Chapter 7

Other threats to the reserve system

7.1 This chapter will discuss a number of threats identified during the inquiry as matters of considerable community concern. Foremost amongst these was climate change. Land clearing, neighbours' management practices and mining are also discussed.

Climate change

7.2 Climate change was identified as a threat to protected areas in submissions by government authorities in every jurisdiction. Queensland, like others, noted the 'potentially serious impacts of climate change on terrestrial and aquatic biodiversity', while NSW rated it as a 'key threat' to conservation.[1] The WA Government acknowledged that climate change may require a strategic response informed by research:

> It is particularly important in the light of global changes, such as climate change, to also invest in the science base to gain a better understanding of changes and effective management actions.[2]

7.3 A number of submissions supported the call for more research into climate change. Professor Ralf Buckley told the committee:

> [Climate change] has not had a significant effect yet on protected areas in Australia or anywhere else. When it does, it will be through subtle mechanisms that will be hard to recognise at first. Research on those things is really only beginning. It is not at all well understood.[3]

7.4 The Department of the Environment and Water Resources noted that Parks Australia recognises the importance of climate change as a key management risk, and is proposing to prepare a discussion paper on the potential implications of climate change for the management of Commonwealth Reserves.[4] The Department has since advised the committee that they have entered into contracts for the assessment of potential impacts of climate change on the national reserve system and the Australian Government's protected areas (other than the Great Barrier Reef Marine Park), and the implications of these impacts for development and management of these areas.[5]

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1 Queensland Department of Premier and Cabinet, *Submission 175*, p. 27; NSW Department of Environment and Conservation, *Submission 155*, p. 29.

2 Department of Conservation and Land Management, Western Australia, *Submission 135*, p. 17.

3 *Committee Hansard*, 21 April 2006, p. 70.

4 Department of the Environment and Heritage, *Submission 126*, p. 15.

5 Australian Greenhouse Office, Department of the Environment and Heritage, personal communication with Committee Secretariat, 19 October 2006.

Current predictions and strategies

7.5 The impacts of climate change are expected to vary across the range of protected areas. For example, the principal concern in relation to Kakadu National Park is seawater intrusion to its extensive freshwater floodplains. In its submission, which draws upon information on the impacts of climate change in Australia prepared by the CSIRO,[6] WWF Australia notes that:

> A 2ºC to 3ºC rise in temperatures may result in the complete loss of freshwater wetlands in Kakadu, which would be inundated with salt water as a result of sea level rise.[7]

7.6 The Department of the Environment and Water Resources acknowledges the risk to freshwater floodplains, and advises that the draft 5th management plan for the Park provides for monitoring the effects of saltwater intrusion and for the implementation of actions and programmes, where feasible, that will mitigate against the impacts of saltwater on significant freshwater habitats.[8]

7.7 In relation to marine protected areas, climate change is one of the most challenging emerging issues, as it is now considered to be a real, serious and long-term threat to marine ecosystems.[9] A direct effect of rising sea temperatures is coral bleaching, which is expected to damage the Great Barrier Reef Marine Park, and other coral reefs. On the basis of CSIRO figures,[10] WWF Australia stated that:

> The most likely outlook for the Great Barrier Reef is that mass bleaching, leading to the death of corals, will become a more frequent event in Australian coral reefs in coming decades. A 2ºC warming is expected to bleach 95% of the reef leaving it devoid of coral and dominated by seaweed and blue-green algae.[11]

7.8 On a global scale, climate change appears to be exacerbating the cumulative effects of human impact on the world's oceans, permanently changing their chemistry and circulation systems. Mr Harold Adams told the committee that as the oceans 'absorb more and more carbon from the atmosphere, they are becoming more acidic

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6 Jones, R (2005), 'Recent Science – What is Dangerous Climate Change', Presented at Climate Action Network Conference, September 2005, Melbourne. Available at: www.cana.net.au. See also: B Preston and R Jones (2006), *Climate Change Impacts on Australia and the Benefits of Early Action to Reduce Global Greenhouse Gas Emissions: A consultancy report for the Australian Business Roundtable on Climate Change,* CSIRO.

7 *Submission 161*, p. 40.

8 Department of the Environment and Heritage, *Submission 126*, p. 15.

9 Department of the Environment and Heritage, *Submission 126*, p. 15.

10 B Preston and R Jones (2006), *Climate Change Impacts on Australia and the Benefits of Early Action to Reduce Global Greenhouse Gas Emissions*: *A consultancy report for the Australian Business Roundtable on Climate Chang,* CSIRO, p. 22.

11 *Submission* 161, p. 40.

and this is already impacting on the marine biodiversity of the oceans'.[12] Dr Gina Newton elaborated:

> It has only recently come to light that the oceans are becoming more acidic, with some of the worst areas on our doorstep in the Southern Ocean. In addition, the Southern Ocean's so-called conveyor belt thermohalocline circulation system, which has an important influence on global ocean circulation and the world's weather patterns, is starting to break down.[13]

7.9 Dr Newton went on to note that although changes to species distribution are already evident, we do not yet understand what the implications of climate change will mean for the physiology and behaviour of particular species:

> We are already starting to document changes in the species distribution patterns, and changes in oceanographic conditions such as the southerly penetration of the east Australian current. Some of the changes in the species distribution patterns in particular have resulted in the establishment of pests such as the urchin barrens that are now taking over traditional rock lobster habitat in Tasmanian waters. As yet, we understand very little of the potential physiological effects of climate change which would include changes to reproductive behaviour and timing. It is likely that the impact of climate change will compound existing threats and pressures from human activities.[14]

7.10 The Burnett Mary Regional Group for NRM Inc stated that:

> The wet tropical forests of North Queensland appear to be in great peril. The researchers in north Queensland are predicting indeed a catastrophic collapse of that forest for a warming of only a few degrees.[15]

7.11 WWF quantified this risk, citing research by Williams, Bolitho and Fox,[16] predicting that global warming of greater than 2ºC would see a 90 per cent reduction of the core environment of Australia's tropical rainforests, home to 65 vertebrate species in the North Australian wet tropics, and noting that 90 Australian animals have been specifically identified as being at risk from climate change.[17]

7.12 Across ecosystems, climate change is expected to exacerbate pre-existing threats, such as fire and feral plants and animals:

> As a result of climate change we will see changes in fire regimes, so small changes in climate might result in significant changes in fire regimes, which

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12 Australian Association for Maritime Affairs, *Committee Hansard*, 16 June 2006, p. 26.

13 Australian Marine Sciences Association*, Committee Hansard,* 16 June 2006, p. 38.

14 Australian Marine Sciences Association*, Committee Hansard,* 16 June 2006, pp 39–40.

15 *Submission 189*, p. 5.

16 S Williams, E Bolitho and S Fox (2003), *Climate Change in Australian Tropical Rainforests: an impending environmental disaster,* Proceedings of the Royal Society of London.

17 *Submission 161*, p. 41.

> will have consequences not just for ecological communities but also for surrounding residential communities and farmers. Fire management compels us to look at the implications of climate change. We also expect—and we are starting to see—that climate change has implications for the spread of weeds and pests.[18]

7.13 The World Commission on Protected Areas (IUCN) noted that 'climate change is also most likely to result in increased intensity and frequency of extreme events, such as fires, droughts and floods.'[19]

7.14 The Blue Mountains Conservation Society identified climate change as a factor contributing to groundwater depletion:

> In the Blue Mountains, climate change…means higher temperatures (equals more evaporation and less infiltration) and lower precipitation (equals less infiltration). Both lower the watertable, thereby reducing the available resource and adversely impacting on vulnerable ecosystems. Parks will inevitably suffer as climate change intensifies.[20]

7.15 Birds Australia expressed concern at the effects of increased temperature on freshwater habitats, already at risk from the impacts of irrigation and other water use:

> Increased ambient stream and river water temperatures result in stress on these habitats. Feral organisms and fish who prefer warmer water often replace natives. Systems are more vulnerable to toxic algae blooms.[21]

Responses to climate change

Building ecological resilience

7.16 Regardless of the specific ecosystem under discussion, many submissions that identified threats from climate change called for greater monitoring, and for management strategies that reduced other pressures and promoted resilience. In relation to marine reserves, the Department of the Environment and Water Resources wrote:

> Significant rises in sea water temperature over the last 5–7 years have resulted in coral bleaching events worldwide, including a number of marine protected areas in Australia. Marine reserve managers now need to consider options to monitor the onset of a likely coral bleaching event, manage the reserve in a way that reduces as far as possible all other pressures and have strategies at hand to respond post-event.[22]

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18 Dr Tony Fleming, NSW National Parks and Wildlife Service, *Committee Hansard* 12 May 2006, p. 10.

19 *Submission 137*, p. 35.

20 *Submission 29,* pp 2–3.

21 *Submission 105*, p. 8.

22 Department of the Environment and Heritage, *Submission 126*, p. 15.

7.17 As the South Australian Fishing Industry Council pointed out:

> The resilience of our marine ecosystems must be better understood and recognised in the context of existing uses, the consequences of a failure to manage terrestrial impacts and global climate change.[23]

7.18 It was recognised that it was not only marine reserves that needed to build resilience against the threat of climate change. It was commonly suggested that terrestrial reserves needed to enhance resilience to cope with climate change and that the main solution was to increase the size and connectivity of reserves, so that they contained a continuum of different climatic zones, altitudes and aspects. This suggestion is consistent with Strategy 5.2 of the *National Biodiversity and Climate Change Action Plan*, which identifies the need to:

> …strengthen the capacity of the reserve system to act as refuges for vulnerable terrestrial species and integrate reserve planning and management with broader landscape protected area networks to allow the movement of species across bioclimatic gradients.[24]

7.19 As the World Commission on Protected Areas stated:

> Arguably the concept of 'ecological networks' is the single most important consensus direction in global conservation. It has been strongly endorsed at an international level…. This direction recognises connectivity and 'turning islands to networks' is the way to achieve the international goal of benefits beyond boundaries and is essential to management effectiveness and a key component for building resilience in the face of rapid change, especially climate change, into the system.[25]

7.20 It was also suggested that the impacts of climate change made it imperative to ensure that resilience was built into the parks systems by:

> improving connectivity between parks and through ecosystem networks involving many lands to enable species, populations and communities to adapt to changes in climates and recover from local extinction events.[26]

7.21 Other witnesses to the inquiry also highlighted the importance of landscape connectivity and resilience against climate change. Mr Graeme Worboys, a practitioner and author in the field of protected area management, called for:

> …continental scale conservation connectivity for lands such as the Great Escarpment of Eastern Australia and Australia Alps corridor, northern

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23 Mr Neil MacDonald, *Committee Hansard*, 6 June 2006, p. 14.

24 Natural Resource Management Ministerial Council (2004), *National Biodiversity and Climate Change Action Plan 2004–2007*, Australian Government, Department of the Environment and Heritage, Canberra, p. 27.

25 *Submission 137*, p. 20.

26 World Commission on Protected Areas, *Submission 137*, p. 35.

> Australia and south-western Australia…to minimise the effects of climate change and forecast biome shifts.[27]

7.22 Mr Worboys was involved in developing a proposal for the establishment of a protected corridor running 2,800 km along the Eastern Australian Great Escarpment, between Cairns and the Victorian border.[28]

> The Corridor could comprise extensive areas of inter-connected natural lands that cover a range of altitudinal gradients to facilitate adaptation to climate change…The Great Escarpment is still mostly undisturbed along many sections of its length, and still offers many opportunities for the retention of continuous, unfragmented natural bushland. A number of protected areas have already been established along the Great Escarpment, however, many of the natural areas in public ownership are still unprotected.[29]

7.23 The Australian Bush Heritage Fund, an organisation which purchases private property for the purposes of conservation, raised the issue of how private landholders could better contribute towards a whole of landscape approach, and how:

> Private land-holders generally can contribute by improving biodiversity conservation so that we are not dealing with a mosaic system or a jigsaw or little postage stamps of national parks and government protected areas dotted around the landscape. You build resilience by having cooperative, collaborative and complementary approaches…. it requires land-holders across all tenures and regardless of their ultimate motivation, whether it be for commercial profit or conservation, to work together to ensure that the whole landscape is more resilient by building more resilient drainage basins and riparian zones and working right across the system.[30]

7.24 It was also confirmed by The Nature Conservancy, another key organisation that purchases private land for the purpose of habitat conservation, that efforts were being made by private landholders towards building ecological resilience, stating:

> Importantly, we work across landscapes at a scale large enough to conserve ecological processes and to ensure that protected lands and waters retain their ecological integrity.[31]

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27 *Submission 152,* p. 4.

28 See for example: Pulsford, I, Worboys, G, Gough, J & Shepherd, T (2004), 'The Australian Alps and the Great Escarpment of Eastern Australia conservation corridors' in David Harmon & Graeme Worboys (eds) *Managing Mountain Protected Areas: Challenges and Responses for the 21st Century;* Worboys, G, Lockwood, M, & De Lacy, T (2005), *Protected area management principles and practice* (second edition), Oxford University Press, Melbourne.

29 WWF - Australia, *Submission* 161, p. 42.

30 Mr Doug Humann, *Committee Hansard*, 5 June 2006, p. 10.

31 Dr Michael Looker, *Committee Hansard*, 20 October 2006, p. 32.

7.25 Basically, whole of landscape or bioregional approaches proposed to enhance connectivity between protected areas across different tenures of land ownership. The World Commission on Protected Areas noted that this concept had strong backing in Australia, but they cautioned that:

> While there is high consensus on the desirability of such multiple tenure models based around core conservation lands, only a few working examples have emerged to date. The primary impediment remains the cost and complexity of putting together different land tenures and sea uses, gaining the cooperation of the many government departments and agencies in a federal system, as well as coordinating the private and community input. This will only occur with real and sustained commitment of policy and funding by both national and state /territory/local governments.[32]

7.26 However, while there may need to be a more comprehensive strategy across jurisdictions towards building ecological resilience across the landscape, some states have already fully adopted the concept. The Department of Environment and Heritage South Australia stated that:

> Resilience is something that is right at the forefront of mind with the climate change issue…. The resilience is really important and one way of achieving that is through the connectivity across the landscape. That is the whole way. It is not just the way we manage our parks now, it is the approach that underpins the whole approach to biodiversity conservation in South Australia.[33]

Recommendation 6

7.27 The committee recommends that the Commonwealth, States and Territories boost the resilience of reserves against the effects of climate change by focussing on increasing their connectivity, so that they contain a continuum of different climatic zones, altitudes and ecosystem types.

Land clearing

7.28 Land clearing is listed as a key threatening process to biodiversity under the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999*. In advice that supports that listing, 'land clearing' is understood as the destruction of the above ground biomass of native vegetation and its substantial replacement by non-local species or by human artefacts.

> It includes clearance of native vegetation for crops, improved pasture, plantations, gardens, houses, mines, buildings and roads. It also includes

32 *Submission 137*, p. 20.

33 Mr Greg Leaman, *Committee Hansard*, 6 June 2006, p. 39.

> infilling of wetlands or dumping material on dry land native vegetation, and the drowning of vegetation through the construction of impoundments.[34]

The definition specifically excludes silvicultural operations in native forests and manipulation of native vegetation composition and structure by grazing, burning or other means. [35]

7.29 In its submission, the World Commission on Protected Areas notes that the *Australian Terrestrial Biodiversity Assessment* found that vegetation clearing is the most significant threat to species and ecosystems in eastern Australia. Although protected areas are not directly cleared they can often be impacted by related problems such as salination, which is now having serious impacts on large areas across the continent, loss of water quality and fragmentation.[36]

7.30 Despite an increase in revegetation and ecosystem restoration activity in recent years, the rate of land clearing continues to result in a net loss of native woody vegetation.[37] This increases pressures on remnant intact ecosystems:

> It used to be that biodiversity was conserved in many different land tenures. There were huge areas of relatively undisturbed land that were outside protected areas, but most of those areas are gone and the remaining ones are going, and so parks are more and more critical for conserving biodiversity because there is less and less biodiversity outside parks. That means two things: firstly, that we should look at mechanisms to conserve biodiversity outside parks and, secondly, that we have to be particularly careful about threats to parks themselves.[38]

7.31 Birds Australia also noted that clearing remnant vegetation removed the opportunity to reserve under-represented ecosystems, but made the point that such clearing often produced only marginal economic benefits:

> Hundreds of thousands of hectares of Victorian mallee and Queensland woodland have been cleared of trees and scrubs for agriculture. Much of this land is marginally useful for agriculture but vital for biodiversity. It is

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34 Threatened Species Scientific Committee (2000), *Advice to the Minister for the Environment and Heritage from the Threatened Species Scientific Committee on a public nomination of a Key Threatening Process under the Environment Protection and Biodiversity Conservation Act 1999*, http://www.deh.gov.au/biodiversity/threatened/ktp/clearing.html

35 Threatened Species Scientific Committee (2000), *Advice to the Minister for the Environment and Heritage from the Threatened Species Scientific Committee on a public nomination of a Key Threatening Process under the Environment Protection and Biodiversity Conservation Act 1999*, http://www.deh.gov.au/biodiversity/threatened/ktp/clearing.html

36 *Submission 137*, p. 36.

37 Department of the Environment and Heritage (2001), 'Biodiversity Theme Report', *Australia State of the Environment Report 200,* http://www.deh.gov.au/soe/2001/biodiversity/biodiversity04-1b1.html#areaclearedormodified

38 Professor Ralf Buckley, Griffith University, *Committee Hansard* 21 April 2006, p. 70.

> clear that not all habitats are adequately represented in the reserve system, and this is particularly true of habitats that also offer agricultural opportunities.[39]

Fragmentation

7.32 A number of submissions identified the fragmentation of habitats as a distinct threat to the viability of parks, others raised it within a broader discussion of reserve history and future planning. It is particularly a problem near coastal cities, where small parks reserved early last century are now surrounded by urban development, but larger parks in viable agricultural areas can be subject to similar pressures. The NSW Government identified some specific problems:

> Land clearing for urban development and agriculture has meant that reserves can become isolated islands of habitat surrounded by significantly modified areas. This isolation can be a significant threat to plants and animals that are not able to disperse easily across long distances. Without the ability for individuals to disperse into a reserve, resident populations may suffer from inbreeding depression (a lack of genetic exchange). Individuals also need to be able to disperse from reserves to avoid threats such as fire or predators. Approximately 25% of parks in NSW have identified this as a problem.[40]

7.33 The National Parks Association of Queensland raised the question of viability, particularly when populations are subject to additional stresses, such as drought:

> There is a need to maintain an area that is sustainable. Dr Martin Taylor particularly drew my attention to Toohey Forest Park, where there is no connectivity there. A lot of the wildlife in that area has disappeared because of the current climate. It is a very dry site. There is very little water, so you cannot sustain the plants and the animals in that area. The area of concern that I have are that many of the areas that have been reserved by the state government are on the small side.[41]

7.34 The Coast and Wetlands Society pointed out that the effects of fragmentation may not become fully apparent for a long time:

> On land, many of these threats arise from the fact that the conservation network now consists of fragments of habitat within a modified matrix; the consequences of fragmentation and the impact of edge effects may take decades to be fully experienced.[42]

7.35 'Edge effects' refers to a number of problems that develop or are exacerbated when parks have large boundaries in relation to their total area. Problems endemic to

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39 *Submission 105,* p. 13.

40 *Submission 155*, p. 32.

41 Mr John Bristow, *Committee Hansard* 21 April 2006, p. 30.

42 *Submission 7*, p. 3.

all parks, such as invasion by feral and domestic animals and weeds, and the movement of native animals off-reserve, can be increased because there are more opportunities to cross tenure boundaries and less area to sustain or protect native fauna.

7.36 Native species may require minimum areas or area/edge ratios in order to support or constrain their populations. For example, Friends of Waite Conservation Reserve, one of a number of small and isolated parks in the Mt Lofty Ranges of SA, pointed out that 'woodland birds like the Scarlet Robin need a home range of between 3 and 50 ha to be able to successfully raise their young'.[43] Some parks in this area were donated to the reserve estate by South Australian families, and may be as small as 7.5 hectares.[44]

7.37 Populations of some native species, such as bell miners and associated insects, may build up to unsustainable levels on the edge of disturbed eucalypt ecosystems, and are associated with 'rural dieback' of eucalypt species.[45]

7.38 Birds Australia identified areas of threatened remnant habitat that are vital to biodiversity, because they now act as corridors or refuges for species at risk:

> There are strips of native habitat which are left along roads, in difficult to access areas, along stream beds and in some agricultural areas. These areas serve as corridors between parks, conservation reserves and natural habitats where animals and birds can move to breed, find water or food. Islands of natural habitat sustain gene pools of flora and fauna. Today many of these vital wildlife corridors and islands are disappearing to agriculture, housing development and road-works. These corridors, usually on non-government lands, are vital links in the reserve landscape and must be encouraged and facilitated by government programs and partnerships.[46]

7.39 The Government of South Australia advised that South Australia has developed a framework for landscape-scale conservation. Through its NatureLinks program, public protected areas are to be managed as core conservation areas, and a range of complementary conservation and land management measures can be applied across the landscape. The goal of the program is to achieve long-term conservation outcomes in the face of ongoing threats such as fragmentation, inappropriate land uses, and climate change.[47]

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43 Friends of Waite Conservation Reserve, *Submission 94*, p. 3.

44 Government of South Australia, Department of Environment and Heritage (2006), *The Greater Mt Lofty Parklands – Yurrebill,* http://www.parks.sa.gov.au/parks/parks/adelaide/adelaide_submap/index.htm

45 Department of the Environment and Heritage (2001), 'Biodiversity Theme Report', *Australia State of the Environment Report 2001,* http://www.deh.gov.au/soe/2001/biodiversity/biodiversity04-1b1.html#areaclearedormodified

46 *Submission 105,* p. 13.

47 *Submission 194,* p. 10.

7.40 Professor Christopher Margules noted, in relation to particularly fragmented landscapes, that 'there is a serious risk in areas that have been severely transformed that some of those habitat remnants will not continue to perform the conservation function they currently perform.' [48] Considering how best to strategically allocate resources to increase their resilience to threat, he offered:

> …if you have limited conservation resources to spend in these severely fragmented landscapes you should make the fragments bigger. If you had to do one thing or the other—join them up with corridors or make them bigger—I would make them bigger.[49]

Responding to land clearing: options

7.41 There is currently no uniform legislation in Australia that sets conditions on land clearing. State and territory legislation mainly covers woody native vegetation and provides for many exemptions of a general nature, for example: 'day-to-day farm management' (NSW) and clearing for urban development (WA). The legislation does not apply to all land tenures in all states[50] and there may be no legislation at all:

> Tasmania is now the only Australian state without land clearance legislation…You may wonder how important this is to the reserve system; well it is vital to achieve adequate conservation. Many vegetation communities are found predominantly on private land.[51]

7.42 The Queensland Government noted that about 32 million hectares, an area equal to 19 per cent of Queensland's total land area, has been cleared of remnant native vegetation. Clearing activity has been concentrated in the east of the state, severely compromising the reservation of regional ecosystems:

> In the fertile agricultural areas such as the Brigalow Belt the pressure of development, enhanced by initiatives such as water infrastructure proposals, means that opportunities to develop a comprehensive protected area system [are] likely to be forgone unless urgent action is taken.[52]

7.43 The Environment Association proposed that assigning a monetary value to ecosystem components may provide more options to land managers who are currently persuaded to clear land for economic reasons:

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48 CSIRO*, Committee Hansard* 31 March 2006, p. 7.

49 Professor Christopher Margules, Tropical Landscapes Program, Tropical Forest Research Centre, CSIRO*, Committee Hansard* 31 March 2006, p. 7.

50 Department of the Environment and Heritage (2001), 'Biodiversity Theme Report', *Australia State of the Environment Report 2001,*: http://www.deh.gov.au/soe/2001/biodiversity/biodiversity04-1b1.html#vegetationclearanceanoverview

51 The Environment Association Inc, *Submission 129*, p. 2.

52 *Submission 175*, p. 24.

> The land valuation system needs to be overhauled to include the valuing of ecological capital. Otherwise how can one either be rewarded for its conservation or penalised for its destruction or degradation if it is not valued with our other systems of value.[53]

7.44 The Wilderness Society also expressed interest in exploring 'how people can get an economic livelihood out of protecting nature', noting some work that had been done in relation to quantifying the economic value of retaining native vegetation:

> One obvious answer that…farmers are interested in is the issue of receiving payment, whether you are providing water services, carbon services or whatever…the best economic analysis has been done in the context of climate change and carbon services…the Research School of Biological Sciences was central to the analysis that was done for the Commonwealth in the lead-up to the decision to end land clearing in Queensland…Part of the argument behind that was the contribution it would make to stopping greenhouse gas emissions from land use change.[54]

Neighbours' management practices

7.45 Ecological and hydrological processes do not respect land tenure boundaries. The management practices of national parks impact on their immediate and regional neighbours, and vice versa. This section will discuss the effects on national parks of land management and other practices carried out nearby.

Pollution

7.46 Professor Ralf Buckley nominated pollution generally as an external threat to parks:

> The external ones [threats] are the same threats that threaten biodiversity in general—loss of habitat, which in the case of parks means encroachment around the boundaries, fires crossing into parks from other areas, pollution of water upstream of park boundaries, pollution of marine parks outside the marine park boundaries and so on.[55]

7.47 The World Commission on Protected Areas identified littering, toxic runoff and sewage as specific pollution issues in the Great Barrier Reef World Heritage Area, Fraser Island and Kosciusko.[56] The Department of the Environment and Water Resources identified run-off as perhaps the greatest threat to the Great Barrier Reef:

> In relation to the Great Barrier Reef Marine Park poor water quality is the greatest ubiquitous threat to marine species and marine ecosystems, particularly due to cumulative impacts, in the Great Barrier Reef. By far the

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53 *Submission 129*, p. 4.

54 Ms Virginia Young, *Committee Hansard* 16 June 2006, p. 96.

55 *Committee Hansard*, 21 April 2006, p. 70.

56 *Submission 137*, p. 37.

greatest source of pollution leading to reduced water quality is land-based human activity. [57]

7.48 Birds Australia listed four categories of pollution and described how they affect parks and protected areas:

> **Untreated human waste** Most Australian rural and small town human waste is treated in individual home and business septic systems. Many of these systems have failed. A number of Australia's cities do not adequately treat sewage and pump their effluent into the ocean, rivers or streams. The result is severe damage to the habitats which receive this toxic effluent. Marine Protected Areas are particularly vulnerable to effluent discharges.
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> **Agricultural toxic waste** Farms are responsible for significant discharges of animal manure effluent, nitrogen loading of waters from fertiliser, and the spread of hormones and medicines used to treat livestock and pesticide residue. These materials often have an impact upon adjacent National Parks, other conservation reserves and Marine Protected Areas.
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> **Mining impacts** Mines are sometimes found in parks and conservation reserves. They are also frequently located near reserves. Mines often use tailing dams where toxic waters are stored. These dams can leak or fail, often poisoning streams which pass through parks and conservation reserves. Toxic air pollution from gold mining, arsenic, and lead mining have an adverse impact upon park and conservation reserve biodiversity. Some water-borne mining effluent can impact on marine reserves when uncontrolled waste enters the sea.
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> **Industrial effluent** Industry often creates untreated or inadequately treated effluent which can damage National Parks, other conservation reserves and Marine Protected Areas. Coal burning power stations are a source of acid rain which damages National Parks, other conservation reserves and Marine Protected Areas. Paper mills sometimes release dioxin into streams and rivers with serious consequences.[58]

7.49 In Melbourne, Professor Elery Hamilton-Smith gave the committee a recent example, from the Limestone Coast area of South Australia, of how agricultural chemical use can lead to pollution incidents that may be difficult for the user to foresee:

> We were doing a replication of a study I had done in 1961 to count the size of the bat population; we knew it had declined. When we arrived, we found that it had declined far more than we had thought. There were dead bodies of bats everywhere, all the insect fauna of the cave in which they roosted and reared their young was dead and the group had been moving constantly. We knew there was something desperately wrong. We got a chemical

57 Department of the Environment and Heritage, *Submission 126*, p. 14.

58 *Submission 105*, p. 9.

> analysis, and that told us they were using methamidophos. It was the first time it had been imported into this country.[59]

7.50 It became apparent from Professor Hamilton-Smith's account, however, that data from international regulatory authorities that was available at the time of importation indicated that the chemical posed a serious risk to groundwater, both on and off reserves:

> The methamidophos was apparently imported and put on the market without any questioning, even though the United States EPA have constantly campaigned for its prohibition and most United States state governments totally prohibit it. We were able to get wondrous support from the US EPA, with all the data we needed to prove that this stuff should never have been allowed into the country. The South Australian government acted within one week, for which they deserve great credit. But they recognised immediately that it was a very serious problem. The half-life of methamidophos in daylight is about eight hours; in the dark, it is weeks—plenty of time to get into and totally destroy the quality of the ground water by killing all the living things in it that help to keep it pure and drinkable.[60]

7.51 Methamidophos is licenced for use in Australia as an active constituent by the Australian Pesticides and Veterinary Medicines Authority.[61]

Upstream water use

7.52 A number of submissions identified water management as a threat to the reserve system, noting that, as the related issues were complex, solutions could be difficult to implement:

> There are many threats to achieving the objects on management including…the adverse effect on water quality and quantity caused by human habitation and the withdrawal of ground water for irrigation and household purposes upstream.
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> It is acknowledged that what can be achieved to ameliorate the adverse effects of some of these threats may be limited.[62]

7.53 The Wilderness Society identified water management as a threat to biodiversity more generally:

> …in addition to salinity problems, the modifications to hydrological flows from broad scale clearing also have serious ramifications for biodiversity by, inter alia, modifying the distribution and availability of surface water.

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59 Australasian Cave and Karst Management Association, *Committee Hansard* 5 June 2006, p. 64.

60 Australasian Cave and Karst Management Association, *Committee Hansard* 5 June 2006, p. 64.

61 Australian Pesticides and Veterinary Medicines Authority (2006), *Registered Products Database,* http://services.apvma.gov.au/PubcrisWebClient/welcome.do

62 Tamborine Mountain Progress Association, *Submission 84,* pp 1–2.

> Such changes can have profound affects on wildlife habitat, particularly in the semi-arid and arid centre and seasonally dry tropical Australia.[63]

7.54 All submissions received in relation to water issues saw catchment management and flow regulation as government responsibilities, both on and off reserve:

> …often the greatest threat on which such areas depend, the water regime, is not addressed or resourced sufficiently well by governments. For freshwater protected areas, governments need to identify potential threats from parts outside the boundaries of the reserve.[64]

7.55 Professor Richard Kingsford wrote to the committee concerned about the long-term effects of water resource development on freshwater protected areas that include downstream wetlands and floodplains, for example: the Macquarie Marshes, Kinchega National Park, Yanga Nature Reserve, The Coorong, and Hattah-Kulkyne National Park. He expressed the view that:

> …the conservation objectives for which the reserves were originally declared are not being met. The critical resource of water that sustains the ecosystems on which the plants and animals depend is no longer available. Most of the floodplains and wetlands in the Murray-Darling Basin at the terminal end of rivers are in ecological crisis…These areas clearly demonstrate that governments cannot guarantee the future protection of such areas without water protection.[65]

7.56 Some submissions expressed concern that the mechanisms that currently regulate water use are not rigorous enough to prevent ongoing and future environmental damage. Noting that many Great Artesian Basin discharge springs, home to endemic aquatic invertebrates, are already extinct from overuse of artesian water, and some discharge springs are listed as 'threatened ecological communities' under the EPBC Act,[66] Professor Kingsford stated:

> The EPBC Act can protect against major developments threatening listed aquatic ecosystems but cannot deal with threats beginning before its enactment in 1999; enforce proactive biodiversity management; or control

63 *Submission 131*, p. 23.

64 Professor Richard Kingsford, School of Biological, Earth and Environmental Sciences, University of New South Wales, *Submission 118*, p. 2.

65 School of Biological, Earth and Environmental Sciences, University of New South Wales, *Submission* 118, p. 2.

66 Professor Richard Kingsford & Jon Nevill, 'Scientists urge expansion of freshwater protected areas', *Ecological Management & Restoration,* Vol 6 No 3 December 2005. *Submission 118 Attachment 1*, pp 161–162.

> small cumulative threats or potentially threatening management regimes in the wider catchments.[67]

7.57 Mr Jon Nevill pointed out that other planning and regulatory instruments are also failing to protect freshwater ecosystems and resources:

> Existing water planning, land use planning, and development assessment frameworks are not providing adequate protection for Australia's freshwater ecosystems…There is still much scope for improving water resource management at the State level...Apart from the issues of over-allocation of water to extractive use, protected areas, and alien species, the most serious concern is a failure (principally on the part of State governments) to effectively control the cumulative effects of incremental water infrastructure development – particularly farm dams, levee banks, agricultural drainage, extraction of groundwater and surface water, and GDE [groundwater dependent ecosystem] matrix removal...[68]

7.58 Australia was the first nation to become a contracting party to the Convention on Wetlands of International Importance (the Ramsar Convention). The mission statement of the Ramsar Convention is 'the conservation and wise use of wetlands, by national action and international cooperation, as a means to achieving sustainable development throughout the world.' This means ensuring that activities which might affect wetlands will not lead to the loss of biodiversity or diminish the many ecological, hydrological, cultural or social values of wetlands.[69]

7.59 Mr Eric Fisher OAM, who owns and manages a private Ramsar-listed wetlands site in central western NSW, and chairs the NSW Ramsar Managers Network, noted not only a lack of support from governments for private wetland conservation initiatives, but that water allocations made by the NSW Government had directly threatened a number of significant wetlands whose owners had chosen Ramsar listing as a means of protection:

> …the private landholders who had put their land under an international wetland agreement to which the State and Australian Government were signatories were not receiving any support in their attempts to maintain the ecological character of these listed lands. We have been successful in raising the awareness at most levels of government but still we have seen a decline in our Ramsar listed wetlands. The Gwydir and Wilgara Wetlands are both severely degraded by over allocation of water and up river development…

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67 Professor Richard Kingsford & Jon Nevill, 'Scientists urge expansion of freshwater protected areas', *Ecological Management & Restoration,* Vol 6 No 3 December 2005. *Submission 118 Attachment 1*, p. 162.

68 *Submission 3 Attachment 1*, p. 4.

69 Department of Environment and Heritage (2004), *Ramsar in Australia,* http://www.deh.gov.au/water/wetlands/ramsar/ramaust.html

> I chose Ramsar because of its principle of wise use to protect my land for future generations. My family has been on the property for close to a hundred years. In that time we have been able to maintain a bird colony of up to 30,000 breeding birds. Unfortunately we are losing this unique area due to matters beyond our control regarding water allocation.[70]

7.60 Birds Australia noted that lower rainfall and higher evaporation rates caused by global warming would put environmental flows under increasing pressure from competing demand for water for agricultural, urban, mining, and industrial uses.[71]

7.61 While legitimate concerns were raised by some witnesses, it is worth noting what the State of the Environment Report 2006 points out:

> There have been some positive moves in the past five years with environmental flow allocations, habitat restoration, and invasive species control programmes in many river systems. Controls on point-source nutrient and chemical pollution have also been reasonably successful over the past decade, though some concerns remain. Community attitudes to water are beginning to change, with water 'left in the river' no longer seen as wasted water, but as a valuable resource for Australia's riverine ecosystems. Evidence of this is the increasing attention that is being paid to the development of a national system of freshwater aquatic reserves to ensure that those river and wetland ecosystems that are still largely 'pristine' can be protected into the future, especially those in northern Australia (Nevill 2006).[72]

Groundwater

7.62 The Blue Mountains Conservation Society drew attention to the interrelationship between global warming and groundwater depletion. As noted above, climate change is expected to deplete available surface water by increasing evaporation rates and decreasing rainfall and humidity, but it will also affect the recharge rates of groundwater systems that are often little-understood.

> For the Blue Mountains and over much of the State, there is an abysmal lack of knowledge regarding the economic benefits of leaving groundwater in situ versus exploiting it. For Blue Mountains' aquifers, little is known regarding recharge sites and rates, and flow directions and their rates. There is doubt over the numbers and locations of springs and licensed and unlicensed water bores, the aquifer-geometry being tapped, and the amounts of water extracted. This is exacerbated by land-use changes in

70 *Submission 204,* pp 1–2.

71 *Submission 105*, p. 8.

72 Department of the Environment and Heritage, web site, *State of the Environment 2006*, http://www.deh.gov.au/soe/2006/publications/report/inland-waters.html, accessed 6 December 2006.

> which 'bush' is replaced by development, such that run-off from hard surfaces reduces infiltration and the watertable suffers.[73]

7.63 A number of submissions by scientists and speleological groups discussed threats to underground ecological communities that rely on groundwater and are therefore affected by changes in water use and hydrology. Activities that occur outside reserves, such as forestry operations and mining, were identified as having a significant impact on groundwater flow:

> It is still our opinion that the key threat to this area [the 'Aquatic Root Mat Community in Caves of the Swan Coastal Plain', which is listed as a threatened ecological community under the EPBC Act] is the existence of pine plantations in the catchment of these caves – where the pine trees are reducing recharge to the superficial aquifers, and are removing water from the aquifer, thus contributing to the lowering of the Gnangara Mound (the watertable). The Government needs to hasten their plans to reduce the Pine Tree Plantations in the east. We reiterate that this should be a priority as the catchment to the east is significant to the karst hydrology…
>
> The key threat to the [Cape Range] National Park [WA] would be if mining on the rest of the Cape were to change the hydrological regime. This would affect the karst hydrological system and subterranean fauna. It is important that the National Park boundaries be extended to include the rest of the Cape and that the Mining Reserve be removed.[74]

7.64 The Australian Speleological Federation provided an example of the difficulty of attempting to replicate water flow once the original patterns have been disturbed:

> The main concern is the situation for the cave fauna in the stream caves. Further to what was reported previously [in Yanchep National Park, WA] the CALM, Water Corporation and Waters and Rivers Commission have been artificially maintaining water to certain areas in attempts to maintain the subterranean stygofauna habitats. The Government project to direct artificial supplementation to the cave stream in the Crystal Cave lasted only several weeks and the water has been switched off due to concerns regarding oxidised irons in the karst system. It is our understanding that there is no longer any living stygofauna in this cave or in the Root Mat communities in this cave.[75]

Commonwealth initiatives on water management and conservation

7.65 The Department of Agriculture, Fisheries and Forestry pointed out that surface water along with groundwater was continually under threat from pollution and over-exploitation, and therefore required active management. The difficulty was that, along with other natural resources, water management was the responsibility of state

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73 *Submission 29,* pp 2–3.

74 Australian Speleological Federation, *Submission* 79, p. 3.

75 *Submission 79*, p. 3.

and territory governments, while the Commonwealth itself provided a role in the leadership and coordination of policy reforms across jurisdictions.[76]

7.66 It was recognised in 2002 that within each state and territory there were significant impediments to the implementation of effective groundwater protection. These included a lack of technical expertise and/or number of people to identify what protection was required; poor communication between agencies responsible for groundwater protection; inadequate identification of agency responsibilities; inadequate tools for the identification and implementation of protection programs; and a lack of resources or regulatory tools to adequately check compliance and enforcement of groundwater protection.[77]

7.67 Following these findings, the Commonwealth Government recognised the need for a more comprehensive and inclusive water management and conservation regime across Australia, and that this would require a deeper involvement of the states and territories. Following a water reform process started in 1994, the Council of Australian Governments (COAG) in 2003 agreed to develop a National Water Initiative (NWI) to:

- improve the security of water access entitlements, including by clear assignment of risks of reductions in future water availability and by returning over-allocated systems to sustainable allocation levels;
- ensure ecosystem health by implementing regimes to protect environmental assets at a whole-of-basin, aquifer or catchment scale;
- ensure water is put to best use by encouraging the expansion of water markets and trading across and between districts and States (where water systems are physically shared), involving clear rules for trading, robust water accounting arrangements and pricing based on full cost recovery principles; and
- encourage water conservation in our cities, including better use of stormwater and recycled water.[78]

7.68 This represented a significant shift in water resources policy, one that required more consistent water management and conservation commitments at state level. To that end, in October 2004 the Prime Minister announced the formation of an

76 Department of Agriculture, Fisheries and Forestry, web site, *Groundwater*, http://www.daffa.gov.au/natural-resources/water/groundwater, accessed 6 December 2006.

77 Natural Resource Management Standing Committee, *Groundwater Quality Protection Discussion Paper*, Commonwealth of Australia, 2002, p. 4.

78 Department of the Environment and Heritage, web site, State of the Environment 2006, http://www.deh.gov.au/soe/2006/publications/drs/indicator/212/index.html, accessed 6 December 2006.

independent statutory body called the National Water Commission, created to assess progress in implementing the NWI.[79]

7.69 As the Department of the Environment and Water Resources explained, preparation of an implementation plan by each state and territory government is now a requirement of the NWI. These plans include steps and timelines for implementation of key actions under the NWI, and there are fairly comprehensive guidelines provided by the Commonwealth as to what each plan must address. The NWI also requires the Commission to accredit these plans. The Commission has accredited five NWI Implementation Plans:

- Australian Government Implementation Plan;
- New South Wales Implementation Plan;
- Victoria Implementation Plan;
- Queensland Implementation Plan;
- South Australia Implementation Plan.[80]

7.70 Tasmania, the Northern Territory and the Australian Capital Territory have drafted their implementation plans, while Western Australia is currently preparing its implementation plan in consultation with the Commission.[81]

7.71 While more can always be done to address water conservation issues, this Commonwealth initiative will go a long way towards ensuring a comprehensive water management regime right across Australia. Once fully implemented, it should address the major concerns of witnesses in regards to water conservation issues.

Mining

7.72 The committee received a few submissions that identified mining as a general threat to reserves. Birds Australia cited 'scale, sensitivity and inattention to environmental impact' as problems associated with mining and oil and gas extraction.[82] The Tasmanian National Parks Association wrote:

> Many so-called "reserved" areas are open to destructive mining activity. Resource extraction should only be allowed in certain reserve categories in

79 Department of the Environment and Heritage, web site, *State of the Environment 2006*, http://www.deh.gov.au/soe/2006/publications/report/inland-waters.html, accessed 6 December 2006

80 National Water Commission, web site, *National Water Initiative Implementation*, http://www.nwc.gov.au/nwi/nwi_implementation.cfm, accessed 6 December 2006.

81 National Water Commission, web site, *National Water Initiative Implementation*, http://www.nwc.gov.au/nwi/nwi_implementation.cfm, accessed 6 December 2006.

82 *Submission 105*, p. 10.

> line with IUCN categorisation and always as a secondary activity in the particular reserve.[83]

7.73 There were also some submissions that raised mining as a local issue, that is, as a threat to a particular national park or area. Lithgow Environment Group (LEG) expressed concern about a sand mine on the boundary of the Greater Blue Mountains World Heritage Area (GBMWHA):

> There is already a sand mine on the Newnes Plateau north of Clarence which abuts the National Park and the GBMWHA and L.E.G. is not impressed with the way this site is looking or its impacts on the environment. It is an ugly eyesore and its difficult to see how this land can be rehabilitated in a satisfactory way.
>
> L.E.G. is against further sand mining leases in this or other Blue Mountains areas as it is a unique and beautiful area which could attract many tourists and, of course, tourist dollars. Apart from this the Newnes Plateau adjoins the National Park and also needs protecting and should be included in the GBMWHA.
>
> There are many problems associated with the current sand mining such as dust clouds, lowering of the watertable to the detriment of not only the residents of Clarence but also the drying up of swamps and water courses.[84]

7.74 The Blue Mountains Conservation Society noted that expansion of sand mining in the Newnes Plateau area is being considered as part of the Department of Planning's Sydney Construction Materials strategy, before listing some effects of sand mines:

> • they have a disastrous visual impact in terms of the total stripping of vegetation, the dimensions of the quarry and the associated treatment plant and workshops, the dust cloud associated with the workings, and the impossibility of meaningfully rehabilitating the site once the resource is exhausted – this could be visible from the GBMWHA, as well as locally;
>
> • they have the potential to disrupt and contaminate surface drainage and, as quarries deepen, they can lower the local watertable – this is of particular concern to Clarence Village, but it could also impact beyond the immediate area in terms of the drying out of swamps and water courses and the consequent loss of habitat;
>
> • they result in the total destruction of local habitat – this could include threatened and endangered species, and sites of archaeological significance;
>
> • the associated quarrying and treatment machinery and the on- and off-site transport system create noise pollution – this could impact on nearby parts of the GBMWHA;
>
> • related tracks and access roads open the immediate region to unauthorized use and increased fire risk; and

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83 *Submission 78,* p. 5.

84 *Submission 116*, pp 1–2.

> • concern is disproportionately magnified for several quarries in that the impacts are exponentially cumulative.[85]

7.75 Blue Mountains Conservation Society supported Lithgow Environment Group's call for the area to be reserved, but stopped short of asking for the area to be included in the GBMWHA:

> The solution to the problem is clear. If the GBMWHA, the national parks and the ambience of this spectacular region are to be preserved, existing sand extraction should be tapered off and no more licences granted. The region should become protected as a State Conservation area.[86]

7.76 There are also underground coal mines in the vicinity of the GBMWHA, and the Blue Mountains Conservation Society nominated ways that those mines potentially threatened the GBMWHA:

> • subsidence-related modifications to surface drainage (swamps and creeks) in terms of flow volumes and directions, watercourse gradients, and water quality;
>
> • destruction of scenic value through subsidence-induced damage (toppling, cracking and rock falls) to pagodas and cliffs;
>
> • substantial modification to the natural hydrologic regimes due to the mine workings breaching important aquifers – the inflow and disposal of large volumes of groundwater (e.g. 10+ megalitres per day) cannot be disregarded;
>
> • creating a network of tracks (for monitoring the potential problems arising from subsidence) that open the area to trail bikes, 4-wheel drives and other destructive activities.[87]

The Society noted that problems related to subsidence had been addressed in respect of new mines by 'subsidence management plans that present avoidance, minimization and mitigation practices, and/or emplace rehabilitation and compensation commitments.'[88]

7.77 The Tarkine National Coalition identified mining as an ongoing threat to the Tarkine region:

> The values of the Tarkine region were documented for the Australian Heritage Commission by the Tasmanian Conservation Trust in 1992 and while the recent Community Forest Agreement has seen an additional 73,512 hectares protected from logging; this same area has no protection

85 *Submission 29,* pp 4–5.

86 *Submission 29,* p. 5.

87 *Submission 29,* p. 5.

88 *Submission 29,* p. 5.

> from other threats to its natural values such as mining exploration and ore extraction.[89]

7.78 Mining in the Tarkine was also raised by the Tasmanian National Parks Association, who called for reservation of the Tarkine and the Styx Valley:

> Instead, the Tarkine, which contains the habitat of about 50 rare and endangered species, including the wedge-tailed eagle 9 and the giant freshwater crayfish, remains threatened by mining and other forms of development. Only by conferring national park status on the Tarkine and nominating it for World Heritage Area listing can the area be fully protected, as promised in Government publicity. For similar reasons, the TNPA also calls on the State Government to confer national park status on the forests reserved in the Styx Valley. [90]

7.79 The Minerals Council of Australia (MCA) noted that mining activity was inappropriate in some areas, identifying World Heritage Areas as 'no go':

> The MCA recognises that, in some cases, exploration and mining development may be incompatible with the objectives for protected areas, even after all technically and economically feasible steps to reduce adverse impacts have been considered.
>
> In line with the International Council on Mining and Metals (ICMM) commitment of August 2003, the MCA recognises World Heritage Areas as 'no go' zones for mining and exploration. This was widely lauded internationally as a landmark commitment with respect to the interaction between mining and protected areas.
>
> Where existing operations are within or directly adjacent to World Heritage properties, ICMM members, including MCA member companies, will ensure that operations on these sites are not incompatible with the outstanding universal values of these areas, and do not put the integrity of these properties at risk.[91]

7.80 The MCA further noted that they are currently engaged in strategic dialogue with the IUCN in relation to:

- developing and promoting best practice guidance in the area of biodiversity conservation;
- ensuring that the criteria for assessing potential protected areas are based on the principles of sustainable development and include a rigorous science-based assessment that includes both natural resource and mineral values;

89 *Submission 60*, p. 2.

90 *Submission 78,* pp 9–10.

91 *Submission 165,* p. 2.

- developing a science-based set of explicit principles and procedures to assist governments in decisions to restructure the management of degraded protected areas;
- developing a science-based approach to define the conditions under which mining may access (or be excluded from) each of the IUCN protected area classifications; and
- managing the de-designation and/or adjustment to the boundaries of legally designated protected areas.

It is anticipated that the outcomes of this dialogue will provide the basis for an agreed ICMM/IUCN position on:

- 'no-go' areas for mining;
- guidance for companies on biodiversity management; and
- the basis of a nationally consistent system for the management of interactions between mining and protected areas.[92]

92 *Submission 165,* pp 2–3.