

Climate change impacts on the Gondwana Rainforests of Australia



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The Gondwana Rainforests of Australia World Heritage Area is one of 19 listed World Heritage properties in Australia.

Extending across 40 reserves on Australia's east coast, the property is recognised by UNESCO for its examples of major stages of the Earth's evolutionary history, ongoing geological and biological processes, and exceptional biological diversity.¹

The changing climate poses a threat to the unique habitats in the WHA and to the species that live there.

The Earth Systems and Climate Change Hub is working with the people responsible for managing the reserves to understand how climate change will impact the World Heritage Area.

1. Gondwana Rainforests of Australia Statement of OUV, <https://whc.unesco.org/en/list/368>

The workshop

In October 2018, a workshop was convened in Brisbane at the University of Queensland to bring experts from key agencies together to discuss available climate change projections for the Gondwana Rainforests of Australia World Heritage Area (Gondwana Rainforests WHA) and identify specific data needs for ongoing climate change adaptation planning.

Gondwana Rainforests of Australia World Heritage Area

The Gondwana Rainforests WHA is a serial World Heritage property containing 40 separate reserves within north-east New South Wales and south-east Queensland. Covering more than 366,000 hectares, the rainforests comprise warm temperate, cool temperate, subtropical and dry rainforests similar to those that covered the ancient supercontinent Gondwana. The rainforests are biodiversity hot-spots and are home to many rare and threatened plants and animals.

On-ground management of the Gondwana Rainforests WHA is largely by the NSW National Parks & Wildlife Service (part of the NSW Office of Environment and Heritage) and Queensland Parks & Wildlife Service (part of the Queensland Department of Environment and Science). The Queensland Department of Environment and Science (DES) have developed a Biodiversity and Ecosystems Climate Adaptation Plan, designed to facilitate the adaptation of Queensland's biodiversity and ecosystems to the effects of climate change.

Climate change has been identified as a threat to the integrity of the Gondwana Rainforests WHA. Changes in temperatures and rainfall are likely to directly affect already restricted cool, moist habitats. Changes in fire regimes and severe storm events, coupled with changes in competition from pest species, are likely to further impact these habitats and the plants and animals that live there.

Climate change

Climate change refers to long-term changes in the average pattern of weather that occur over decades, centuries or longer. Climate variability, for example, due to the El Niño Southern Oscillation, occurs at shorter timescales of years to decades, while weather occurs on the timescale of hours to days.

Climate change projections are not predictions, but they tell us about the response of the climate system to possible future scenarios. Our confidence in projections is determined by considering climate model results along with our physical understanding of the climate system and past observations.

Climate projections for the broader Gondwana Rainforests region include:

- increased average temperatures in all seasons (very high confidence)
- more hot days and warm spells with a substantial increase in the temperature reached on hot days, the frequency of hot days, and the duration of warm spells (very high confidence)
- a possible modest decrease in rainfall that is strongest in winter and modest increase in summer rainfall in the northern part of the region – but there is low confidence in these projections due to a very large spread of

The importance of cloud for the Gondwana Rainforests WHA

In high elevation forests, water from cloud and fog provides up to half of the annual vegetation water requirements.

The shifting of the cloud base up or down the mountains associated with climate change will have important implications for the management of these forests and the fauna that lives in them.

For this reason, cloud projections are of particular interest to managers.



increases to decreases across climate models.

- increased severity of extreme rainfall events
- higher surface solar radiation (i.e. decreased overall cloud cover)
- decreased relative humidity (although modest in winter)
- higher evapotranspiration.

Changes projected generally increase for higher emissions scenarios and for further out in the century.

Detailed climate change projections are available at climatechangeinaustralia.gov.au – Gondwana Rainforests are in the East Coast cluster (both North and South sub-clusters).

Next steps

The Hub will be working with Gondwana Rainforests WHA managers to assess the impact of climate change on cloud cover in the region covered by the Border Ranges Rainforest Biodiversity Management Plan. The case study will be carried out in 2019–20.

The Gondwana Rainforests Management Committee will continue to investigate adaptation planning for the World Heritage area within their jurisdictions. Opportunities to coordinate and share information and learnings between jurisdictions will be investigated and optimised. Input and advice from the Gondwana Rainforests advisory committees shall be sought as projects and programs are developed, including identifying knowledge gaps along the way.

The full report from this workshop is available on the Earth Systems and Climate Change Hub website at www.nespcclimate.com.au.

For more information on the ESCC Hub's work in Gondwana Rainforests WHA, please contact Hub Knowledge Broker, Mandy Hopkins on 03 9239 4649 or mandy.hopkins@csiro.au.