Submission 057
Date received: 05/08/2011

australian network of environmental defender's offices

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

5 August 2011

The Australian Network of Environmental Defender's Offices (**ANEDO**) consists of nine independently constituted and managed community environmental law centres located in each State and Territory of Australia.

Each EDO is dedicated to protecting the environment in the public interest. EDOs provide legal representation and advice, take an active role in environmental law reform and policy formulation, and offer a significant education program designed to facilitate public participation in environmental decision making.

Contact Us
EDO ACT (tel. 02 6247 9420)
edoact@edo.org.au

EDO NSW (tel. 02 9262 6989)
edonsw@edo.org.au

EDO NQ (tel. 07 4031 4766)
edonq@edo.org.au

EDO NT (tel. 08 8981 5883)
edont@edo.org.au

EDO QLD (tel. 07 3211 4466)
edoqld@edo.org.au

EDO SA (tel. 08 8410 3833)
edosa@edo.org.au

EDO TAS (tel. 03 6223 2770)
edotas@edo.org.au

EDO VIC (tel. 03 8341 3100)
edovic@edo.org.au

EDO WA (tel. 08 9221 3030)
edowa@edo.org.au

Submitted to:

The Secretary
House of Representatives Standing Committee on Climate Change, Environment and the Arts

By email: ccea.reps@aph.gov.au

Executive Summary

ANEDO welcomes the opportunity to provide comment to the House of Representatives Standing Committee on Climate Change, Environment and the Arts Committee Inquiry into Australia's biodiversity in a changing climate.

The inquiry is welcome recognition of the fact that Australia's biodiversity, already under threat from a wide range of stressors – such as destruction and fragmentation of habitat, invasive species, changes in disturbance regimes, and over-exploitation of native species - now faces a further threat from a rapidly changing climate.[1] Indeed, climate change is expected to become the first or second greatest driver of global biodiversity loss over the next century.[2]

Reflecting our interest and expertise, our submission largely addresses the following terms of reference:

- **Whether current governance arrangements are well placed to deal with the challenges of conserving biodiversity in a changing climate; and**
- **Mechanisms to promote the sustainable use of natural resources and ecosystem services in a changing climate.**

The impacts of climate change raise serious concerns about the adequacy of existing biodiversity conservation regimes to effectively protect biodiversity in the current context. Much of our current approach to conserving biodiversity in Australia reflects an asset based approach to biodiversity conservation and land management and is based on a static notion that the fundamental character of biodiversity being protected in any area will remain essentially the same over time.[3] However biodiversity conservation under a rapidly changing climate will require new ways of thinking that acknowledge the likely changes and uncertainties of climate change impacts on species and ecosystems. It will require a governance framework focused on managing and responding to a dynamic system.

Furthermore, changes in biodiversity will have far-reaching impacts for natural resources and ecosystem services essential to human well-being. To ensure that natural resources and ecosystem services such as clean water and clean air are guaranteed for the benefit of all in the future, it is essential that use of natural resources and ecosystem services is sustainable. A robust sustainability framework is necessary to guide use and management in the long term.

We note that reducing the threat of climate change to biodiversity, and therefore the viability of critical resources and services, will require both effective mitigation and adaptation strategies. We support Commonwealth and State Governments taking rapid mitigation action to reduce emissions. In line with the focus of the inquiry, this submission focuses solely on adaptation strategies for biodiversity conservation.

---

[1] Auld TD and Keith DA 2009, 'Dealing with threats: integrating science and management', Ecological Management and Restoration, 10(S1): S79-S87.

[2] Heller N and Zavaleta E (2009) 'Biodiversity management in the face of climate change: A review of 22 years of recommendations' *Biological Conservation* 142: 14-32; ; Sala et al, 'Biodiversity – global biodiversity scenarios for the year 2100' *Science* 287, 1770-74.

[3] Dunlop, M and Brown p (2008) 'Implications of climate change for Australia's National Reserve System: A preliminary assessment.' Report to the Department of Climate Change, February 2008. Department of Climate Change, Canberra, Australia.

In June 2009 EDO NSW recently produced a comprehensive discussion paper, *Climate change and the legal framework for biodiversity protection in Australia: a legal and scientific analysis,* evaluating the current legal regime at the Federal level and its adequacy to protect biodiversity under climate change. ANEDO has also previously addressed the appropriateness of the Commonwealth environmental law regime for dealing with climate change and other emerging pressures in numerous submissions to the Commonwealth government; most recently in our submission to the ten year review of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). We have incorporated much of what we have previously advocated in these papers in this submission, however the discussion paper and submission can be accessed from the EDO NSW website (http://www.edo.org.au/edonsw/site/publications.php) and the ANEDO website (http://www.edo.org.au/policy/policy.html) respectively.

Part one of this submission sets out the predicted impacts of climate change on biodiversity. **Part two** outlines emerging scientific principles for conserving biodiversity under a changing climate. Measured against these principles, **part three** analyses the adequacy of current governance arrangements to deal with the challenges of conserving biodiversity under climate change and provides recommendations for legislative and policy reform necessary for the conservation of biodiversity in the current context. **Part four** considers the increased use of ecologically sustainable development principles as a mechanism to promote sustainable use of natural resources and ecosystem services.

Summary of Recommendations

1. Conservation goals

- Facilitate national debate on the appropriateness of our current approach to biodiversity conservation under climate change.
- Maintain the aspirational conservation goals of seeking to protect all species from extinction.
- Ensure that conservation goals reflect the realities of climate change by incorporating new objectives specifically referring to strengthening ecosystem resilience and facilitating adaptation and the use of adaptive management principles.

2. Protected areas

- Greater funding and resources should be provided to ensure that the implementation of the National Reserve System (NRS) framework occurs at a faster rate.
- The design of the reserve system should focus on building resilience to climate change.
- 'Threat' should be identified as a criterion in the process to prioritise what areas should be protected under the NRS framework. Identification of climate refugia and key migration corridors should also be a priority.
- Climate change considerations should be explicitly included in management tools. In particular, management plans for protected areas should be amended to include strategies that build resilience and manage for uncertainty in light of climate change.

- Adaptive management should be used as a management framework of all protected areas and barriers to the effective implementation of adaptive management frameworks across the reserve system should be identified.

3. Threatened species listing

- Broaden species protection by greater focus on ecosystems and habitats as well as single species at risk.
- The EPBC Act should be amended to enable the listing of 'key functional species'; populations of species; and species not currently threatened but likely to be vulnerable to climate change.
- The definition of 'native' under the EPBC Act should be amended to accommodate circumstances of species moving in response to climate change
- The Species Scientific Committee should have a greater role in listing decisions.

4. Threatening processes and threat abatement planning

- A greater focus should be given to threat abatement planning
- Threat abatement efforts should focus on sets of threats that overlap and interact to affect large numbers of species.

5. Critical habitat

- The definition of critical habitat under the EPBC Act should be amended to encompass areas essential for the conservation of threatened species and communities, even though the area is not presently occupied by the species or community.

6. Landscape-scale assessment and planning

Landscape-scale assessment could be improved by:

- Requiring the Minister to be satisfied that a policy, plan or program meets the 'improve and maintain' test before granting approval.
- In deciding whether the 'improve and maintain' test is satisfied, require the Minister to be satisfied that areas of high conservation value for listed threatened species and ecological communities are protected, and any loss of other areas of less value for listed species and ecological communities is offset in accordance with offset rules.
- Inclusion of a discretionary mechanism which allows the Minister to override the above rules in circumstances where the Minister is of the opinion that a better outcome could be achieved by departing from the rules.
- Facilitating the adaptation of biodiversity to climate change should form a key component of any bioregional plans made.

7. Conservation on private land

- Barriers to the up-take of different schemes should be identified and addressed.
- The objectives and rules of different schemes should be better coordinated so that conservation investment on private land is more effectively targeted.
- Greater incentives should be provided for the restoration of land, including land that is not necessarily of high conservation value currently.

- More flexible schemes should be developed to broaden options for private conservation, including short-term schemes.
- A native vegetation trigger should be introduced under the EPBC Act to enable the Commonwealth government to take a lead role in halting broad-scale clearing of native vegetation across Australia.

8. Resources

- The conservation of biodiversity must remain a fundamental principle in all adaptation and mitigation response to climate change.
- Ongoing funding for biodiversity conservation should be made available to allow for the effective utilisation of legislative conservation tools.

9. Recommendations of the Hawke Review

- The Government should release its response to the Hawke review without delay.
- The Government should implement the recommendations of the Hawke review aimed at addressing adaption issues under the EPBC Act, including adding 'ecosystems of national significance' as a matter of national environmental significance.

10. Promoting sustainable use of natural resources and ecosystems

- Strengthen the recognition of ecologically sustainable development principles by amending relevant natural resource legislation to make it a primary consideration and require decision-makers to act consistently with the principles.

1. Predicted impacts of climate change on biodiversity

It is well documented that climate change is already impacting Australia's biodiversity, and that further significant impacts are expected as the climate continues to change. What is most remarkable is that significant impacts are already being observed under the modest level of change observed thus far in comparison to future projected changes.[4]

Climate change threatens biodiversity both directly, through impacts from changes such as rising temperatures and sea levels, and indirectly, by exacerbating the impacts of existing and ongoing threats on biodiversity, and because of the complex interactions between them. Furthermore, climate change is predicted to impact on biodiversity through increased frequency and severity of extreme weather events such as droughts, heat waves, floods and storms. Climate change is expected to become a leading driver of biodiversity decline in the 21st century.[5]

[4] Biodiversity and Climate Change Expert Advisory Group, *Australia's Biodiversity and Climate Change: a strategic assessment of the vulnerability of Australia's biodiversity to climate change – summary for policy makers* (2009), p3.

[5] Heller N and Zavaleta E (2009) 'Biodiversity management in the face of climate change: A review of 22 years of recommendations' *Biological Conservation* 142: 14-32.

A number of scientific studies have assessed the impacts that climate change is already having on biodiversity and the likely impacts in the future.[6]

As summarised in EDO NSW's discussion paper, broadly, the likely biodiversity impacts of climate change are:

- Reductions and shifts in the geographic distribution of species
- Changes to the timing of species' lifecycle events
- Changes in population dynamics and survival
- Changes in the location of species' habitats
- Increase in the risk of extinction for species that are already vulnerable
- Increased opportunity for range expansion of invasive species
- Changes in the structure and composition of ecosystems and communities
- Changes in coastal and estuarine habitat due to rising sea levels

Species and ecosystems that are particularly vulnerable to the impacts of climate change are those with long generation times, low mobility, small or isolated ranges and low genetic variation.[7] Species already under threat due to restricted distributions and small population sizes are at great risk of becoming extinct.[8] Certain ecosystems have been identified as more vulnerable than others to the negative impacts of climate change such as coral reefs, alpine ecosystems, mangroves and wetlands.

2. Ecological principles for conserving biodiversity under climate change

While there is considerable uncertainty about the precise nature and extent of climatic impacts on biodiversity and varied predictions of actual responses, several principles have consistently emerged in the scientific literature as a basis for conserving biodiversity under a changing climate.[9]

Below we have identified some key principles that should underpin biodiversity management under the impacts of climate change. EDO NSW discusses these principles in detail in its discussion paper. We summarise them here.

A number of these principles are established conservation principles that should continue to be implemented, or implemented more effectively and urgently under a changing climate. The principles apply to both terrestrial and marine environments.

---

[6] Biodiversity and Climate Change Expert Advisory Group, *Australia's Biodiversity and Climate Change: a strategic assessment of the vulnerability of Australia's biodiversity to climate change – summary for policy makers* (2009), p5; Dunlop M and Brown P (2008) *Implications of climate change for Australia's National Reserve System: A preliminary assessment. Report to the Department of Climate Change* Department of Climate Change Canberra, Australia, p 59 and 124; Garnaut R, *The Garnaut Review 2011: Australia in the Global Response to Climate Change* (2011) 12.

[7] Howden, M., Hughes, L., Dunlop, M., Zethoven, I., Hilbert, D. and Chilcott, C (2003) *Climate change impacts on biodiversity in Australia,* Outcomes of a workshop sponsored by the Biological Diversity Advisory Committee, 1-2 October 2001, Commonwealth of Australia.

[8] Secretariat of the Convention of Biological Diversity (2003). Interlinkages between biological diversity and climate change. Advice on the integration of biodiversity considerations into the implementation of the United Nations Framework Convention on Climate Change and its Kyoto Protocol. Montreal, SCBD, 154p. (CBD Technical Series no. 10).

[9] A comprehensive review of scientific recommendations on biodiversity management and adaptation in the face of climate change can be found in Heller N and Zavaleta E (2009) 'Biodiversity management in the face of climate change: A review of 22 years of recommendations' *Biological Conservation* 142: 14-32.

2.1 Facilitating Adaptation

Species have historically responded to climate change using a combination of adaptation mechanisms – acclimatisation; migration/dispersal; and evolutionary adaptation.[10]

However, due to the projected rapid pace of current climate change, many species are unlikely to be able to migrate quickly enough and evolutionary adaptation may not be an option, particularly for those species already under threat.[11] In addition, the extent of existing pressures on biodiversity creates further complexities. For example, in many cases, migration to more suitable habitat is no longer possible due to extensive habitat loss and fragmentation.

As previously advocated by ANEDO and reiterated in the discussion paper prepared by EDO NSW, it follows that to reduce the impacts of climate change on biodiversity we should aim to facilitate adaptive responses by minimising disturbance to adaptation options as much as possible. The literature commonly classifies adaptation strategies into[12]:

- Resistance strategies - enhance the ability of species and ecosystems to remain unaffected by climate induced or other climate-exacerbated threats.
- Resilience strategies - enhance the ability of species or ecosystems to absorb or recover from disturbances induced or exacerbated by climate change.
- Transformative strategies - attempt to assist systems to a new state, or that are designed to protect a future state.

Building resilience by promoting diversity and flexibility within ecosystems is generally advocated in preference to resistance strategies.[13]

2.2 Enhancing Resilience

Resilience can be enhanced by:

- Ensuring that a diversity of ecosystem types is well protected (representation) in multiple examples (replication). If the biodiversity of a system is fully represented in multiple examples, the likelihood of losing entire ecosystems to a disturbance is substantially decreased.
- Maintaining large patches of habitat. Large patches of habitat are critical for their ecological value in maintaining populations of interior dwelling species, providing core habitat with less influence of edge effects and supporting a greater number of species than smaller patches of similar habitat.[14] Large patches are also integral to supporting large, genetically diverse populations.[15]

---

[10] Mackey B (2007) ' Climate change, connectivity and biodiversity conservation' in *Protected Areas: buffering nature against climate change. Proceedings of a WWF and IUCN World Commission on Protected Areas symposium, 18-19 June 2007, Canberra* (eds Taylor and Figgis), pp90-96, WWF-Australia, Sydney; Noss, R (2001) 'Beyond Kyoto: Forest management in a time of rapid climate change' *Conservation Biology* 15(3): 578-590.

[11] Heller N and Zavaleta E (2009) 'Biodiversity Management in the face of Climate Change: A review of 22 years of recommendations' *Biological Conservation* 142: 14-32.

[12] Poiani K.A et al 'Redesigning Biodiversity Conservation Projects for Climate Change: Examples from the Field' (2011) 20 *Biodiversity Conservation* 185.

[13] Heller N and Zavaleta E (2009) 'Biodiversity Management in the Face of Climate Change: A review of 22 years of recommendations' *Biological Conservation* 142: 14-32.

[14] Forman, R. (1995) 'Some general principles of landscape and regional ecology' *Landscape Ecology* 10(3):133-142; Fischer, J., Lindenmayer, D. and Manning, A. (2006) 'Biodiversity, ecosystem function, and resilience: ten guiding principles for commodity production landscapes' *Frontiers in Ecology and Environment* 4(2): 80-86.

[15] Lidenmayer, D. and Burgman, M. (2005) *Practical Conservation Biology*. CSIRO Publishing, Australia.

- Maintaining and improving connectivity between different types of habitat and different patches of habitat.
- Enhancing the ability of the broader landscape or matrix (those areas surrounding protected areas) to support species and ecosystems. It has long been recognised that protected areas alone are not adequate to protect biodiversity because they are too few, too isolated, not always adequately managed[16] and often not appropriately located.[17]
- Identifying and protecting climate refugia. These are key sites or refuge areas that are likely to provide important habitat allowing species to persist in the face of climatic stress.
- Protecting ecosystem structure and function, particularly 'key functional species'.[18] Ecosystem functionality and resilience depends on a dynamic relationship within species, among species and between species and their environment, as well as physical and chemical interactions within the environment.

2.3 Recognise and manage for uncertainty

Recognising that ecosystems change and the inherent and complex uncertainties of natural systems, scientists have long advocated that management within an adaptive framework is vital to enhancing the protection of biodiversity, particularly those ecosystems that are highly complex or poorly understood. [19]

Adaptive management is an iterative process that seeks to improve management by testing hypotheses and learning from the results, and then incorporating lessons learnt into future management actions. It is particularly useful in situation where there is high uncertainty regarding ecological processes.[20]

2.4 Prioritise conservation actions

It has long been the case that resources for biodiversity protection are limited, which has meant that government agencies often fail to provide adequate funding to manage the biodiversity that they are responsible for protecting.

Prioritisation currently occurs largely on the basis of conservation status,[21] that is, more funding is allocated to those species or ecological communities with the highest risk of extinction. However there are concerns within the scientific community about this approach. Spending the most money on the species with the highest extinction rate is

---

[16] Fischer J, Lindenmayer D and Manning A (2006) 'Biodiversity, ecosystem function, and resilience: ten guiding principles for commodity production landscapes' *Frontiers in Ecology and Environment* 4(2):80-86.

[17] Margules C, Pressy B (2000) 'Systematic conservation Planning' *Nature* 405: 243-253.

[18] For example, Walker B (1995) 'Conserving biodiversity through ecosystem resilience' *Conservation Biology* 9(4): 747-752.

[19] Holling CS (1978) *Adaptive Environmental Assessment and Management*. Blackburn Press, Caldwell, NJ; Walters C (1986) *Adaptive Management of Renewable Resources*. McGraw Hill, New York.

[20] Holling CS (1978) *Adaptive Environmental Assessment and Management*. Blackburn Press, Caldwell, NJ; Walters C (1986) *Adaptive Management of Renewable Resources*. McGraw Hill, New York; Climate Change Science Program (US) (2008): *Preliminary review of adaptation options for climate-sensitive ecosystems and resources.* A report by the U.S Climate Change Science Program and the subcommittee on Global Change Research. [Julius SH and West JM (eds), Baron JS, Griffith N, Joyce LA, Kareiva P, Keller BD, Palmer MA, Peterson CH, and Scott JM (Authors)]. U.S Environmental Protection Agency, Washington, DC, USA..

[21] Joseph L, Maloney R and Possingham H (in press) 'Optimal allocation of resources: a project prioritization protocol' *Conservation Biology*.

not the most efficient way of minimising species extinctions, because often these species will require significant resources with only a small chance of success. [22]

It has been recommended that to maximise conservation outcomes within a limited budget, prioritisation must take into account four factors: [23]

- species values (this could be defined by conservation status, evolutionary distinctiveness, social value, economic value, ecological function etc).
- cost of management (generally, all else being equal, a cheaper action should be prioritised over a more expensive action).
- benefit of management (this is the difference in outcomes with management taking place versus without management taking place).
- likelihood of success of management (generally, all else being equal, an action likely to succeed should be prioritised over an action likely to fail).

In addition, any prioritisation process needs to clearly establish the objective of the process and a timeframe over which the objective should be achieved.[24]

3. Adequacy of the Commonwealth regime for conserving biodiversity under climate change

In this part we discuss the adequacy of key aspects of the existing biodiversity conservation regime at the national level in conserving biodiversity under a rapidly changing climate.

Given the breadth and complexity of the issue, it is not possible for this submission to consider the implications of climate change on every aspect of current governance arrangements that affect biodiversity. We focus on what we consider to be priority areas to deal with the challenges of conserving biodiversity in a changing climate. The issues discussed are largely governed under the Commonwealth's principle piece of biodiversity conservation legislation, *the Environment Protection and Biodiversity Act 1999* (EPBC Act).

Our analysis demonstrates that while a number of key mechanisms for conserving biodiversity under the current regulatory framework are potentially useful for protecting biodiversity under climate change, the overall conclusion is that current mechanisms are not adequately designed or equipped to deal with the challenges of climate change on biodiversity. These mechanisms need to be revised to accommodate changes and uncertainties under climate change. We provide some suggestions for improvement.

3.1 Conservation goals

Given the significant threats faced by Australia's biodiversity together with the emerging threat of climate change, ANEDO considers that it is an appropriate time to evaluate the current approach to biodiversity conservation in Australia.

---

[22] Possingham HP, Andelman SJ, Burgman MA, Medellin RA, Master LL and Keith DA (2002) ' Limits to the use of threatened species lists' *Trends in Ecology and Evolution* 17(11): 503-7.

[23] Joseph L.N et al 'Optimal Allocation of Resources Among Threatened Species: Project Prioritization Protocol' (2009) 23(2) *Conservation Biology* 328; Briggs S (2009) ' Priorities and paradigms: directions in threatened species recovery' Online early: http://www3.interscience.wiley.com/journal/119881249/issue

[24] Joseph, above n 42; Briggs S (2009) ' Priorities and paradigms: directions in threatened species recovery' Online early: http://www3.interscience.wiley.com/journal/119881249/issue

Currently, we have a snapshot approach to conserving species and ecosystems as they are, and where they are. It is an approach based on identifying threatened species and focusing our efforts on managing these particular species as well as identifying important areas and seeking to preserve them as they are. For example, the EPBC Act aims to protect ecological communities, which are identified (amongst other ways) in terms of current species composition of the community, often in a particular location.[25]

As noted, the impacts of climate change on biodiversity are predicted to be significant, with species changing their geographic distributions and abundance, the alteration of ecosystem structure and function and significant extinctions likely to occur given the limitations of the natural adaption of biodiversity and the range of other threats that also exist. As a result, we need to reconsider the fundamental goals of biodiversity conservation. Conservation goals must be re-defined to recognise the likely changes, and to manage the uncertainty of future climates.

Some scientists argue that current overarching goals and legislative objectives which generally aim to protect all species from extinction and to prevent change to biodiversity will be impossible to achieve under climate change.[26] A recent report commissioned by the Australian Government observed that:

> Some …conservation aspirations may become conceptually difficult if not practically impossible (in a natural setting). For example, maintaining:
> - specific populations, communities or ecosystems in a given location,
> - particular communities and ecosystems anywhere,
> - species richness at a given location, or in a region, and
> - specific patterns of ecosystems at a landscape level[27]

The report proposes that the task under climate change is one of 'managing change to minimise loss' rather than 'preventing change' and in this context, suggests that the following two overarching conservation goals are appropriate;

- to facilitate natural changes in species and ecosystems, including natural adaptation to climate change
- to preserve elements of biodiversity that are both particularly valued and threatened.

ANEDO considers that debate on the appropriateness of the current approach to biodiversity conservation must be stimulated as a matter of urgency.

We make the following points:

- Aspirational goals and legislative objectives currently seeking to protect all species from extinction should be retained. The threats of climate change highlight the need and present an opportunity for a renewed commitment to the conservation of biodiversity. However, in light of the predicted impacts of climate change on biodiversity, and the potential for climate change to deleteriously affect all matters of national environmental significance, there is a need for conservation goals to explicitly reflect the realities of climate change. We should move beyond the narrowly

[25] *Environment Protection and Biodiversity Conservation Act 1999* s 366.

[26] Dunlop M and Brown PR (2008) *Implications of climate change for Australia's National Reserve System: A preliminary assessment. Report to the Department of Climate Change* Department of Climate Change Canberra, Australia; Climate Change Science Program (US) (2008): *Preliminary review of adaptation options for climate-sensitive ecosystems and resources.* A report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research. [Julius SH and West JM (eds), Baron JS, Griffith B, Joyce LA, Kareiva P, Keller BD, Palmer MA, Peterson CH, and Scott JM (Authors)]. U.S Environmental Protection Agency, Washington DC, USA.

[27] Dunlop M and Brown PR (2008) *Implications of climate change for Australia's National Reserve System: A preliminary assessment. Report to the Department of Climate Change* Department of Climate Change Canberra, Australia

focused single-species, 'preserve and conserve' model that is currently central to our biodiversity conservation regime to ecosystem or landscape based biodiversity protection. Conservation goals and legislative objectives should be updated to specifically address matters such as the need to promote ecosystem resilience and adaptive capacity and to recognise and adopt flexible management principles including adaptive management.

- Although decisions about our approach to biodiversity conservation under climate change involve ethical questions that should be informed by society, science plays an important role in informing the debate. Science should identify what changes are likely due to climate change, what sorts of overarching goals might be achievable, and what are the best ways of achieving these goals once set. For example, if the objective remains to protect all species from extinction, a key role for science will be to determine how to make the best use of limited resources to achieve this (i.e. prioritisation) which involves a range of scientific and economic questions.

Recommendations

- Facilitate national debate on the appropriateness of our current approach to biodiversity conservation under climate change.
- Maintain the aspirational conservation goals of seeking to protect all species from extinction.
- Ensure that conservation goals reflect the realities of climate change by incorporating new objectives specifically referring to strengthening ecosystem resilience and facilitating adaptation and the use of adaptive management principles.

3.2 Protected Areas

Protection and management of habitat is a central aspect of biodiversity protection in Australia. On public land, this is achieved through the declaration of protected areas. Certain conservation initiatives on private land that result in in-perpetuity protection of high conservation value land are also recognised as part of the protected area system.

The system of protected areas in Australia is known as the National Reserve System (NRS). The goal of the NRS, which was endorsed by all Australian jurisdictions, is to achieve a system of protected areas that is comprehensive, adequate and representative (CAR).

Associated with the CAR objectives are a number of key targets:

- Comprehensiveness - at least 80% of the number of extant regional ecosystems in each bioregion are represented in the NRS by 2010-2015.
- Adequacy - the need to secure an 'adequate' size and configuration of protected areas to provide long term protection and security for the natural and cultural values they support (no quantified target set).
- Representativeness - at least 80% of extant regional ecosystems in each sub-region are represented in the NRS by 2010=2020.

In addition, other priorities include the protection of critically endangered and endangered species and regional ecosystems in each sub-region.

All Australian governments have agreed on a set of minimum standards that must be met before a protected area can be included in the NRS. These include:[28]

- The area must be protected in perpetuity.
- The area must contribute to meeting the CAR goal of the NRS.
- The area must be able to be classified into one or more of the six IUCN protected area management categories.
- The area must be managed in a manner that is open to public scrutiny.

Protected areas under a changing climate

As noted, although there is considerable uncertainty about what the impacts of climate change on biodiversity will be, or how species and ecosystems will respond, many studies conclude that protected areas remain essential for the conservation of biodiversity under climate change.[29]

While historically, the design of protected area systems has not generally taken into account the impacts of climate change on biodiversity,[30] there is general agreement that the NRS, which aims to maximise the diversity of habitats protected, provides a robust framework for conserving biodiversity framework under a changing change. As noted, the CAR goals are based on sampling the diversity of ecosystem types (comprehensiveness) and the diversity within ecosystem types (representativeness) across geographic ranges.[31] Indeed, increasing protection of a full range of habitats is considered likely to be much more effective under climate change than approaches to habitat protection that solely target endangered species and ecosystems.[32]

The NRS currently includes over 9,000 protected areas and protects nearly 13% of Australia's land mass. It is made up of national parks, indigenous lands, private protected areas and land held by landholders under covenants.

Despite this, however, many of Australia's ecosystems are not adequately protected. A review undertaken by the Organisation for Economic Cooperation and Development in 2007 concluded that:

> The National Reserve System does not yet meet the test of being comprehensive, adequate and representative.

While all 85 bioregions have some representation, there are currently 34 regions where less than 10% of the area is reserved. Of the 403 subregions, 42 have no representation at all. This indicates that the CAR principles are far from being achieved, and the rate of reservation needs to increase dramatically, particularly given the challenges of climate

---

[28] Natural Resource Management Ministerial Council (2005) *Directions for the National Reserve System: A Parternship Approach* Department of the Environment and Heritage, Canberra.

[29] Heller N and Zavaleta E (2009) 'Biodiversity management in the face of climate change: A review of 22 years of recommendations' *Biological Conservation* 142: 14-32.

[30] Margules CR and Pressey RL (2000) "Systematic Conservation Panning" *Nature* 405 at pp 243-253.

[31] Hyder Consulting (2008) *The Impacts and Management Implications of Climate Change for the Australian Government's Protected Areas: Final Report*, Canberra, ACT: Department of the Environment, Water, Heritage and the Arts; Dunlop M and Brown PR (2008) *Implication of Climate Change for Australia's National Reserve System: A Preliminary Assessment. Report to the Department of Climate Change* Department of Climate Change, Canberra, Australia.

[32] Dunlop M and Brown PR (2008) *Implications of climate change for Australia's National Reserve System: A preliminary assessment. Report to the Department of Climate Change* Department of Climate Change Canberra, Australia

change. It has also been observed that, to date, reserve design does not systematically consider biodiversity change due to climate change.[33]

The ability of the NRS framework to protect biodiversity under climate change will depend largely on the ability to achieve the CAR goals within each bio-region. Therefore there is a need to improve the representation, comprehensiveness and adequacy of the NRS, as well as reserve design.

Establishment of protected areas

Adequacy

The challenge for the NRS under a changing climate is maintaining adequacy. Changes in the distribution and abundance of species, species interactions, habitat suitability and the nature of threats will affect the ability of protected areas to maintain long-term viability of populations. For example, if changes in species distributions occur existing protected areas may decrease in their effectiveness, as the species that are found within protected areas currently may be unable to live within those areas in the future. In general, climate change is likely to require greater effort to ensure current levels of adequacy are maintained for a given species.[34]

A number of strategies commonly suggested for addressing adequacy in light of climate change include:

- increasing the size of protected areas to ensure populations remain viable and to absorb higher levels of disturbance;
- increasing connectivity of areas
- decreasing threats
- complementary management of the surrounding matrix

Future resilience

While the principles of a comprehensive, representative and adequate reserve system remain critical and relevant, under a changing climate selection of protected areas needs to be more precisely focused on future resilience.

A key issue in relation to the current process under the NRS framework for prioritising what land should be protected is that the process does not appear to consider 'threats'.[35] Given that protected areas are often 'residual' to human requirements, we consider threat to be an important consideration in this process. Without its consideration, there is no way of determining whether an action to protect land is having a conservation outcome that is additional to what would have otherwise occurred.[36]

---

[33] Department of Sustainability, Environment, Water, Population and Communities, *National Reserve System Protected Area Requirements*, Department of Sustainability, Environment, Water, Population and Communities <ttp://www.environment.gov.au/parks/nrs/about/management.html> at 29 July 2011.

[34] Dunlop M and Brown PR (2008) *Implications of CLiamte Change for Australia's National Reserve System: A Preliminary Assessment. Report to the Department of Climate Change* Department of Climate Change, Canberra, Australia.

[35] Pressey B 92009) 'The Mis-Measure of Conservation: How Much Do We Find Out How Much Difference we Make?' Abstract, Fenner Conference on the Environment. Available at: www.landscapelogic.org.au/Fenner 2009.html

[36] This is the concept of 'additionality', which is an important concept that is applied in relation to both carbon offsetting and biodiversity offsetting under the NSW BioBanking scheme.

In addition to recognising threats, the design of the reserve system under a changing climate needs to focus on building resilience to climate change by increasing connectivity (through protection of key migration corridors) and identifying and protecting ecological processes and climate refugia.

As noted, refugia are critical habitats for the protection of biodiversity and their protection will become even more critical to building resilience and adaptive capacity for biodiversity under a changing climate. Identification of refugia and key migration corridors across bioregions should therefore be a key priority for the identification of proposed protected areas under the NRS.

Funding

The establishment of new protected areas will depend in particular on adequate funding to purchase and manage land and the availability of suitable land for purchase, which depends largely on the extent of clearing in a region.

The Australian government's commitment in of $180m over five years to accelerate the development of the NRS, partly in light on the challenges posed by climate change, is a welcome start.

Management of protected areas

Management plans

Although all the terrestrial Commonwealth reserves have a current management plan prepared,[37] the EPBC Act is currently not prescriptive enough in terms of the strategies that should be contained in management plans. As a result, climate change considerations have not been at the forefront of thinking when formulating these plans. The Australian government has commissioned two major reports into the management of protected areas to assess the impacts and management implications of climate change. Both these reports raise profound issues for the management of these areas in coming years, and demonstrate that climate considerations are not explicitly included in management plans.[38]

For example, the 2008 report, *The Impacts And Management Implications of Climate Change For The Australian Government's Protected Areas: Final Report,* found that:

> Existing management plans for protected areas should be amended to include strategies that build resilience and manage for uncertainty in light of projected climate change impacts.

As a result, the report recommended that management plans for protected areas should be amended to include strategies that build resilience and manage for uncertainty in light of projected climate change impacts. ANEDO supports the explicit inclusion of climate change considerations in both terrestrial and marine biodiversity management tools.

---

[37] Department of Environment, Water, Heritage and the Arts, Parks and Reserves. http://www.environment.gov.au/parks/parks/index.html

[38] Hyder Consulting (2008) *The Impacts and Management Implication of Climate Change for the Australian Government's Protected Areas: Final Report,* Canberra, ACT: Department of the Environment, Water, Heritage and The Arts; Dunlop M and Brown PR (2008) *Implications of Climate Change for Australia's National Reserve System; A Preliminary Assessment. Report to the Department of Climate Change* Department of Climate Change Canberra, Australia.

There should be mandatory requirements to incorporate assessments of climate change impacts and to focus on climate change adaptation.

Adaptive management

Furthermore, the effectiveness of current management strategies will become more uncertain as protected areas become subject to changes in biodiversity and the nature of threats. While many scientists argue that addressing existing threats is a key strategy to combat the impacts of climate change,[39] current management strategies that address existing threats may become less applicable and will need to be modified, or new, untested approaches implemented. It will become increasingly difficult to decide what new management strategies to try and decisions may be based less on existing experience and more on modelling and monitoring.[40]

Increasing uncertainty in relation to the management of protected areas under climate change strongly suggests the need to apply adaptive management frameworks to the implementation of management strategies, which deal explicitly with uncertainty.

Park managers will, however, require the legislative and institutional backing to adopt adaptive management approaches. Thus there is a clear need to identify and overcome the barriers to effective implementation such as lack of institutional support, high costs and lack of funding.[41]

One way to potentially create greater institutional support could be to incorporate adaptive management as a management principle under the EPBC Act. Management principles must be taken into consideration in preparing management plans under the Act.

Funding

In light of increasing management costs for the reserve system under climate change, it is essential that the budgets for national park management agencies are increased.

Recommendations

- Greater funding and resources should be provided to ensure that the implementation of the NRS framework occurs at a faster rate.
- The design of reserve system should focus on building resilience to climate change.
- 'Threat' should be included as a criterion in the process to prioritise what areas should be protected under the NRS framework. Identification of climate refugia and key migration corridors should also be a priority.
- Climate change considerations should be explicitly included in management tools. In particular, management plans for protected areas should be amended to include strategies that build resilience and manage for uncertainty in light of climate change.

[39] Heller N and Zavaleta E (2009) 'Biodiversity Management in the Fact of Climate Change: A Review of 22 Years of Recommendations' *Biological Conservation* 142 14-32.

[40] Dunlop M and Brown PR (2008) *Implications of Climate Change for Australia's National Reserve System: A Preliminary Assessment. Report to the Department of Climate Change* Department of Climate Change, Canberra, Australia.

[41] Boemann B et al (2007) 'Adaptive Management of Forest Ecosystems: Did Some Rubber Hit the Road' *BioScience* 57(2): 186-191; Climate Change Science Program (US) (2008): *Preliminary Review of Adaptation Options for Climate-Sensitive Ecosystems and Resources.* A Report by the U.S Climate Change Science Program and the Subcommittee on Global Change Research. [Julius SH and West JM (eds), Baron JS, Griffith B, Joyce LA, Kareiva P, Keller BD, Palmer MA; Lindenmayer D and Burgman M (2005) *Practical Conservation Biology*. CSIRO Publishing, Australia.

- Adaptive management should be used as a management framework of all protected areas and barriers to the effective implementation of adaptive management frameworks across the reserve system should be identified.

3.3 Listing of threatened species

The listing of threatened species and ecological communities is a central element of biodiversity conservation regimes around Australia, including for the protection of nationally significant species and ecosystems under the Commonwealth's EPBC Act.

Criticisms of focusing on threatened species as a basis for biodiversity conservation, however, have intensified in the past decade.[42] A key criticism has been that threatened species lists reflect a single-species approach to conservation, which often fails to adequately protect overall biodiversity, ignoring entire habitats and ecosystems. This criticism has been addressed to some extent in Australia by enabling the listing of ecological communities and key threatening processes. A further criticism of focusing on threatened species is that it may result in perverse outcomes for biodiversity in general. For example, a development that clears a large amount of habitat for non-listed species may be allowed to proceed, while a development that clears a small amount of habitat for threatened species may not be approved.[43]

Listing of threatened species under climate change

The problems identified above are likely to be exacerbated under a changing climate. Climate change will also raise additional issues associated with the listing process.

We make the following points:

- A focus on threatened species may not accurately reflect what needs to be done to protect overall biodiversity under a changing climate. For example, areas important for connectivity for a wide range of species may not be properly considered in decision-making without a relationship to threatened species. Thus there is a risk that attention may be diverted from resourcing other strategies to protect biodiversity under climate change.[44]

- While the listing of threatened species is often criticised for failing to protect overall biodiversity, the listing process provides a potential tool to protect key functional species and groups which play an important role in maintaining ecosystem functions. As noted, by better ensuring that ecological functions are maintained, we can maximise the number of species protected, including the many we have not yet identified.[45] This will be particularly important under a rapidly changing climate.

- The current listing process under the EPBC Act allows species to be listed on the basis of current conservation status. Species that are not currently threatened, but are likely to be become threatened in the future are not eligible to be listed.

[42] For example, see Rohlf D (1991) 'Six Biological Reasons Why the Endangered Species Act Doesn't Work- And What to Do About It' *Conservation Biology* 5 273-282.

[43] Possingham HP et al (2002) "Limits to the Use of Threatened Species List" *Trends in Ecology and Evolution* 17(11) at pp 503-7.

[44] Possingham HP et al (2002) "Limits to the use of Threatened Species Lists" *Trends in Ecology and Evolution* 17(11) at pp 503-7.

[45] Possingham HP et al (2002) "Limits to the use of Threatened Species Lists" *Trends in Ecology and Evolution* 17(11) at pp 503-7.

Therefore those species that are likely to be become threatened under future climates are not eligible to be listed. This could be addressed by enabling listing on the basis of vulnerability assessments or 'susceptibility traits'.[46]

- The listing of ecological communities, by reference to (amongst other things) community composition and location in a particular area may become problematic under a changing climate as communities expand, contract, change their nature, disassemble and re-assemble.[47]

- The EPBC Act currently does not allow for the listing of populations. Providing for the listing of populations would add flexibility to the process, which is likely to be required under climate change. For example, protecting populations at the limits of their range or disjunct or genetically distinct populations would provide a mechanism to protect advancing populations as they migrate in response to climate change (though the species itself would not be eligible for listing).

- Under the EPBC Act, only species native to Australia (present in Australia or an external territory before 1400) are eligible for listing.[48] This definition may become problematic in facilitating natural adaptation under climate change. For example, a species previously restricted to Papua New Guinea may move into Australia in response to climate change and establish a small population. Under the current definition of native, this species would not be eligible for listing under the EPBC Act, despite its tenuous hold in Australia.[49] (Implementation of this option would need to take into account the impact of the species on native species).

- The current listing process under the EPBC Act provides the Minister with broad discretion to decide on a theme for nominations and finalising the priority assessment list. As climate change is likely to increase the extinction risk of many species, we believe there is a key role for the Scientific Committee (and a more limited role for the Minister) in ensuring that nominations and assessment for threatened species listing focus on the areas of greatest need, such as groups of species particularly vulnerable to climate change or species that play a key role in ecosystem function.

Recommendations

- Broaden species protection by greater focus on ecosystems and habitats as well as single species at risk.
- The EPBC Act should be amended to enable the listing of "key functional species'; populations of species and species not currently threatened, but likely to be vulnerable to climate change
- The definition of 'native' under the EPBC Act should be amended to accommodate circumstances of species moving in response to climate change.
- The Scientific Committee should have a greater role in listing decisions.

[46] Bradshaw C et al (2008) "Threat or Invasive Status in Legumes is Related to Opposite Extreme of the Same Ecological and Life-history Attributes" *Journal of Ecology* at 96 869-883.

[47] Dunlop M and Brown PR (2008) *Implications of Climate Change for Australia's National Reserve System: A Preliminary Assessment. Report to the Department of Climate Change* Department of Climate Change, Canberra, Australia.

[48] *Environment Protection and Biodiversity Conservation Act 1999* s 528.

[49] Adam P (2009) 'Going with the Flow? Threatened Species Management and Legislation in the Eyes of Climate Change' *Ecological Management and Restoration* 10 ss 44-45.

3.4 Key threatening processes and threat abatement planning

As noted, a key impact of climate change will be the exacerbation of existing threats. Many scientists therefore argue that addressing existing threats is a key strategy to combat the impacts of climate change.[50]

The EPBC Act provides for the listing of key threatening processes. These are processes which threaten, or may threaten, the survival, abundance or evolutionary development, of native species, or ecological communities in that it adversely affects an already listed species or community, or because it might result in an unlisted species or community becoming listed.[51]

The Minister may decide whether to develop a threat abatement plan for key threatening processes.[52] Threat abatement plans provide for the research, management, and any other actions necessary to reduce the impact of a listed key threatening process on native species and ecological communities.[53]

Threat abatement planning provides an important mechanism for identifying and coordinating the management of threats at a broad scale.[54] A key characteristic of threatening processes is that they operate in ways that affect multiple species, usually simultaneously, and therefore actions to abate threats are likely to benefit multiple species.[55] Threat abatement planning is therefore an important tool for addressing conservation issues above the species level. That is, it moves beyond single-species approaches.

Threat abatement planning will remain a key mechanism to protect biodiversity under climate change. Many of the threats likely to be exacerbated by climate change such as invasive species, changes in fire regimes and changes in hydrology operate at a landscape scale, and can rarely be managed on a site by site basis.[56] As such climate change may increase the need to manage threats at a landscape scale. Threat abatement plans provide a good mechanism to coordinate threat abatement actions across regions and to target priority areas. Threat abatement planning also provides a mechanism to identify and focus on sets of threats that overlap and interact to affect large numbers of species (known as 'threat syndrome') which is likely to be more cost effective.[57]

Climate change does however present a number of challenges to the threat abatement planning process:

---

[50] Heller N and Zavaleta E (2009) 'Biodiversity Management in the Face of Climate Change: A Review of 22 Years of Recommendations' *Biological Conservation* 142 14-32; Heller N and Zavaleta E (2009) 'Biodiversity Management in the Face of Climate Change: A Review of 22 Years of Recommendations *Biological Conservation* 142 14-32; Reaser JK et al (2000) "Coral Bleaching and Global Climate Change: Scientific Findings and Policy Recommendations" *Conservation Biology* 14(5) at pp 1500-1511.

[51] Environment Protection and Biodiversity Conservation Act 1999, s188(4).

[52] Environment Protection and Biodiversity Conservation Act 1999, s270A.

[53] *Environment Protection and Biodiversity Conservation Act* 1999 s271.

[54] Mahon P (2009) 'Targeted Control of Widespread Exotic Species for Biodiversity Conservation: The Red Fox (*Vulpes vulpes)* in New South Wales, Australia *Ecological Management and Restoration* 10 s59-69; Downey P et al (2009) 'Weeds and Biodiversity Conservation: A Review of Managing Weeds under the New South Wales Threatened Species Conservation Act 1995' *Ecological Management and Restoration* 10 s79-87.

[55] Auld T and Keith D (2009) 'Dealing with Threats: Integrating Science and Management' *Ecological Management and Restoration* 10 s79-87.

[56] Burgman M et al (2007) 'Threats Syndromes and Conservation of the Australian Flora' *Biological Conservation* 134 73-82.

[57] Burgman M et al (2007) 'Threat Syndromes and Conservation of the Australian Flora' *Biological Conservation* 134 73-82.

- Unlike many other threatening processes, the development of strategies to combat the impacts of climate change on biodiversity are only just beginning and lack of knowledge and uncertainty poses a significant barrier to effective threat abatement.[58] Climate will exacerbate and change the nature of existing threats in ways that will be difficult to predict.

- While threat abatement planning is an effective tool to focus conservation efforts on the broad processes that cause species to decline and therefore is likely to benefit multiple species and be cost effective, some scientists caution against focusing too much on threat abatement plans at the expense of species-specific recovery plans. They argue that many species are affected by multiple threats and failure to abate all threats may not achieve a successful outcome at the species level.[59] Threat abatement plans are likely to work well in cases where one threat is causing the primary impact on many species and the control of that threat is feasible at a large scale.

Recommendations

- A greater focus should be given to threat abatement planning
- Threat abatement efforts should focus on sets of threats that overlap and interact to affect large numbers of species.

3.5 Critical habitat

The value of identifying and protecting habitat critical to the survival of species and ecological communities is well recognised.

The EPBC Act provides for the listing of habitat identified as critical to the survival of listed threatened species and ecological communities.[60] The provisions for listings only apply in Commonwealth areas.

However the critical habitat provisions of the Act have rarely been utilised, with critical habitat only being listed for five listed threatened species to date.[61]

Critical habitat under climate change

Critical habitat will remain an essential tool for conserving biodiversity under climate change. As noted, the protection of key sites important for the survival of specific threatened species or likely to provide refuge in the face of climate change is a key strategy for conserving biodiversity.

We note however that the impacts of climate change are likely to cause species' habitat to shift, which will lead to difficulties in defining critical habitat.

---

[58] Auld T and Keith D (2009) 'Dealing with Threats: Integrating Science and Management' *Ecological Management and Restoration* 10 s79-87.

[59] Priddel D and Carlile N. (2009) 'Key Elements in Achieving a Successful Recovery Programme: A Discussion Illustrated by the Gould's Petrel Case Study' *Ecological Management and Restoration* 10 ss97 102.

[60] *Environmental Protection and Biodiversity Conservation Act* 207A.

[61] See Department of Environment, Heritage, Water and The Arts register of critical habitat http://www.environment.gov.au/cgi-bin/sprat/public/publicregisterofcriticalhabitat.pl

The definition of critical habitat implies that for habitat to be declared critical, it must be current habitat for a threatened species, although there is some uncertainty over this. On this basis, critical habitat cannot be declared for land that is not current habitat for a threatened species or community, but is likely to be required by a threatened species or community in the future under climate change.

Similarly, there is uncertainty over whether buffer areas comprising non-habitat for a threatened species can be included in the area declared to be critical habitat. As noted, buffering important habitat (such as critical habitat) is likely to be an important strategy to conserve biodiversity under climate change.

We therefore consider that the definition of critical habitat should explicitly encompass areas essential for the conservation of threatened species or communities, even though the area is not presently occupied by the species or community.

This is the case in Queensland under the *Nature Conservation Act 1992* which defines critical habitat as:[62]

> An area of land that is considered essential for the conservation of protected wildlife, even though the area is not presently occupied by the wildlife.

The Hawke review supported the need for greater flexibility in the definition of critical habitat, particularly in instances where information may be limited, referring to a definition proposed by the Threatened Species Scientific Committee:[63]

> The geography/place necessary for the persistence of viable populations given plausible futures of impinging factors.

Recommendations

- The definition of critical habitat under the EPBC Act be amended to encompass areas essential for the conservation of threatened species and communities, even though the area is not presently occupied by the species or community.

3.6 Landscape-scale assessment and planning

As noted, landscape-scale management will become increasingly important under a changing climate. The EPBC Act allows the Commonwealth to engage on a landscape scale for protection of matters of national environmental significance through strategic assessments and bioregional plans. These mechanisms can facilitate an ecosystem approach, rather than looking at single species or habitats in isolation.

The Hawke review of the EPBC Act recommend expanded use of strategic assessments and bioregional planning as a means of moving to a more ecosystem or landscape based approach to biodiversity protection (discussed below).

Strategic assessment under climate change

[62] *Nature Conservation Act (Qld) 1992*, s13(2).

[63] Australian Government, *Report of the Independent Review of the Environment Protection and Biodiversity Act 1999,* October 2009 at para 5.18

The site-scale approach to conservation management, which tends to be directed at single threatened species or single developments or activity, has not worked well to date,[64] and is unlikely to do so under climate change. Under a site by site approach, decisions relating to actions are restricted to the site in question with limited scope to consider the impacts of an action on a broader scale. It can therefore be difficult to prove a single action will have a significant impact. Processes important for the protection of biodiversity under climate change such as connectivity cannot be properly considered in decision making. Furthermore, sites that are currently important to a given species may become less important to that species in the future under climate change.

Strategic assessment processes, which are predicated on a landscape scale assessment, offer the greatest potential for broader, macro-level consideration of regional and cumulative impacts and the ability to investigate issues across extended time-scales. This is particularly useful in regard to issues such as climate change, that require action now to mitigate but for which the full impacts may not be clear for a number of years into the future. Furthermore, strategic assessment processes allow key ecological principles for protection of biodiversity under climate change, such as increasing connectivity and representation, to be considered in land-use planning processes, thereby achieving more for biodiversity conservation than site based assessment.

However, given the consequences of strategic assessments, in that no further environmental assessment is required for individual sites, the process must be subject to robust and strict criteria. We caution that the extent to which strategic environmental assessment will provide adequate protection of biodiversity across the landscape will depend on the criteria considered and the process of assessment. There is a danger that if not done properly, strategic assessment will instil a much lower level of environmental protection than a site by site approach. This has already been observed in the Regional Forest Agreement process which has clearly failed in its protection of biodiversity.

We note a number of concerns with respect to the current strategic assessment process:

- Under the current provisions of the Act the Minister has wide discretion in deciding whether to grant approval to a policy, plan or program. Though the Minister's discretion is limited to some extent by the requirement not to act inconsistently with various international conventions and domestic policies. We note, however, with the exception of recovery plans, which contain relatively specific provisions, the factors limiting the Minister's discretion are primarily broad principles, which are often difficult to interpret and apply to specific situations.

- There is no clearly defined standard or level of protection that the Minister must be satisfied of prior to granting approval to a policy, plan or program.

- There are no guidelines that define the appropriate level of environmental information required to properly undertake a strategic assessment.

- Our ability to undertake landscape-scale assessments to ensure the protection of biodiversity is currently limited and subject to much uncertainty. Climate change is likely to significantly increase this uncertainty. For example, it will require us to focus less on planning for biodiversity pattern (the elements of biodiversity that can be

[64] Bubna-Litic K (2008) "Ten Years of Threatened Species Legislation in NSW—What Are the Lessons?" in Jeffrey et al (2008) *Biodiversity Conservation, Law and Livelihoods: Bridging the North-South Divide* Cambridge University Press at pp 265-279.

mapped and are regarded as static in time and space) and more on planning for biodiversity processes (the things that maintain biodiversity such as pollination, predation etc).[65] However, planning for biodiversity processes is a relatively new and undeveloped concept.

ANEDO considers that the strategic assessment process could be improved by structuring the Minister's decision-making powers in making approvals. We propose that the Act establish criteria that the Minister must be satisfied are met before granting approval of a policy, plan or program under a strategic assessment process (with some allowance for discretion).

One possibility of a test to guide approval of a class of actions under an endorsed policy, plan or program is the 'improve and maintain' test used in NSW. Another is the 'no net loss' test used in Victoria. The Hawke review expressed preference for the 'improve and maintain' test because of its existing application to the biodiversity certification arena, its potential for exceeding the status quo through the concept of improvement and its applicability to the natural and cultural environment.[66]
In deciding whether the 'improve and maintain' test has been met, we submit that the Minister should be satisfied that:

- Areas of high conservation value for listed threatened species and ecological communities (with high conservation value areas clearly defined under EPBC regulation) are protected.
- Any loss of other areas of less value to listed threatened species and ecological communities is offset in accordance with offset rules (with offsetting rules in the context of the strategic assessment provisions clearly defined under EPBC regulation and in accordance with recognised offset principles such as those set out by Gibbons and Lindenmayer)[67].

However we recognise that due to the ecological complexity of landscape-scale assessment processes, it is unlikely to be possible to define a set of rules for determining high conservation value areas and offsets whose strict application will always achieve the best biodiversity outcome when applies across Australia. As such, we suggest that a discretionary mechanism be included under the Act, which allows the Minister to override the rules in circumstances where the Minister is of the opinion that a better outcome could be achieved by departing from the rules.

We note that despite the drawbacks of single species, site based assessments, they remain important under climate change. There is the potential for other factors to be considered in the site assessment process, including consideration of the scientific principles identified in the previous section. For example, consideration of the importance of the site for the adaptation of biodiversity under climate change such as a climate refuge or an important corridor.

---

[65] Pressey R, Cabeza M, Watts M, Cowling R, and Wilson K (2007) 'Conservation planning in a changing world' *Trends in Ecology and Evolution* 22(11): 583-592.
[66] Australian Government, *Report of the Independent Review of the Environment Protection and Biodiversity Act 1999,* October 2009 at p 86.
[67] Gibbons P and Lindenmayer D (2007) 'Offsets for land clearing: No net loss of the tail wagging the dog?' *Ecological Management and Restoration* 8:26-31.

Recommendations

Landscape-scale strategic assessment could be improved by:

- Requiring the Minister to be satisfied that a policy, plan or program meets the 'improve and maintain' test before granting approval.
- In deciding whether the 'improve and maintain' test is satisfied, require that the Minister be satisfied that areas of high conservation value for listed threatened species and ecological communities are protected; and any loss of other areas of less value for listed species and communities is offset in accordance with offset rules.
- Inclusion of a discretionary mechanism which allows the Minister to override the above rules in circumstances where the Minister is of the opinion that a better outcome could be achieved by departing from the rules.

Bio-regional planning

Bioregional plans are another landscape-scale planning tool available to the Commonwealth government under the EPBC Act.[68] Under the Act, the Minister may prepare a bioregional plan for a bio-region that is within a Commonwealth area, or may cooperate with a State or State agency or any other person in the preparation of a bioregional plan for a bioregion that is not wholly within a Commonwealth area.

The plans may include provisions relating to biodiversity and its conservation status, important economic and social values, heritage values of places, objectives relating to biodiversity and other values, priorities and strategies and actions to achieve the objectives, mechanisms for community involvement in implementation of the plan and measures for monitoring and reviewing the places.

As the Hawke review identified, one of the main benefits of the bioregional planning mechanism is that it allows the Commonwealth government to create an integrated framework for Commonwealth interests at a regional scale.[69]

Once a bioregional plan is made, the Minister must take it into account when making any decision under the EPBC Act to which the plan is relevant.[70]

While there are a number of marine bioregional plans at various stages of completion, no bioregional plans for terrestrial bioregions have been made under the Act.

As the Hawke review recognised, bioregional plans have the capacity to include ecological principles important for the protection of terrestrial biodiversity under climate change.[71]

We note, however, that bioregional plans have limited influence, being one of a number of factors that must be considered by the Minister when making decisions under the EPBC Act. Therefore, even if a plan provides strong statements and establishes

[68] EPBC Act s 176

[69] Australian Government, *Report of the Independent Review of the Environment Protection and Biodiversity Act 1999,* October 2009 at p 80.

[70] *Environment Protection and Biodiversity Conservation Act 1999* s 176.

[71] Australian Government, *Report of the Independent Review of the Environment Protection and Biodiversity Act 1999,* October 2009 at p80.

priorities to enable adaptation of biodiversity to climate change, these may not be translated to actual on ground protection and implementation through the EPBC Act.

Recommendation

Facilitating the adaptation of biodiversity to climate change should form a key component of any bioregional plans made.

3.7 Conservation on private land

As noted, it is increasingly being recognised that a landscape approach to biodiversity conservation is necessary; one that crosses all tenures. There is broad consensus that relying on public protected areas alone will not prevent biodiversity loss, and that we need to develop mechanisms which allow and encourage private land holders to protect vegetation and habitat on their land.

Significant amounts of land of potential conservation value are found on private property. For example, in Victoria 15 per cent of the State's threatened vegetation types are reliant on private land for their survival while another 35 per cent of threatened vegetation types occur largely on private land.[72] Furthermore, many threats to biodiversity take place on private land, such as agricultural practices, grazing and land clearing.

The protection of biodiversity on private land will be a vital strategy to protect biodiversity under climate change. As noted, combating the impacts of climate change will generally require a 'softening' of the matrix, increasing connectivity across landscapes, creation of buffers around sensitive areas, and the protection of a diversity of habitat types. All these strategies will require increasing the protection and management of biodiversity on private land.

There are a number of initiatives established at the Commonwealth and state level for the protection of biodiversity on private land. For example:

- Conservation agreements in perpetuity on whole or part of the land;[73]
- Acquisition programs by philanthropic or Trust bodies that may see the land join the NRS;[74]
- Assistance to purchase land for conservation;[75]
- Technical assistance in managing land for conservation;[76]
- Stewardship payments for the management of land for conservation;[77] and
- Tax incentives.[78]

---

[72] Commonwealth State of the Environment Report 2006 at http://www.environment.gov.au/soe/2006/publications/drs/indicator/111/index.html

[73] See, for example, *Environment Protection and Biodiversity Conservation Act 1990* s 305.

[74] See, for example, the Australian Bush Heritage Fund. Found at: http://bushheritage.org.au/ (17 February 2009).

[75] The Natural Heritage trust National Reserve System Program facilitates the establishment of Private Protected Areas, providing up to two thirds of the purchase price to assist voluntary land purchase in exchange for permanent protection of the land.

[76] Many schemes provide this. One such program is Land for Wildlife, which operates across Australia—for example, see: http://www.dse.vic.gov.au/DSE/nrepna.nsf/LinkView/34933B99F789EF0E4A25677800115944BA15AEEDADB3CA6C4A2567D600824A6C

[77] Section 305 (1)(e) of the *EPBC Act 1999* provides that conservation agreements may contain terms requiring the Commonwealth to provide financial, technical or other assistance to a person bound by the agreement.

[78] See, for example, *Income Tax Assessment Act 1997* s 31.5.

The Commonwealth plays a major role funding conservation programs through Caring for our Country but most private conservation programs operate under state legislation and are implemented at a regional level.

Conservation on private land, however, has always operated as a supplement to government efforts to protect biodiversity.[79] The take-up of programs at the Commonwealth level has been limited, although the situation seems to have improved in recent years, with greater government attention on facilitating and promoting private conservation initiatives. Nonetheless, take-up remains greater at the state level. For example, there are only 12 conservation agreements finalised under the EPBC Act.[80] In contrast, there are around 200 voluntary conservation agreements finalised in NSW.

Philanthropic organisations operating on a national scale have been relatively successful. For example, Bush Heritage Australia[81] owns and manages 31 reserves throughout Australia covering over 946,276 hectares in six states.[82]

We make the following points in relation to private conservation under climate change:

- There is a clear need to increase private land conservation schemes under climate change. This will require Commonwealth and state governments to address barriers to up-take of private land conservation schemes including lack of appropriate incentives and benefits, and the in-perpetuity nature of some agreements.

- Various schemes operate under different objectives and rules and therefore target investment on different types of land. There is likely to be a need to ensure greater coordination of private land conservation schemes to ensure that conservation investment on private land through the schemes is more strategically targeted. That is, when operating together, they are more likely to result in overall protection and management of private areas important for the protection of biodiversity under climate change.

- Climate change is likely to require significant investment in the restoration of degraded areas. As such, there is likely to be a key role for private land conservation schemes which allow for the protection and management of land that is not necessarily of high biodiversity value currently, but with restoration, is likely to be important for biodiversity under climate change. Examples of such initiatives include Biobanking agreements, Property Vegetation Plans and wildlife refuge agreements under NSW legislation.

- There may be a key role for more flexible schemes in the short term, such as wildlife refuge agreements under NSW legislation. While voluntary and binding while in place, a wildlife refuge declaration can be easily revoked and future landholders do not have to be bound by the agreement if they do not wish to be. Similarly, in Victoria, the Land for Wildlife scheme establishes a voluntary but non-binding agreement with landholders for land to be managed for biodiversity conservation.

---

[79] Young MD et al (1996) *Reimbursing the Future: An Evaluation of Motivational, Voluntary, Price-based, Property-right and Regulatory Incentives for the Conservation of Biodiversity at* p 145. Available online at http://www.environment.gov.au/biodiversity/publications/series/paper9/index.html

[80] http://www.environment.gov.au/epbc/anout/conservation-agreements.html#list

[81] A national not-for-profit organization that protects Australia's unique animals, plants and their habitats by acquiring and managing land of outstanding conservation value)

[82] http://www.bushheritage.org.au/

Upon registration a commitment is made to uphold the objectives of the scheme. It does not alter the legal status of property and therefore is not passed on to subsequent owners of the land. Such schemes may address the concerns of landholders interested in conservation but reluctant to commit to a binding scheme that forecloses the opportunity to participate in more financially beneficial schemes in the future.

- It is critical that legislation provides strong protection for areas of high biodiversity on private land. Remnant vegetation on private land forms and important component of biodiversity conservation. Few state legislative approaches adequately address ongoing use and management of vegetation remnants on private land. In light of this we consider that an important 'gatekeeper' role must be played by the Commonwealth in regulating assessment of significant land clearing proposals under the EPBC Act. Introducing a land clearing trigger under the Act would be one way for the Commonwealth government to take a leadership role in protecting native vegetation on a national scale.

Recommendations

- Barriers to the up-take of conservation initiatives should be identified and addressed.
- The objectives and rules of different schemes should be better coordinated so that conservation investment on private land is more effectively targeted.
- Greater incentives for the restoration of land should be provided, including land that is not necessarily of high conservation value currently.
- More flexible schemes should be developed to broaden options for private conservation, including short term schemes.
- A native vegetation trigger should be introduced under the EPBC Act to enable the Commonwealth government to take a lead role in halting broad-scale clearing of native vegetation across Australia.

3.8 Resources

Biodiversity conservation has historically been under resourced, leading to problems of implementation. This is evidenced by the disparity between the conservation tools available under various legislative schemes and their uptake and implementation. For example, at the national level, the Commonwealth has stepped back from making mechanisms such as recovery plans mandatory and moved to a discretionary planning approach, largely due to a failure to meet legislative requirements under the EPBC Act.

As noted, climate change will require more active management of protected areas with associated resource implications. Many of these costs will be taken from park budgets, but will be unrelated to biodiversity conservation, such as maintenance costs associated with fire frequency, cyclonic activity and extreme weather events.[83] Other costs will

[83] Hyder Consulting (2008) The Impacts And Management Implications Of Climate Change For the Australian Government's Protected Areas: Final Report, Canberra, ACT: Department of the Environment, Water, Heritage and the Arts at pp 52, 63, 81, 197, 215, 226, 235 and 244.

relate directly to biodiversity conservation such as research, monitoring and intensive management and ex situ initiatives.[84]

Resources for adaptation for the purposes of biodiversity conservation will have to compete for resources with other sectors, including within the 'adaptation budget', such as adaptation strategies around human settlements.

The establishment of an ongoing Biodiversity Fund (worth $948 million in the first 6 years) to support projects that deliver biodiversity and related environmental benefits under the Commonwealth government's carbon price package is very welcome recognition of the importance of protecting and valuing biodiversity as part of tackling climate change.

Recommendations

- The conservation of biodiversity must remain a fundamental principle in all adaptation and mitigation responses to climate change.
- Ongoing funding for biodiversity conservation should be made available to allow for the effective utilisation of statutory conservation tools.

3.9 Recommendations of the Hawke Review

The Hawke review of the EPBC Act addressed adaptation issues for biodiversity throughout the report. The report proposed that climate change adaptation issues be addressed by using regional and landscape approaches in addition to the current biodiversity management approaches, including expanded use of strategic assessments and bioregional planning;[85] considering emerging threats in decision making; and broader listing key threatening processes.[86]

A key recommendation in the report is that the EPBC Act include 'ecosystems of national significance' as a new matter of national environmental significance in addition to identified species and ecological communities. The inclusion of ecosystems as a matter of 'national environmental significance is intended to shift the focus of the EPBC Act from individual species and ecological communities to a landscape based approach.

ANEDO supports the above recommendations of the review.

The Government has not yet released a response to the Hawke review despite much energy and resources already being applied to the task. The Government should release its response without delay and begin to implement the recommendations contained in the review.

Recommendations

- The Government should release its response to the Hawke review without delay.

[84] Hyder Consulting (2008) The Impacts And Management Implications Of Climate Change For the Australian Government's Protected Areas: Final Report, Canberra, ACT: Department of the Environment, Water, Heritage and the Arts at pp xix, 92, 182, 189, 235 and 244.

[85] Hawke review, recommendation 6.

[86] Hawke review, recommendation 19.

- The Government should implement the recommendations of the Hawke review to aimed at addressing adaption issues under the EPBC Act, including adding 'ecosystems of national significance' as a matter of national environmental significance.

4. Mechanisms to promote sustainable use of natural resources and ecosystem services in a changing climate

A healthy, functioning environment provides invaluable natural resources and ecosystem services essential to human well being such as the food production and water supply. As noted, climate change impacts are expected to severely deteriorate biodiversity and thereby the availability of critical resources and services. The potential impacts of climate change add another layer of uncertainty and complexity to the task of managing those natural resources and ecosystems services which may already be under stress. For example, climate change could potentially reduce the amount of water available to all users of particular river systems.

To ensure that the resources and ecosystem services we depend on are guaranteed for the benefit of all in the future it is essential that the use of natural resources and ecosystem services is sustainable. Therefore a robust sustainability framework is necessary to guide use and management in the long term.

In order to effectively address the impacts of climate change ANEDO submits that all Commonwealth natural resource legislation should better incorporate and implement the principles of ecologically sustainable development (ESD). While the concept and principles of ESD is referred to in a various pieces of legislation at the Commonwealth level and across jurisdictions in Australia, it is often merely one of a number of considerations that decision makers need have regard to.[87] To better implement ESD would require strengthening of the legislation to ensure that decision-makers are required to consider and act consistently with or in accordance with the principles of ESD.

Ecologically sustainable development

Ecologically sustainable development is a long-standing and internationally recognised concept. The concept has been affirmed by the 2002 World Summit for Sustainable Development and has been recognised in Australia's *National Strategy for Ecologically Sustainable Development (1992).*[88] The concept was developed in response to a global realisation that rates of exploitation of natural resources are not environmentally sustainable. The overarching aim of ESD is therefore to achieve a level of development that meets the needs of the present without compromising the ability of future generations to meet their own needs.[89] In particular the concept of ESD attempts to make it clear that environmental impacts are no longer seen as separate from economic and social considerations.[90]

Considering the significant potential impacts of climate change, ESD must play a key role in decision-making relating to natural resources and ecosystem services. ANEDO

[87] For example ESD under the *Water Act 2007* (Cth) is one of a large number of decision-making considerations.
[88] http://www.environment.gov.au/about/esd/publications/strategy/index.html
[89] World Commission on Environment and Development, Our Common Future (1987) at 43.
[90] For example, see: The 2002 World Summit for Sustainable Development and the National Strategy for Ecologically Sustainable Development.

considers that ESD should be the guiding philosophy for natural resource and ecosystem service management. To that end, operationalising ESD as a means of addressing the impacts of climate change requires decision-makers to properly consider and implement the key principles of ESD.

We consider the following key principles of ESD to be relevant to climate change.

The precautionary principle –

The definition of the precautionary principle as accepted in the EPBC Act is:

> if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

Although there is now a large body of scientific evidence that demonstrates that human-induced climate change is already impacting on the planet,[91] as noted, there is significant uncertainty in predicting the precise consequences of climate change on weather conditions, biodiversity etc. This uncertainty triggers the precautionary principle and requires its consideration in the context of climate change.

The precautionary principle is therefore a critical principle for natural resource and ecosystem service management in order to prepare for the range of potential climate change impacts.

Inter-generational equity

The principle of intergenerational equity is acknowledgment of the need for the present generation to ensure that the integrity of the environment is not compromised for future generations. The EPBC Act expresses the principle as follows:

> That the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.[92]

This principle is particularly pertinent in relation to climate change. Climate scientists predict that the impacts of climate change will be felt even more intensely over the coming century, with anticipated temperature increases, in beast scenarios, of between 2 and 4 degrees by 2100 if greenhouse gases remain at current levels.[93] This will have significant impacts on future generations and will affect their amenity, standard of living, health and may also lead to displacement of millions of people. Therefore the current generation must adopt a caretaker role to minimise the impact of current activities.

ANEDO therefore considers that the principle of intergenerational equity must remain at the forefront of thinking when making decisions relating to use of natural resources and ecosystem services and climate affecting activities such as determining of water allocations.

---

[91] For example, see Intergovernmental Panel on Climate Change Fourth Assessment Report.
[92] *Environment Protection and Biodiversity Conservation Act 1999*, s3A.
[93]

Conservation of biological diversity

The conservation of biological diversity and ecological integrity is a central principle of ESD and should be a fundamental consideration in decision-making. As noted, climate change presents significant threats to biodiversity and thereby an ecosystem's ability to deliver goods and services for human well being.

In order to ensure that Australia's biodiversity is preserved, ANEDO considers that the principle of biodiversity conservation should be more consistently factored in when making decisions that may affect threatened species and their habitats.

Market mechanisms

A key element of ESD is the promotion of market mechanisms as a means of integrating environmental, social and economic considerations. Market mechanisms are particularly relevant in the context of climate change, as they can provide incentives to reduce greenhouse gas emissions at minimal cost and to encourage preservation and management of biodiversity.

The use of markets to place more appropriate prices on natural resources and ecosystem services can optimise environmental, social and economic outcomes.

Recommendations:

- Strengthen the recognition of ESD principles by amending relevant natural resource legislation to make it a primary consideration, and require decision-makers to act consistently with the principles.

For more information in relation to this submission please contact Nicola Rivers, Law Reform Director (EDO Vic), o or Nari Sahukar, Acting Policy & Law Reform Director (EDO NSW) on