

APPLICATION OF THE CLIMATE VULNERABILITY INDEX: GONDWANA RAINFORESTS OF AUSTRALIA

Assessing climate impacts on heritage values



“Climate change has become one of the most significant threats to World Heritage, impacting the Outstanding Universal Value (OUV), including integrity and authenticity, of many properties, as well as the economic and social development and quality of life of communities connected with World Heritage properties.”

*2023 UNESCO Policy Document on
Climate Action for World Heritage*

*Wildfires in 2019-2020 impacted one-third
of the Queensland section of Gondwana
Rainforests of Australia © Ben Blanche*

THE CLIMATE VULNERABILITY INDEX

The Climate Vulnerability Index is a **values-based, science driven** and **community focused** assessment process. Through its application, climate change vulnerability of heritage is systematically evaluated using a risk assessment approach. The CVI differs from many other tools as it assesses both:

- **OUV Vulnerability** through considering impacts of key climate stressors on the heritage values; and
- **Community Vulnerability** through considering the economic, social and cultural dependencies upon the World Heritage property.

These assessments include consideration of the adaptive capacity of the values and community to cope with climate change.

Both assessments of vulnerability are highly

relevant for many groups including First Nations rights holders, site managers, responsible management agencies, the businesses that are dependent on the property and their local communities, especially as the CVI assesses the extent to which they may be able to adapt.

In addition to the formal management partners for each heritage place, the involvement of the local community members in a CVI workshop increases the public awareness of the impacts of climate change on heritage and the resulting effects on economic, social and cultural connections.

The CVI is increasingly acknowledged as a systematic way to assess the impacts of climate change upon World Heritage values in a transparent and replicable way. It has now been applied in other heritage locations showing its ability to assess a diverse array of heritage.

GONDWANA RAINFORESTS OF AUSTRALIA (QUEENSLAND SECTION)

In 1994, the Queensland section of the Gondwana Rainforests was incorporated into the serial World Heritage property in recognition of its outstanding natural values within remnant patches of rainforest in south-eastern Queensland. These include various habitat types and the underlying geology features, as well as many plant and animal species that are unique to the area.

In addition, the First Nations peoples of the area have ancient and ongoing relationships with the landscapes, which are a source of their physical and spiritual cultural practices. The land management practices and stewardship of First Nations peoples over countless generations have contributed to the unique values that exist

today. There are also heritage aspects from more recent times that have been recognised, including historic connections, trails, roads and buildings.

The following eight key values were identified and assessed in the CVI process:

1. Unique rainforest habitats
2. Other significant habitat for biodiversity
3. Important flora
4. Important fauna
5. Ongoing ecological and evolutionary processes
6. Significant geomorphological features and processes
7. Indigenous cultural heritage
8. Post-contact heritage

PRELIMINARY MEETINGS WITH RIGHTSHOLDERS

Preliminary on-site meetings were held with relevant First Nations peoples to ensure that their cultural perspectives and values were appropriately incorporated into the project. The nature and extent of involvement was determined by each First Nations group.

Having project participants from each of the three First Nations groups of the area brought invaluable perspectives, which would not otherwise have been incorporated. On-going co-management with First Nations partners is a key recommendation from the project.



Discussions were held on-Country with First Nations peoples in advance of the main workshop © CVI

CLIMATE INFLUENCES ON GONDWANA RAINFORESTS

Analysis of climate variables revealed spatial gradients in rainfall and temperature that align with the east-west geographical orientation of the Queensland Section, typically less rainfall in the west and with cooler nights that provide a greater daily temperature range than in the east. Historical observations for the region were complemented by locally-relevant projections under a high-emissions scenario (“SSP3-7.0”) that corresponds to a global increase of ~4°C

warming by 2100. Observed historical warming in the Gondwana Rainforests has led to an increase in the number of hot days and hot nights, changes that are projected to continue at increased rates. Projections to 2050 indicate rainfall will continue to be variable in the future and will likely decrease further; however, heavy downpours will become more intense. Dangerous fire weather has become more frequent and is projected to worsen.

	Air temperature	Hot days, Hot nights	Average rainfall	Extreme rainfall events	Cloud base height	Drought	Storms	Fire weather	Evaporation	Humidity
Observed changes	1.7°C since 1910; 0.6°C since 1995-2014.	Increase in hot days and nights observed.	Slight drying trend, mostly in the cooler seasons.			Several extreme droughts since 2000.		Increase in number of dangerous fire weather days since the 1950s.		Observed change in humidity unclear.
Projected change: 2050, SSP3-7.0	Continued increase +1.4°C.	Continued increase in frequency of hot days and hot nights.	10% drier but variable; greatest in autumn and winter.	Increased intensity: ~8% heavier for heavy rainfall days ~15% heavier for hourly downbursts.	Little change or slight raising of “Lifting Condensation Layer” (proxy for cloud base height).	Increase in time spent in drought, especially extreme drought.	Tropical cyclones may be less frequent; expected to be more intense and with heavier rainfall.	Harsher fire weather projected; uncertainty about magnitude of change and frequency.	Evaporation is projected to increase by 6%.	Slight Decrease (–1%) or little change in average humidity.

Confidence in projected change:

Very high	High	Medium	Low/uncertain
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Based on analysis led by V. Round (NESP/CSIRO)

THE MAIN WORKSHOP

The main workshop involved presentations and interactive sessions during which assessments were made regarding the vulnerability of the key values – and of the community to a decline in those values. Discussions were also held during a visit to Queen Mary Falls.

Participants included management and governance agencies from Local, State (Queensland and NSW) and Federal levels; three First Nations groups with rights and interests across the area; research and science institutions; recreation and tourism peak bodies; NGOs and conservation interests; and Advisory Committee members.

Preliminary assessments were made in six breakout groups and these were reported back to subsequent plenary sessions for discussion and synthesis.



Participant assessments from breakout groups were discussed in plenary © CVI

The three key climate stressors selected by the workshop as the focus of the CVI assessment were Wildfire, Precipitation trend and Temperature trend. Informed by climate projections, **OUV Vulnerability was determined to be High**, while the **Community Vulnerability was Moderate**.



OUTCOMES OF THE CVI

The project aims were fulfilled through the successful application of the CVI systematic framework to deliver outputs that included:

- a list of key heritage values for which a shared understanding was established
- baseline assessments of their condition and changes since World Heritage inscription
- an analysis of climate data and model projections for the area.

Outcomes from the project included:

- connections with First Nations groups that have continued and strengthened
- a sound basis for continuing efforts to support landscape-scale management with rightsholders and stakeholders
- potential adaptation strategies that have informed future climate adaptation planning being undertaken by the Queensland Government and partners.

The CVI report provides a valuable resource for climate education and advocacy, raising awareness and promoting informed action for the property's protection. Knowledge of the effects of climate change can also support the management within other parts of the World Heritage property and areas outside the property boundary.



For more information, go to:
<https://cvi-heritage.org>

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