

The current impact of climate change on Australian wildlife

By Dr Anne Fowler

BSc(Vet)(Hons) BVSc, MACVSc (Avian Health, Wildlife Health)

The earth is getting warmer. The air temperature has increased by 0.6C globally in the last 100 years. The threat to biodiversity lies in how our wildlife species will manage to adapt to changing availability of water use, fire regimes and land use, in the face of invasion by new species into their habitats. The impact of climate change is not limited to one phyla or one habitat, although specialized species and remnant habitats will be the first to face extinction. It has been estimated that perhaps 55% of Australian species will suffer population declines from climate changes. Species are already being impacted and examples of this will be discussed in the presentation.

What is climate change?

We are seeing a change to the global temperatures as a consequence of human activities. Although natural events in the past have altered the earth's atmosphere and temperature, human activities are changing it at a rate that is unparalleled. The globe is warming as carbon dioxide, methane, nitrous oxides and CFC's accumulate in the atmosphere and reduce the atmosphere's ability to reflect heat into space. The result is an increase in heat bouncing back towards earth. Unfortunately, Australia has one of the highest rates of production of greenhouse gases per head of population. Many of these emissions come from forestry and agriculture but each and every one of us is responsible in our lifestyle choices and purchases every day.

Can we predict what will happen?

No the change is not limited to one ecosystem or species of animal. One area may experience higher rainfall, or more cyclones, and another area may experience longer drought. This complexity makes it difficult to predict and thus manage change. Animals have adapted to these changes, after all, in Gondwanaland, the continent was tropical. However, as the change is now too rapid for evolution, animal species will not be able to adapt in time.

Some of the proposed changes are described below.

1. **There will be more extreme climatic events: heat, drought, fire.** This may lead to the loss wide areas of habitat and wildlife as occurred in the Alpine fires in 2003, or negatively impact on breeding seasons.
 - One of the consequences of these climatic events such as increased temperatures means that habitats that are present on mountains start to move upwards, leading to a loss of suitable habitat. It has been estimated that 30% of snow cover has been lost in the last 50 years. For species such as the Mountain Pygmy possum,

their suitable habitat in the boulder snowfields is gradually being lost with increasing temperatures.

- Increasing temperatures will impact on reptilian species that have the sex of the young altered in response to increasing temperatures.
- Increasing intensity and duration of wildfires are expected. This not only leads to loss of animal species at the time, but alters the seed bank and may lead to dramatic alterations in the type of forest that grows after the fire.

2. The climatic environment will disappear, leading to reduced habitat and interconnectivity. Changes in productivity and nutrient cycling will lead to an ecosystem unable to sustain a population.

Increasing levels of carbon dioxide in the leaves will alter the palatability and nutrient value of these leaves. This has implications for the survival of not only the obligate marsupial folivores, the koala, greater glider and ringtail possum, but invertebrate insects that eat leaf. These insects sit at the bottom of the food chain and are consumed by a variety of avian, reptilian and mammalian species.

3. There will be a reduced synchrony between a species and its lifecycle and the availability of food and habitat.

With the change in phenology seen in migratory and woodland birds where arrival or breeding dates are moving forward or backwards at a rate of over a week a decade, the scenario will occur where young are present, but the food source to feed them is weeks away. It may result in shorter breeding seasons, with young dispersing at times when food is no longer abundant. The net result will be failed breeding seasons and the species that cannot adapt to change will become extinct.

4. Disruption of freshwater ecosystems by altered flow, increased evaporation and warming of the water will occur.

Our best example is the Murray-Darling Basin where a combination of human activity and drought years are now leading to the demise of the River Red Gum forests that line the river. Increasing levels of soil salinity are occurring as a consequence of land management practices and lack of water flow. Wetlands that once filled with seasonal flooding have been slowly depleted and can now no longer sustain bird breeding populations. The mouth of the Coorong is silting up and the small volume of fresh water is insufficient to flush out the tidal migration of salted water. This has had implications for a diverse range of avian and aquatic species.

Rising sea levels will impact on the locations for a wide variety of bird and turtle species that lay eggs in the intertidal zone. Species such as the Lesser Noddy, Herald Petrel, Orange-bellied Parrot and Yellow chat all breed in low-lying areas of coastland.

Rising sea levels will alter the watercourses in the Northern Territory and change the freshwater swamps to saltpan marshes. The highest density of waterbirds, including Magpie Geese and Brolgas, is found in this area and the loss of this habitat will lead to a reduction in numbers, and potentially species over time.

5. The likely range expansion and change of abundance and competitive ability of not only invasive species but novel pathogens.

Some examples include:

- The southwards migration of mosquitos and other tropical insect vectors. These animals will bring with them new types of parasites and blood-borne diseases that will impact on naïve populations of wildlife.
- The southern invasion of the cane toad into NSW and the centre of Australia will expose more species to this species that has resulted in the deaths of many wild animals to date.
- Grasses brought into the country as pasture grasses, such as Gamba grass, may fuel more intense fires.

Conclusion

In the face of so much bad news, it can feel paralyzing. But remember that bad things can happen when good people are silent. There are so many opportunities for action. Wildlife carers are also an army of environmental educators, with the ability to educate the public through their interaction with an individual wild animal.

- Wildlife carers can support wildlife through threatened species programs, and habitat purchase by government or private companies.
- Habitat interconnectivity will assist in wildlife surviving the change by permitting movement between habitats. We can assist in restoring cleared, fragmented and degraded habitat through programs as diverse as Land for Wildlife or Landcare.
- We can continue to lobby government for a capping of carbon emissions and the development of alternative renewable natural energy sources.
- We can each choose every day to conserve water in our homes and workplaces.
- We can lobby government for better control of invasive weeds and pests.
- We can lobby government to put a value on biodiversity and the environment and have this accounted for in new developments and carbon reduction schemes.

The challenge for us as carers is not to lose the big picture while we work daily on the detail of the individual in our care as our role is to be an advocate for wildlife in whatever the challenge it faces in the century ahead.

References

Bryan JH, Foley D, Sutherst RW. Malaria transmission and climate change in Australia. *MJA*, 1996; 164: 345-347

Chambers LE. Associations between climate change and natural systems in Australia: Practical Conservation Biology. *Am Meteorological Society*, Feb 2006, p 201- 205

Flannery T. *The Weather makers*. Text publishing, 2006

Hoegh- Gulberg. *Likely ecological impacts of global warming and climate change on the Great Barrier Reef by 2050 and beyond*. 2007

Hughes L. Climate change and Australia: trends, implications and impacts. *Austral Ecology*, 2003; 28, 423 - 443

Olsen P. *The State of Australia's Birds, 2007: Birds in a Changing Climate*. Pub: Birds Australia.

Overview of the report: implications of climate change for Australia's natural reserve system: a preliminary assessment. Dept Environment, Water, Heritage and Arts, 2008

Pearson RG, Dawson Tp. Predicting the impacts of climate change on the distribution of species: are bioclimate envelope models useful? *Global Ecology & Biogeography*, 2003; **12**, 361–371

Williams SE, Bolitho EE, Fox S. Climate change in Australia's tropical rainforest: an impending environmental catastrophe. *Proc. R. Soc. Lond. B* (2003) **270**, 1887–1892