told by several senior zoologists that they were wasting their time.

"We were told there was nothing up there, that the animals would either move down the mountain or hibernate, and there was no alpine ecology," says Osborne, who is now a senior lecturer in wildlife ecology at the University of Canberra.

Fortunately, they were determined, headstrong students who were captivated by the alpine environment. Osborne was from Benalla in Victoria, and Green was from Mt Gambier in South Australia.

**THE RESEARCHER:** Dr Ken Green has been at the forefront of Australian alpine research.



**THE FLORA:** Spectacular summer wildflower fields are under threat.

# 3. Biosphere Reserve, connectivity conservation and the Australian Alps

- World Biosphere Reserve, Kosciuszko National Park, is a “keystone” area for north-south connectivity of the Australian Alps Parks
- The connectivity extends across two States and the Australian Capital Territory

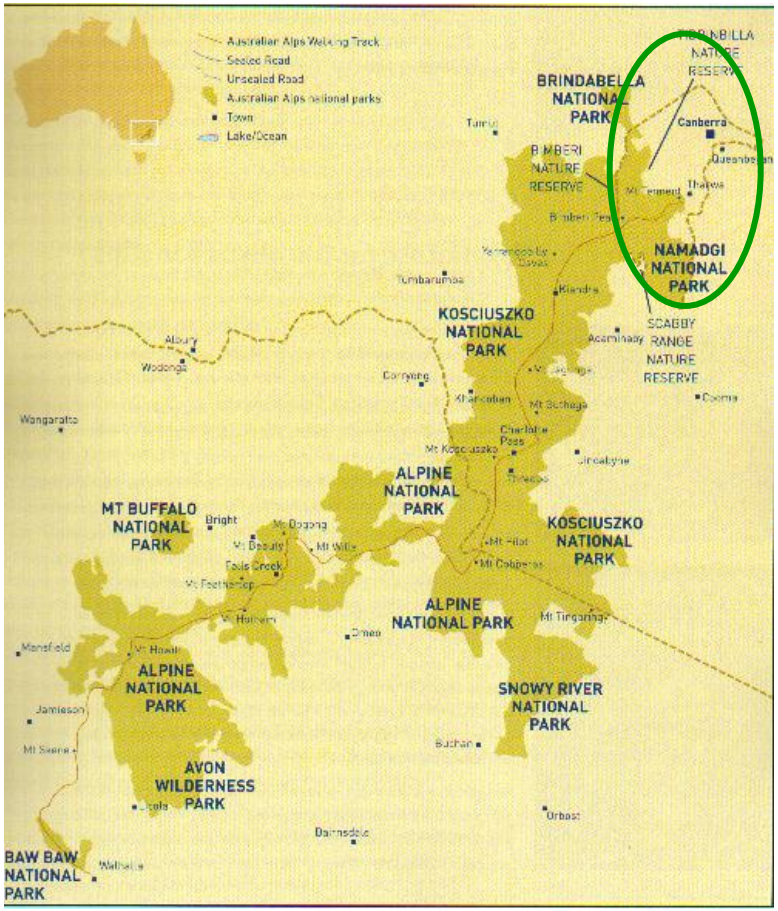
# 3. Biosphere Reserve, connectivity conservation and the Australian Alps

- Kosciuszko National Park is effectively a Biosphere Reserve “Core Area”
- Connectivity conservation unofficially extends that Biosphere Reserve “Core Area” to the north and the south
- A total of 1,678,715 hectares (2006)

# 3. Biosphere Reserve, connectivity conservation and the Australian Alps

- In the ACT, the official Biosphere Reserve concept may be extended further

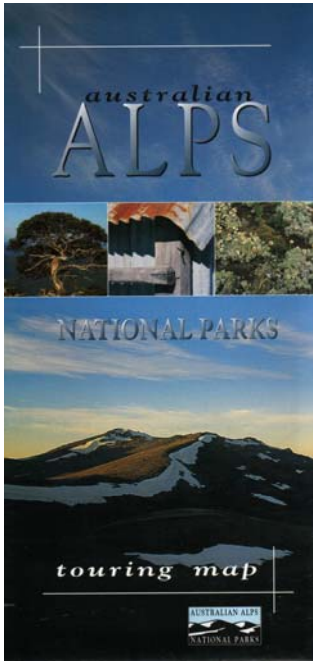
- The Australian Capital Territory Government is currently considering Biosphere Reserve Status for all or parts of the Territory
  - Buffer Zones and Transitional Zones would apply
  - Sustainable Development principles and practices would apply



# 3.1 Biosphere Reserve, connectivity conservation and the Australian Alps

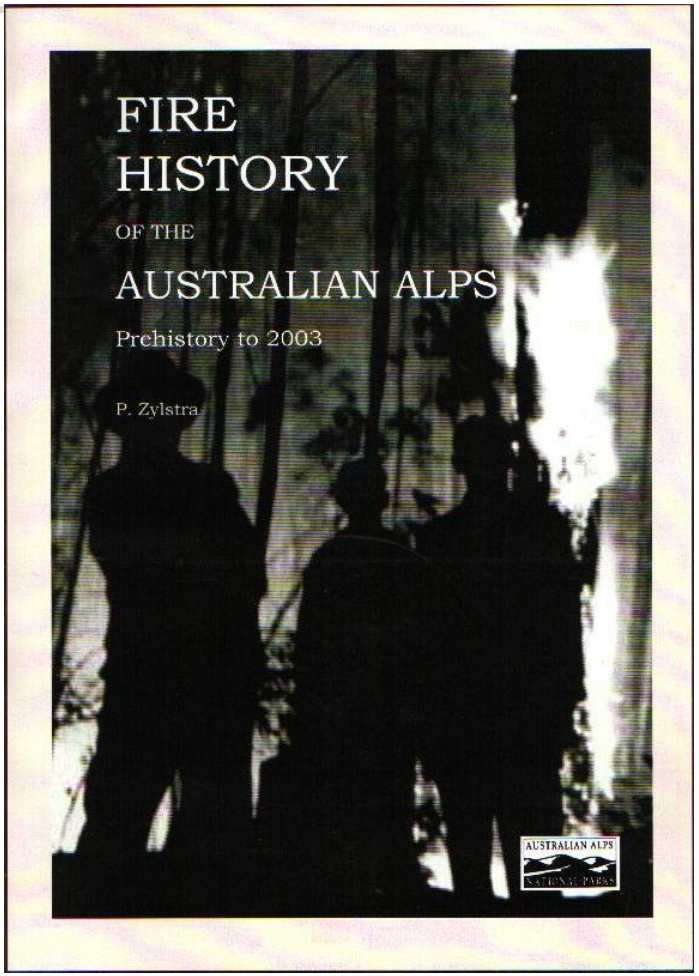
| KNP Biosphere Reserve Functions | Australian Alps Co-operative Program |
|---|---|
| 1. Conservation function (preserve genetic resources, species, ecosystems and landscapes) | ▪ Connectivity: means an “extended” core area<br>▪ Legal cooperative agreement (MOU) means consistency of approach |
| | ▪ Cooperative endangered species works |
| | ▪ Cooperative repair of catchments |
| 2. Development function (foster sustainable economic and human development) | ▪ Catchment protection for critical water supplies for the Murray Darling Basin |
| | ▪ Cooperative recreation and tourism management |
| 3. Logistic support function (Demonstration projects, environmental education and training, research and monitoring) | ▪ Cooperative research and monitoring programs |
| | ▪ Cooperative training |
| | ▪ Cooperative education programs |
| | ▪ Development of joint standards |

# 3. Biosphere Reserve, connectivity conservation and the Australian Alps




Sustainable visitor use information


Science-management workshops




Research reports

# 3.2 The Alps to Atherton (A2A) Corridor

- Australian Alps to Atherton Corridor (A2A)
- Located along the Eastern Ranges of Australia, and parallels (yellow) the East coast
- 2800 kilometres long, from ● Walhalla in Victoria to ● Atherton in Queensland
- Includes 3 States and a Territory
- Large scale connectivity conservation including ○ Kosciuszko National Park World Biosphere Reserve

# 3.2 The Alps to Atherton (A2A) Corridor

- The A2A Corridor announced in February 2007 by the Honourable Mr Bob Debus, Minister for the Environment, NSW
- Also supported by Ministers for the Environment in Queensland, ACT and Victoria
- A national response to climate change in 2007 led by three States and the ACT

6 News Weekend Edition February 24-25, 2007 smh.com.au

60 EARTH HOUR www.earthhour.org

2800km coastal route for wildlife to escape warming

Sydney Morning Herald

"Global warming does not happen by default. It is a man-made problem. Every bit of coal, every litre of oil or gas that humans burn, or hectare of land we clear, adds to the load of gases in the atmosphere that engulf the planet. "We can do

this country to help avoid the threat of mass global warming-induced extinction, I believe we must look to better protect the ecological integrity of this 2800-kilometre corridor," Mr Debus said.

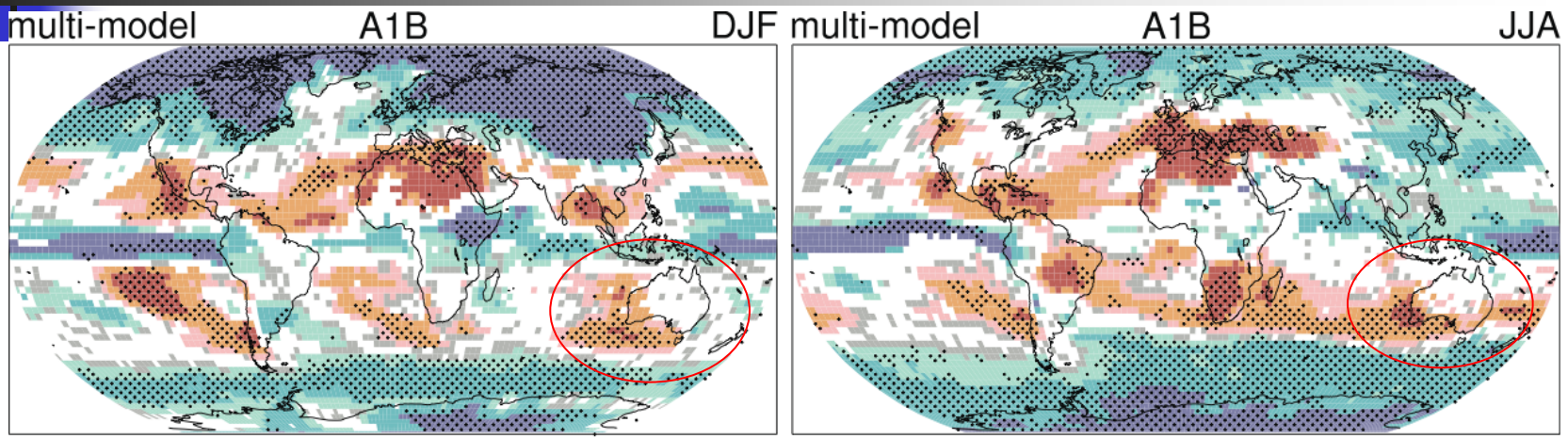
The Australian Bush Heritage Fund will announce the acquisition of the first property specifically identified as part of the corridor. Scottsdale is 1300 hectares south of Canberra at Bredbo, taking in critical platypus and native fish habitat in the Murrumbidgee River, vast native grasslands, dry sclerophyll forest and numerous endangered species. It will be crucial in helping to close a gap not only in the

Cairns Wildlife corridor QLD Brisbane NSW Canberra Sydney Melbourne 300km

Great Eastern Ranges corridor but also another proposed connection between Kosciuszco and the coast.

The Australian Bush Heritage Fund is a non-profit organisation that buys high-conservation land with donations from the public and government. It has formed partnerships with the NSW De-

# 3.2 The Alps to Atherton (A2A) Corridor



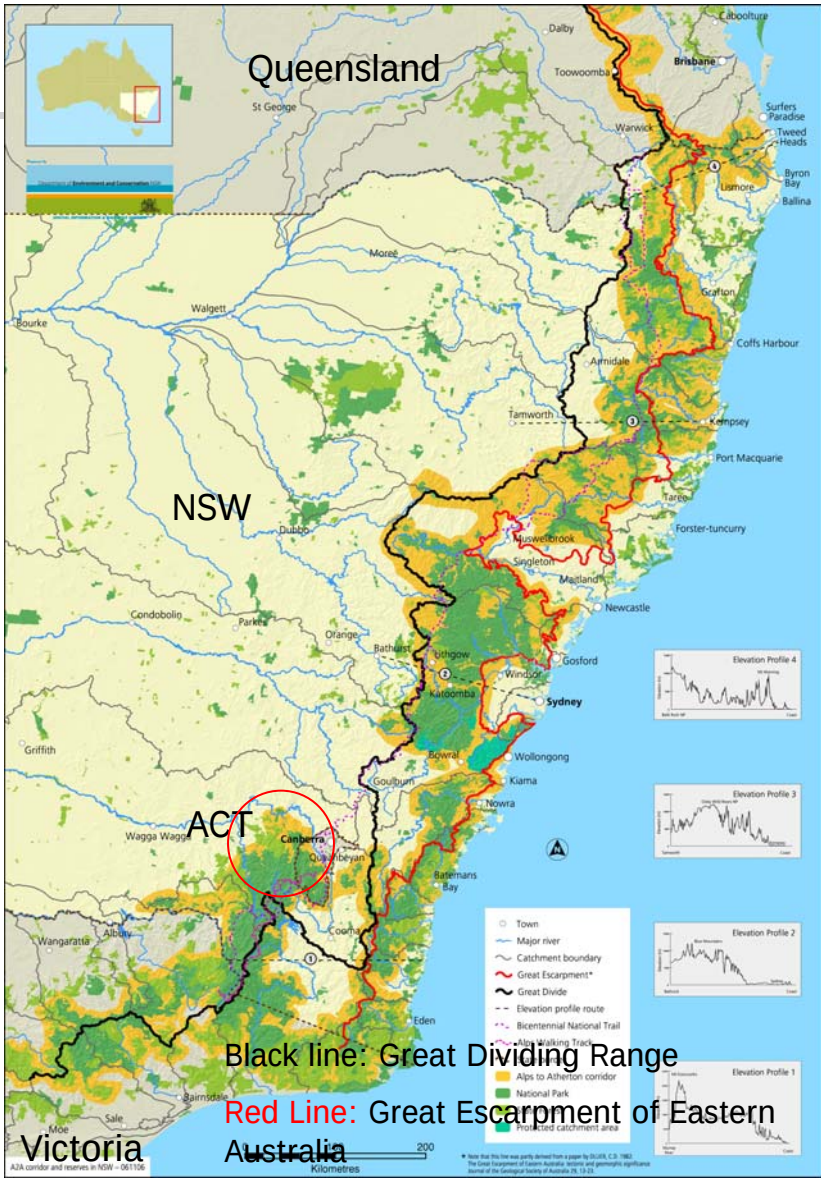

IPCC forecast changes in precipitation for 2090-2099 from 1980-1999

- IPCC modelling, identifies, with confidence, the marked drying of southern and eastern Australia with global warming

- These are continental scale changes requiring a continental scale response

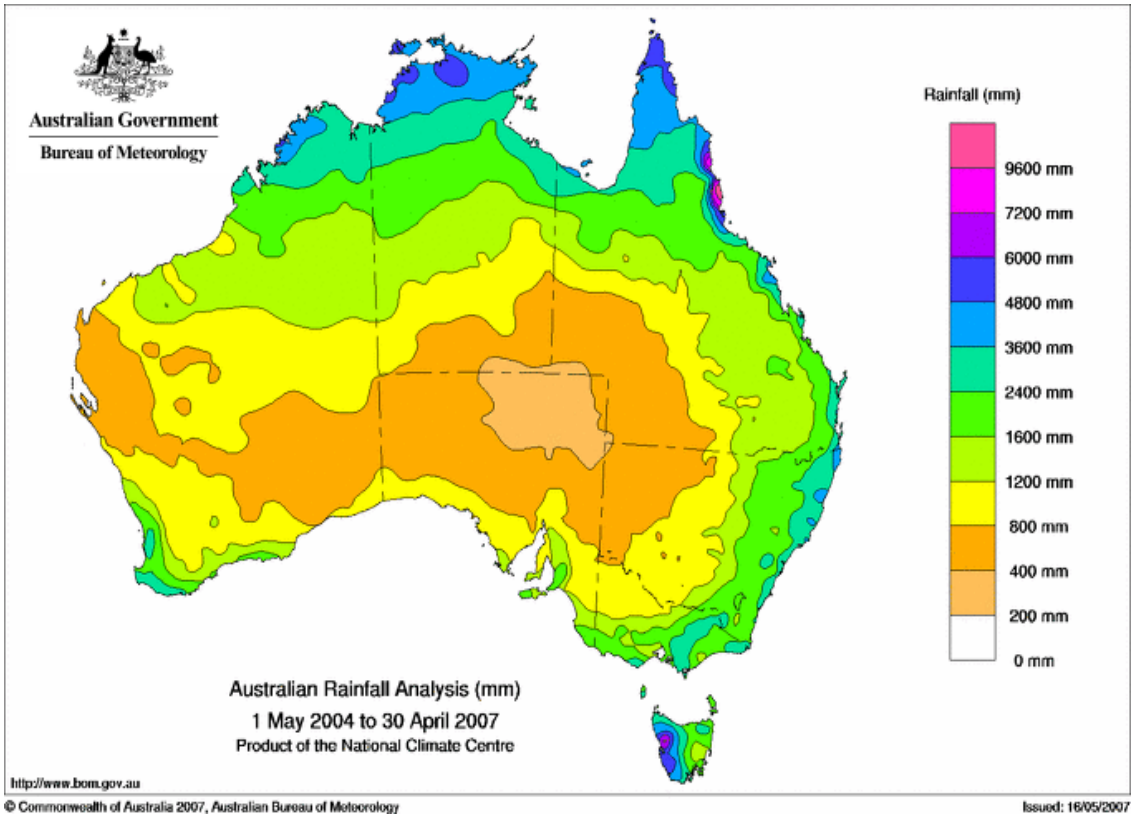
# 3.2 The Alps to Atherton (A2A) Corridor

- NSW and ACT section of the A2A corridor. NSW DECC has a $7 million budget for A2A. Managed by Mr Ian Pulsford of DECC
- A2A Corridor illustrating green core areas (protected areas) interconnected by (yellow) connectivity conservation lands
- Potential ACT Biosphere Reserve located within the recognised connectivity conservation lands



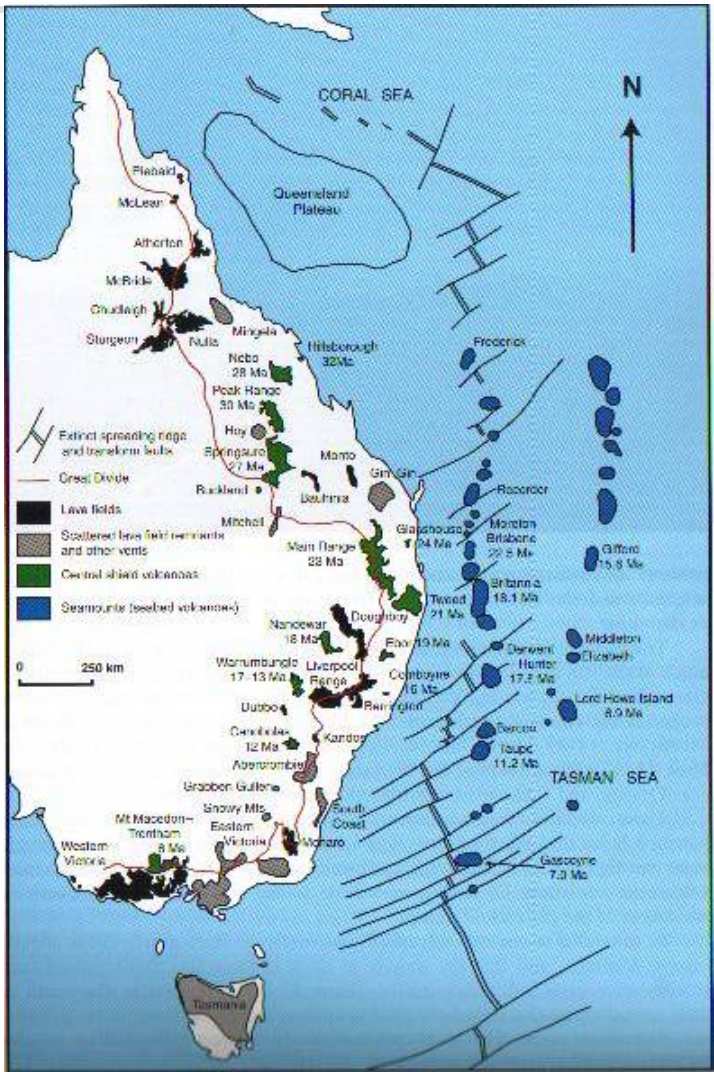
# 3.2 The Alps to Atherton (A2A) Corridor

- Rationale:
- A2A includes the higher rainfall areas of Eastern Australia
- Where there is water, there is life



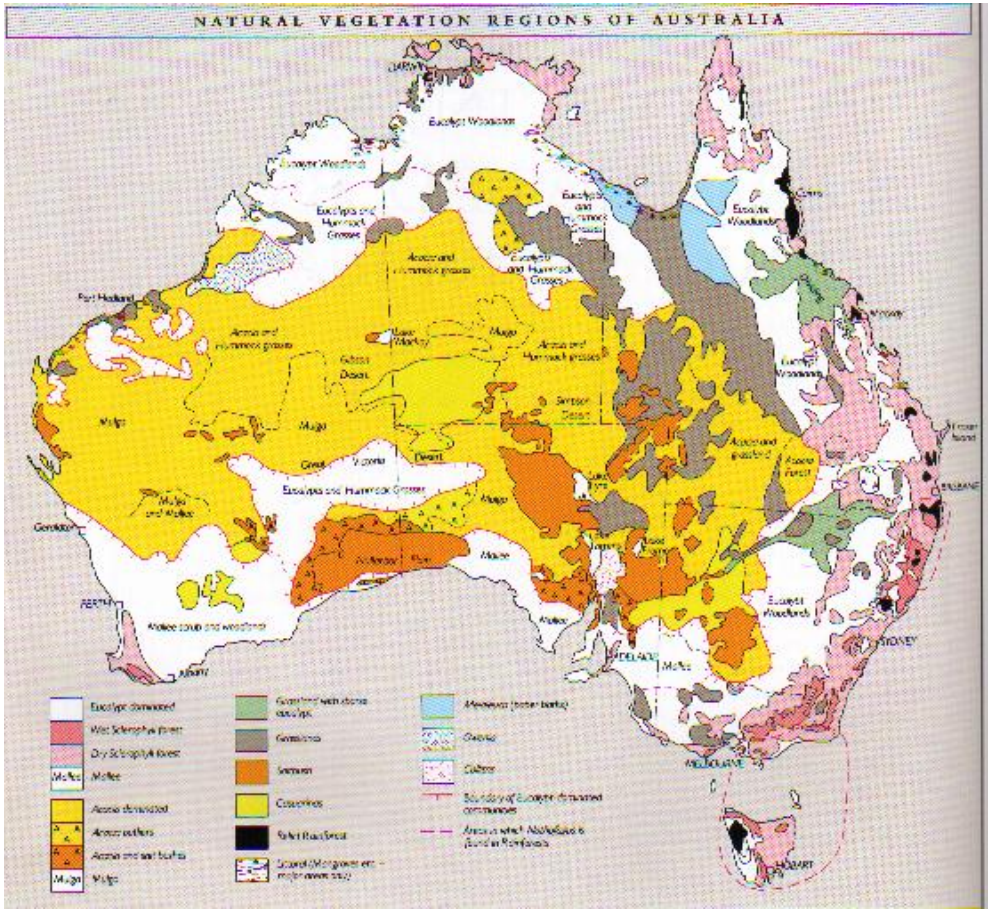
# 3.2 The Alps to Atherton (A2A) Corridor

- Eastern Australia and the Tertiary volcanics
- Some of Australia's richest soils



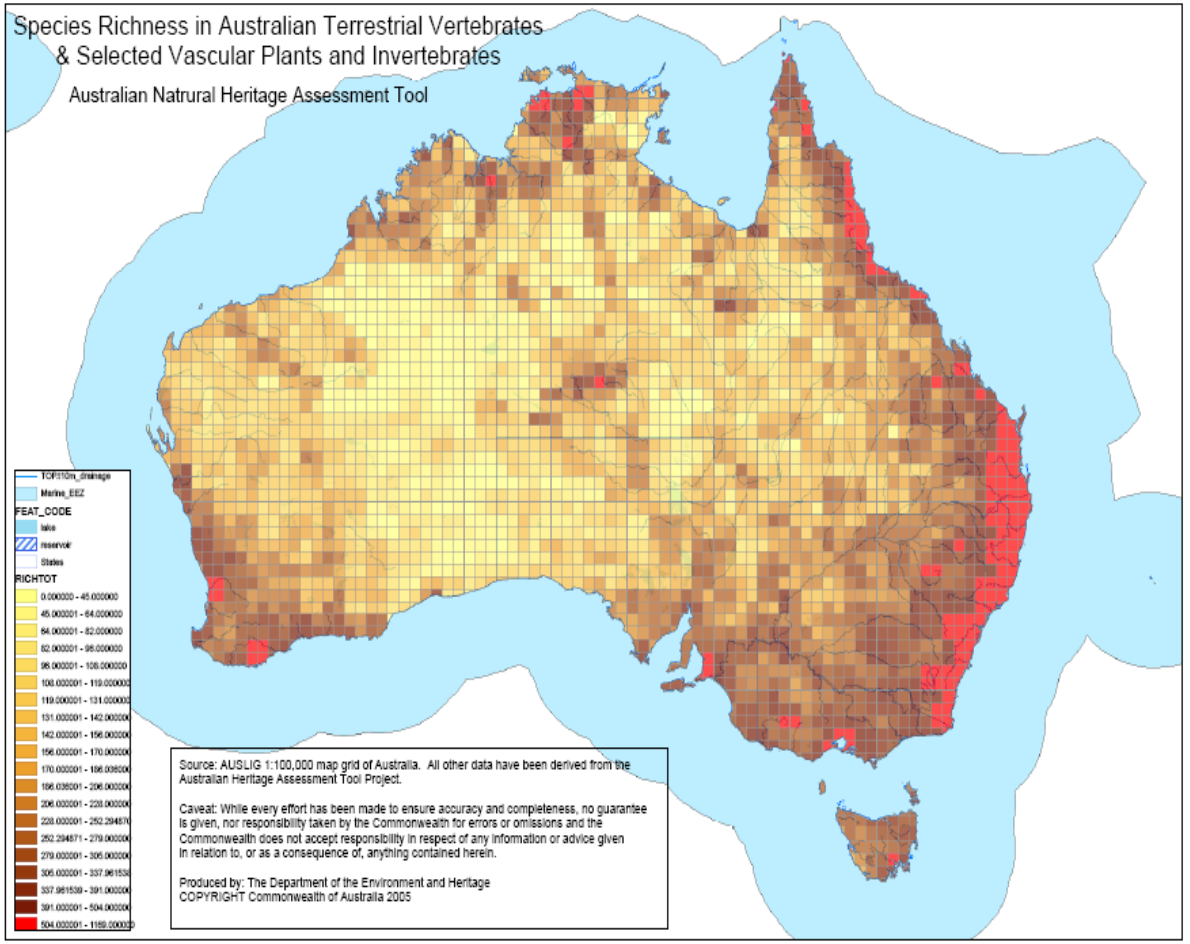
# 3.2 The Alps to Atherton (A2A) Corridor

- Higher rainfall, richer pockets of soils, richer vegetation communities
- Including tall moist Eucalypt forests
- Rainforests



# 3.2 The Alps to Atherton (A2A) Corridor

- The A2A corridor: a rich concentration of species
- Plants
- Animals



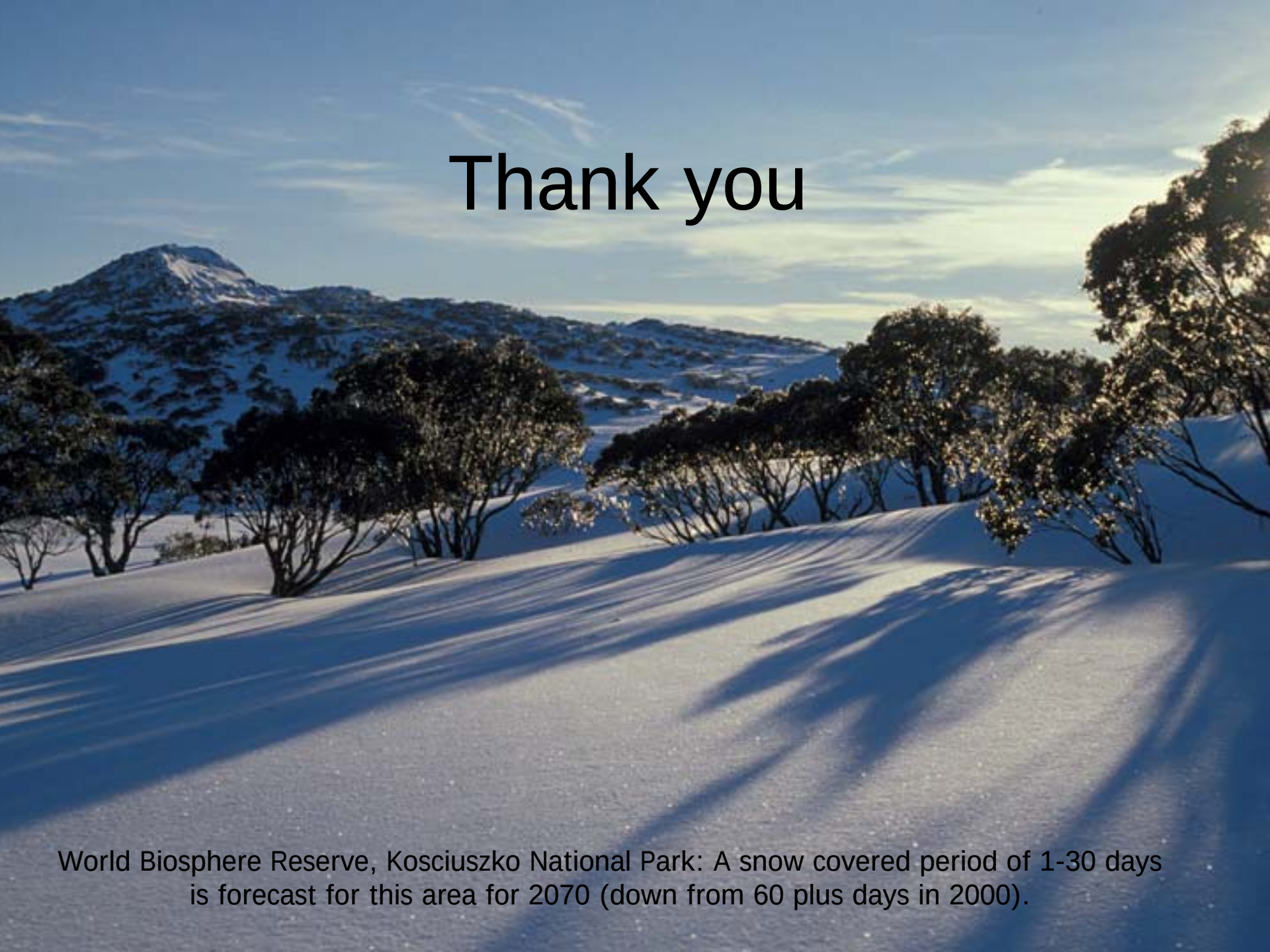
# 3.2 The Alps to Atherton (A2A) Corridor

- A2A connectivity conservation will include:
  - Core protected areas
  - Biosphere Reserve(s)
  - Natural lands that interconnect the core areas
  - A range of different land tenures for the connectivity conservation lands
- Benefits from A2A connectivity conservation include:
  - Sufficient area (and connectivity) for species to respond to the forecast hotter, larger and more extreme bushfires
  - Healthier ecosystems, and therefore healthier catchments which maximise water delivery
  - Potential new stewardship payments that reward private landowners who retain and grow native forests thanks to a new carbon and water economy

# 4. Conclusion

- Large scale connectivity conservation responses to climate change such as the A2A corridor will help save species from extinction
- A2A provides latitudinal and altitudinal opportunities for species movement and catchment protection
- Protected areas, biosphere reserves, private property and other lands form part of the connectivity conservation
- Active management of the corridor will be needed, and new forms of stewardship payments will be needed

# Thank you



World Biosphere Reserve, Kosciuszko National Park: A snow covered period of 1-30 days is forecast for this area for 2070 (down from 60 plus days in 2000).