



Australian Government

**Submission to the House of Representatives Standing Committee on
Climate Change, Environment and the Arts – Inquiry into Australia's
biodiversity in a changing climate**

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Context

The Queensland Government recognises the need to develop a comprehensive and proactive adaptation response to the likely impacts of climate change on our biodiversity. This need is driven by both the wealth of natural assets found in Queensland and the vulnerability of the natural environment to climate change impacts at relatively low average global temperature increases. In its Fourth Assessment Report, the IPCC has identified that Australia's ecosystems have limited adaptive capacity under a 2.0°C of global warming scenario, and become increasingly vulnerable under more severe warming scenarios.

The Queensland Government's climate change adaptation strategy, in relation to biodiversity and a range of affected sectors, is currently under review. As a first stage in the review process, the Queensland Government will release an Issues Paper in early August 2011, seeking public comments on a range of adaptation issues across all key sectors, including ecosystems.

A significant body of work is underway to review the likely impacts of climate change on Queensland's biodiversity, which will feed into the adaptation strategy review. The Queensland Government's intention is for this work is to move beyond generic 'no regrets' adaptation responses such as reducing existing threats and building resilience through landscape restoration. Whilst these responses are valid, they should arguably be pursued by governments even if climate change did not exist. The goal of Queensland's current work program is to come to terms with the potential for widespread and dramatic landscape-scale changes under climate change, consider the major flow-on effects on the ecosystem services most significant to the state's economy, and propose targeted and regionally-specific adaptation policy and management actions which are appropriate for the scale of impacts.

Queensland's submission outlines four key issues, the responses to which will form the basis of its future ecosystems adaptation agenda:

- Developing a more fine-grained understanding of climate change impacts on biodiversity, to help target and prioritise adaptation responses;
- Adaptive management practices, including reviewing the effectiveness of the Queensland Biodiversity Strategy to reflect improved knowledge of climate change impacts;
- Shifting from an environmental to a mainstream economic issue by developing a better understanding of ecosystem services risks and economic implications of biodiversity loss;
- Harnessing carbon market investment to support ecosystems adaptation.

The Queensland Government's current and future work program can help ensure that spending from the Commonwealth Government's \$946 million Biodiversity Fund in Queensland can be targeted to maximise adaptation outcomes.

The Inquiry's terms of reference call for submissions to identify nationally important ecosystems. The following UNESCO world heritage listed sites are clearly of national and international significance, and warrant specific consideration by the Standing Committee on Climate Change, Environment and the Arts:

- The Great Barrier Reef;
- The rainforests of Queensland's Wet Tropics;
- Fraser Island;
- The Gondwana Rainforests of Australia.

The Queensland Government welcomes the work of the Committee in this area and eagerly awaits the

findings of the Inquiry.

Key Issues for Queensland

1 Introduction

Queensland is Australia's most naturally diverse state and is home to an outstanding diversity of terrestrial and marine ecosystems, from the well-known Wet Tropics and Fraser Island World Heritage rainforests, to the desert floodplains of the Channel Country, and the iconic Great Barrier Reef. Around 1350 ecosystems support 70 per cent of Australia's mammals, 80 per cent of its native birds and more than 50 per cent of its native reptiles, frogs and plant species. Queensland's plants are unique, with 45 per cent of all plant species found nowhere else on earthⁱ.

The value of this biodiversity, both its intrinsic natural value and the ecosystem services it provides, is fundamental to Queenslanders' wellbeing and quality of life, and the ongoing health of the state economy. Of Queensland's diverse ecosystems, some 222 are currently listed as endangered and 561 as vulnerableⁱⁱ. The Queensland Government recognises the immediate and long-term threat climate change poses to much of this natural value, and takes very seriously the task of addressing and minimising its impact.

2 Overview of climate risks to biodiversity

Climate change is predicted to cause widespread decline in biodiversity, both as a direct result of climate-driven changes and through interactions with existing biodiversity stressors. The IPCC (2007) has predicted that climate change will result in a significant loss of biodiversity in some ecologically rich sites by 2020, including the Great Barrier Reef and the Wet Tropics. In addition to biodiversity loss, climate change will drive significant changes within ecosystems and across the Queensland landscape.

2.1 Changes in average environmental conditions

Biodiversity decline in Queensland's terrestrial and freshwater aquatic ecosystems will be driven by changes in average environmental conditions, including changes in temperature, rainfall patterns and levels of atmospheric carbon dioxide. Marine ecosystems will be affected by changes in water temperature, circulation patterns, water chemistry (for example, pH, salinity and/or nutrient supply), sea level, tropical cyclones and sources of climatic anomalies such as ENSO eventsⁱⁱⁱ. Riparian, littoral and estuarine ecosystems will be affected by a combination of these changes, and other factors such as sea level rise.

For the majority of biological systems, changes in long-term average environmental conditions may affect individual organisms (physiology), timing of life cycles (phenology), population processes (birth and death rates), shifts and changes in distribution (dispersal and shifts in geographic range) and potential for adaptation (rapid evolutionary change).

2.2 Interactions with non-climate stressors

In addition to its direct impacts on ecosystems, climate change is expected to compound the impact of non-climate stressors on terrestrial, freshwater aquatic and marine ecosystems. Key non-climatic drivers of biodiversity decline in terrestrial ecosystems include land clearing, pollution and invasive species. Non-climate stressors in marine environments include degraded water quality, habitat loss and overexploitation of marine resources.

2.3 Species loss and ecosystem changes

The unique responses of different species to climate change mean that many ecosystems and communities might change in ways that we currently cannot predict. It is quite clear that climate change will cause local extinctions in some areas and the establishment of new species from other areas, thereby changing community composition, species interactions and species distribution. As the ecological interactions and geographical range of species change, a significant number of species will be at increased risk of extinction^{iv} and a number of novel ecosystems will emerge.

All these impacts and changes ultimately diminish the resilience of affected ecosystems - that is, their ability to naturally adapt to change. The IPCC (2007) predicts that the resilience of many ecosystems is likely to be exceeded this century, resulting in major changes in the structure and function of ecosystems and potentially putting at risk the ecosystem services they provide.

The range of climate-driven risks to ecosystems is fairly well established, and it is broadly recognised that these risks are significant even if the average global temperature increase is limited to 2 °C. However, development of appropriately targeted responses is contingent upon a better understanding of the likely extent of the various impacts, and the spatial and temporal extent of ecological impacts remains highly uncertain, both within and among the range of possible climate outcomes.

2.4 Extreme weather events

The impact of long-term ecosystem stressors is expected to be punctuated by increasing impacts of intermittent extreme weather events and natural hazards, such as heatwaves, droughts, fires, cyclones and floods. These periodic events can result in dramatic local effects on biodiversity, and might have a greater long-term impact on the structure and function of ecosystems than changes in average conditions.

3 Existing strategies and actions to enhance adaptive capacity

Adaptation to the impacts of climate change on our natural environment essentially relies on our ability to improve the resilience of ecosystems to the changes that will inevitably occur. The Queensland Government has developed a number of strategies, policies and initiatives to improve the resilience of our natural environment to the future impacts of climate change.

3.1 Vegetation management reform

Major reform of Queensland's vegetation management legislation in 2004 phased out broadscale land clearing by the end of 2006, which had previously been identified as the most significant driver of terrestrial biodiversity loss in Queensland. In addition to significantly reducing Queensland's greenhouse gas emissions, this reform laid the necessary foundations for further initiatives to build the resilience of Queensland's natural environment.

3.2 Expanding the protected area estate

The Queensland Government has committed to expand Queensland's national park estate to 7.5 per cent of the state's land area by 2020, and to expand the protected area estate to 20 million hectares. Funding is provided through the *NatureAssist* Program to support landholders in managing and protecting biodiversity in nature refuges, which are managed

under conservation agreements and contribute to the expansion of the protected area estate. Conservation agreements entered under the *Delbessie Agreement* also provide benefits for rural leaseholders and promote sustainable management of rural leasehold land. Long-term protection of these areas that retain high biodiversity value will improve connectivity across the landscape, provide vital refugia for dislocated species and improve the resilience of ecosystems to climate change impacts.

3.3 Great Barrier Reef protection measures

The Queensland Government has worked cooperatively with the Commonwealth Government in developing the Great Barrier Reef Water Quality Protection Plan 2009, which outlines actions to minimise non-point source pollution (such as nutrients, pesticides and sediment) from broadscale land use and reduce the entry of those pollutants to the reef. The Queensland Government has also recently developed the *Draft State Planning Policy: Protecting Wetlands of High Ecological Significance in Great Barrier Reef Catchments* to protect freshwater wetlands of high ecological significance in the catchments of the reef, which are integral in slowing down and filtering run-off that may contain harmful nutrients and sediment.

Minimising existing stressors on ecosystems will be an important part of our adaptive response to climate change, and this is particularly the case in relation to marine ecosystems where more direct management and adaptation options are not available.

3.4 Improved Fire Management in National Parks

Through the *Improved Fire Management in National Parks* initiative, the Queensland Government is investing an additional \$6.5 million to enhance the planned burn program by incorporating climate change projections.

This initiative aims to better utilise one of the most valuable tools for managing fire-adapted ecosystems and habitats for threatened species. It will also identify ecosystems vulnerable to fire in hotter and drier conditions and implement appropriate burning regimes. Managing wildfire is important for reducing the risk to public safety and private property.

3.5 Building Nature's Resilience: A Draft Biodiversity Strategy for Queensland

Central to conservation management in Queensland is *Building Nature's Resilience: A Draft Biodiversity Strategy for Queensland*. The draft Biodiversity Strategy articulates Queensland's plan for conserving biodiversity, with a central focus on building the resilience of species, ecosystems and ecological processes.

While it recognises the general threat climate change poses to Queensland's ecosystems, it also identifies the need to develop a more comprehensive scientific understanding of the likely impacts of climate change on Queensland's biodiversity, as a basis for developing and prioritising actionable adaptation policies.

To this end, the Premier's Council on Climate Change (an independent advisory on climate change policy issues) is developing a working paper that will review the science on the likely impacts of climate change on biodiversity, ecosystems and landscapes across Queensland, and make recommendations to government based on its findings.

3.6 Climate Change Corridors for Biodiversity

The *Climate Change Corridors for Biodiversity* initiative will target the protection and management of landscape corridors, by identifying areas of high potential biodiversity value and restoring vegetation. Protecting and managing biodiversity corridors will be critical to helping ecosystems and wildlife adjust and cope with climate change, and reconnecting fragmented ecosystems will help build resilience to climate change impacts. This initiative will help meet the goals of expanding the protected area estate.

4 Further opportunities to enhance adaptive capacity

The Queensland Government's response to ecosystem adaptation can be enhanced by developing a better understanding of the impacts of climate change on our natural environment, ensuring land management practices incorporate the most current understanding of these impacts, and ensuring the economic risks and opportunities associated with climate change are fully recognised in government decision making. The Queensland Government's current and future work program can help ensure that spending from the Commonwealth Government's \$946 million Biodiversity Fund in Queensland can be targeted to maximise adaptation outcomes.

4.1 Improved knowledge base for current initiatives

The draft Biodiversity Strategy highlights that further research is required into the impacts of climate change on Queensland biodiversity, to inform biodiversity management generally and to provide a sound basis for adaptive action. For example, it is widely accepted that expansion of protected biodiversity refugia and corridors will benefit biodiversity adaptation in general terms, but there is a real need to better understand likely environmental changes that will affect the efficacy and viability of such initiatives in coming decades. An improved understanding of future environmental conditions at a finer scale will assist the selection and location of biodiversity refugia and corridors to optimise resilience and adaptation outcomes.

4.2 Adaptive management practices

Improved understanding of the impacts and ecosystem responses to climate change also has the potential to greatly enhance existing management practices, and help shift from current paradigms of static ecosystem management to the more dynamic approach that will be necessary in a changing climate. Adaptive management of biodiversity, as proposed by the draft Biodiversity Strategy, must involve continuous adjustment of management practices to reflect and incorporate the most current and reliable information available on climate change impacts.

4.3 Ecosystem services risks and economic implications

Current understanding of the likely impacts suggests extensive species loss and ecosystem change on large scales is a real possibility. In this light, future research should shift from a traditional focus on individual species and ecosystem impacts to better address the whole-of-landscape implications of climate change, as adaptation action at this scale must be considered. The threat that climate change poses to healthy natural landscapes should be better understood in terms of the ecosystem services and economic benefits they provide, such that these considerations can be better incorporated into whole-of-government decision making.

4.4 Harnessing carbon market investment to support ecosystem adaptation

The establishment of a national carbon market and the Commonwealth Government's *Carbon Farming Initiative* is likely to provide a significant future source of investment for reforestation, which if properly managed, represents a unique opportunity to restore biodiversity, build ecosystem resilience and provide a range of ecosystem services. A substantial body of work is underway to realise the potential co-benefits of ecosystem recovery and biosequestration initiatives. Mechanisms should be further developed to ensure that carbon forestry projects are located and designed to optimise ecosystem adaptation outcomes and are resilient to future climate change. This will ensure that funding available under the Commonwealth Government's Biodiversity Fund can be targeted for optimal adaptation outcomes in Queensland.

ⁱ Queensland Government, Environmental Protection Agency, 2008. *State of the environment Queensland 2007*. Queensland Government, Brisbane, Australia

ⁱⁱ Queensland Department of Environment and Resource Management, 2010. *Climate Change in Queensland: What the Science is Telling Us*.

ⁱⁱⁱ Munday, P.L., Leis, J.M., Lough, J.M., Paris, C.B., Kingsford, M.J., Berumen, M.L. and Lambrechts, J. 2009. *Climate change and coral reef connectivity* Coral Reefs, vol. 28, pp. 379–395.

^{iv} Intergovernmental Panel on Climate Change, 2007, Climate change 2007: the physical science basis. Contribution of working group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core writing team, Solomon, S., Qin, D., Manning, M., Chen, Z., Marquis, M., Averyt, K.B., Tignor, M., and Miller, H.L. (eds)], IPCC, Geneva, Switzerland.