



## BACKGROUND PAPER 1: Biodiversity

### *What was said during Time to Talk Canberra 2030*

While the importance of open space and greenery was included in the future scenario, there was no explicit mention of biodiversity. However, biodiversity was most obviously a concern for younger participants who emphasised the need to maintain natural systems within and around the city. They also strongly linked other pro-environment behaviour such as recycling to maintaining biodiversity, suggesting a very holistic perspective on the environment.

### *Definition of issue*

The Australian Government definition of biodiversity is: 'Biodiversity, or biological diversity, is the variety of all species on Earth. It is the different plants, animals and micro-organisms, their genes, and the terrestrial, marine and freshwater ecosystems of which they are a part.'<sup>1</sup>

Biodiversity makes life possible. However, its important role in maintaining human life has historically been underrated.<sup>2</sup> The United Nations Convention on Biodiversity categorises the ecosystem services provided by biodiversity as:

1. **Provisioning services**, the supply of goods of direct benefit to people, often with a clear monetary value, such as timber from forests, medicinal plants and fish.
2. **Regulating services**, the range of vital functions carried out by ecosystems which are rarely given a monetary value in conventional markets. Regulating services include regulation of climate through the storing of carbon and control of local rainfall, the removal of pollutants by filtering the air and water, and protection from disasters such as landslides and coastal storms.
3. **Cultural services** do not provide direct material benefits but contribute to wider needs and desires of society, and therefore to people's willingness to pay for conservation. Cultural services include the spiritual value attached to particular ecosystems, such as sacred groves, and the aesthetic beauty of landscapes or coastal formations that attract tourists.

4. **Supporting services** are not of direct benefit to people but are essential to the functioning of ecosystems and, therefore, are indirectly responsible for all other services. Examples are the formation of soils and the processes of plant growth.<sup>3</sup>

### *Role of strategic land use planning*

Strategic land use planning's main role in maintaining biodiversity is to set aside lands for biodiversity purposes. A secondary role is to facilitate an urban form that, overall, reduces the need to clear habitat and helps people consume less materials, energy and water. To meet the ACT Planning Strategy objectives, strategic and statutory planning needs to:

- protect existing reserves from development for a growing population
- incorporate reserves through the urban fabric of Canberra
- recognise the role of off-reserve conservation measures
- consider and plan to accommodate wildlife movement patterns
- recognise the role of biodiversity in providing a distinct sense of place
- recognise that healthy biodiversity is a foundation of regional resilience.

Biodiversity has significant direct and indirect economic values. Because biodiversity is critical to life, all scales of planning must, at a minimum, consider maintaining biodiversity. A number of existing plans include protection of biodiversity as key outcomes. This includes the ACT Natural Resource Management Council's plan, 'Bush Capital Legacy', the ACT Natural Resource Management Plan 2004–2014, the Integrated Nature Conservation Plan and the Strategic Bushfire Management Plan for the ACT.<sup>4</sup>

Global biodiversity is under enormous pressure from human activities. The third edition of the Global Biodiversity Outlook recently concluded little progress has been made since 2002 to arrest the decline in biodiversity and, in some cases, the pressures on biodiversity are increasing.<sup>5</sup>





'The fossil record shows that the background extinction rate for marine life is 0.1–1 extinctions per million species per year; for mammals it is 0.2–0.5 extinctions per million species per year. Today, the rate of extinction of species is estimated to be 100 to 1,000 times more than what could be considered natural.'<sup>6</sup>

While Australia has a high level of biodiversity, the 2006 National State of the Environment report noted a 'continuing serious decline' which was particularly focussed on areas with high human modifications. The Murray Darling Basin, of which the ACT is part, was specifically named as one of the most affected areas, along with south-west Western Australia, the eastern coastal fringe and the Tasmanian midlands.<sup>7</sup> Overall, approximately 20% of all species in Australia are under threat.

## *What issues does the ACT Planning Strategy need to consider?*

### *Rare and threatened species and urban expansion*

The most recent ACT State of the Environment report noted that development pressure is an ongoing threat to some of the most threatened species, notwithstanding significant improvements in performance between 2003 and 2007.<sup>8</sup> '17 species and 2 communities are listed as endangered and 14 as vulnerable (as of March 2008) under the ACT Nature Conservation Act 1980. Several species, including the Spotted-tailed Quoll and two orchids, were declared threatened during the reporting period.'<sup>9</sup> The report expressed concern about the survival of the two most threatened species in the area, the northern corroboree frog (*Pseudophryne pengilleyi*) and the grassland earless dragon (*Tympanocryptis pinguicolla*) and woodland ecosystems in areas identified for future urban growth.

The primary threat is land clearance for a variety of human uses, including urban development. Other threatening processes include habitat fragmentation, predicted climate change, changed water regimes and the movement of species from one area to another (translocation).<sup>10</sup>

The Office of Commissioner for Sustainability and Environment's recent work on climate impacts on biodiversity looked at the probable impacts on nature reserves. It noted 'The primary strategy is to maintain and enhance fundamental ecosystem processes which in turn support the ongoing ecosystem services provided by the reserves'<sup>11</sup> in concert with adequate funding and effective governance arrangements. Even though there are data and knowledge gaps, crucially it also recommended not to wait for improved climate and impact information before taking the further actions that will enhance the resilience of the nature reserves.

Limiting urban expansion is a key strategy for maintaining biodiversity. This approach is frequently referred to as 'compact city'. A range of sources commend this outcome, including in the ACT's community consultation Time to Talk in 2010.

## *The nature of city development*

The form and structure of urban development can help or hinder biodiversity survival. In 2010, Professor Will Steffen said 'The most effective adaptation approach is to increase resilience of ecosystems and to make space for species and ecosystems to self-adjust as climate shifts. Management strategies include removing or minimising existing stressors and managing for appropriate connectivity.'<sup>12</sup> Many studies recommend promoting connectivity between habitats. Just as people need to move from place to place, so do other species. Habitat connectivity means preserving or creating space for the movement of plants and animals.<sup>13</sup> For example, locally the threshold size for habitat connection is 1.1 km maximum between 10 Ha (100mx100m) minimum size habitats. Maintenance and 'creation' of habitats with linking pathways can help provide the 'living spaces' for self adjustment for a range of different fauna, and detailed consideration is needed in the design and management of the urban interface.

Support for connectivity has been more common in rural areas and less frequent in relation to cities.<sup>14</sup> Canberra only included reference to biodiversity corridors in its planning legislation in 2007. Extending consideration of biodiversity connectivity in cities responds to the recognition that the global population is rapidly urbanising, and the long standing nature/culture split in Western thought.<sup>15</sup> It is desirable that resource management includes biodiversity goals and that measuring and monitoring of outcomes be undertaken for urban, rural and 'nature reserve' areas.

However, biodiversity connectivity is not always easily achieved as cities become intensely developed over time. Major European cities are now looking for ways to restore biodiversity.<sup>16</sup> Luckily, Canberra's planning and development legacy with its structure of towns separated by parkland places it in a better position than many other cities to ensure biodiversity connectivity. The Spatial Plan included provision for wildlife corridors and, since 2004, the ACT Government has commissioned research to enhance its understanding of animal movement patterns. Such research is vital for the planning process.

The recent extension of the reserve network to the north of Canberra has increased the potential to protect important areas of remnant grassland<sup>17</sup> at the expense of urban expansion. However, even a linked system of reserves is unlikely to be sufficient. For example, a study from Greater Vancouver showed the number of linkages needed could not be achieved without off-reserve programs such as encouraging householders to plant native gardens and using utility corridors.<sup>18</sup>

Smaller lot sizes, while an important part of improving land take efficiency, can detract from the possibility of urban back and front yards supporting biodiversity. The disappearing backyard has also been criticised for its potential long term impact on public health.<sup>19</sup> However, a review of the impact of urbanisation on species' richness has shown that blanket conclusions cannot be drawn.<sup>20</sup> High quality design which integrates biodiversity and ecological services from the outset is critical to achieving a sustainable compact city.



## *Behaviour change*

Encouraging pro biodiversity behaviour among residents is also important. For example, the ACT Conservation Council is actively involved in a project to encourage sustainable behaviour among new residents in Gungahlin. Some suburbs in the area have been declared as cat containment areas because of their proximity to the Mulligan's Flat Nature Reserve.<sup>21</sup>

## *Uncontrolled fire*

Canberra's experience through the 2003 bushfires clearly demonstrated the impact fire can have on environmental values more broadly. The initial survey produced after the fires found that 90% of Namadgi National Park and Tidbinbilla Nature Reserve was burnt. 'Habitats for most mammals, reptiles, frogs and birds were considerably altered by the severity and extent of the fires' and, in particular, there were strong concerns for future fish populations given the expected levels of erosion.<sup>22</sup> The surface water quality indicator for the 2007 ACT State of the Environment Report noted the fire's impact on quality in receiving waters.

The 2004 Emergencies Act made mandatory a requirement for a Strategic Bushfire Management Plan. The first plan, released in January 2005, was updated in October 2009. Part three of the plan addresses zoning, establishing a number of zonings which assist in the overall response to fire in the Territory. These are ember zone, inner and outer asset protection zones, strategic firefighting advantage zone, landscape fire management zone, agricultural fire management zone, and cooperative management areas. From a biodiversity perspective, the landscape zone is the most pertinent and is defined as 'areas on government managed lands where planned fire is applied for ecological and catchment requirements, recognising that in some communities, no planned fire will be applied.' Zones, and the more localised fire plans which arise from them, are intended to be reviewed annually.<sup>23</sup> The Territory Plan also has a general code pertaining to fire, which has statutory effect. In particular, it sets out requirements for new areas to mitigate against the effects of bushfire and includes consideration of biodiversity.

## *A liveable city - amenity and enjoyment*

The relationship between biodiversity, amenity and sense of place is also worth considering. And 'any government which relies on property for income will have difficulty accommodating the goals of biodiversity conservation, because as the definition demonstrates, the elements of biodiversity do not necessarily translate into direct monetary value'.<sup>24</sup>

While there is ample evidence that greenery supports mental and physical health, there is still discussion whether any kind of vegetation will do, or whether local native vegetation is preferable.<sup>25</sup> While not natural to the original environment, Canberra's urban forest, made up of a mix of exotic and native species, is much loved by the population. The maintenance of the 'bush capital' remains a clear priority for the community. It would seem a reasonable proposition to combine goals of public health and biodiversity conservation by using local indigenous species wherever possible.

## *Conclusion*

Because of its planning and development in the last 100 years, the garden city and bush capital legacy, Canberra is perhaps one of the cities most likely to achieve good biodiversity outcomes. However, this will require a move away from considering plants and animals as extras, so to speak, on the human stage, and consider biodiversity as the stage on which humans are only one actor. Or put another way, the planning and management of all resources upon which human life depends has to adopt an integrated systems approach to be truly sustainable.



## Endnotes

- 1 Australia's Biodiversity Conservation Strategy, 2010-2030.
- 2 Oliver Morton, *Eating the Sun: How Plants Power the Planet*, Harper Collins, 2009.
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TAMS, ACT Natural Resource Management Plan 2004–2014 [http://www.tams.act.gov.au/\\_data/assets/pdf\\_file/0011/13340/actnaturalresourcemanagementplan2004.pdf](http://www.tams.act.gov.au/_data/assets/pdf_file/0011/13340/actnaturalresourcemanagementplan2004.pdf)  
TAMS, Integrated Nature Conservation Plan <http://incp.environment.act.gov.au/>  
Emergency Services Authority, Strategic Bushfire Management Plan for the ACT, 2004. [http://www.esa.act.gov.au/ESAWebsite/content\\_esa/fire\\_safety/bushfire\\_management\\_plan\\_page/bushfire\\_management\\_plan.html](http://www.esa.act.gov.au/ESAWebsite/content_esa/fire_safety/bushfire_management_plan_page/bushfire_management_plan.html)
- 5 Nicole E. Heller, Erika S. Zavaleta, Biodiversity management in the face of climate change: A review of 22 years of recommendations, *Biological Conservation*, Vol 142, 2009, 14–32. Hillary Rudd, Jamie Vala, Valentin Schaefer, Importance of Backyard Habitat in a Comprehensive Biodiversity Conservation Strategy: A Connectivity Analysis of Urban Green Spaces, *Restoration Ecology*, Vol. 10, No. 2, June 2002, pp. 368–375, Secretariat of the Convention on Biological Diversity. Global Biodiversity Outlook 3 (ISBN-92-9225-220-8) is an open access publication, subject to the terms of the Creative Commons Attribution License <http://creativecommons.org/licenses/by-nc/3.0/>. Copyright is retained by the Secretariat. Global Biodiversity Outlook 3 is freely available online: [www.cbd.int/GBO3](http://www.cbd.int/GBO3)
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- 8 <http://www.environmentcommissioner.act.gov.au/publications/soe/2007actreport/conservingbiodiversity07>
- 9 <http://www.environmentcommissioner.act.gov.au/publications/soe/2007actreport/indicators/nativespecies07>
- 10 Jacqueline de Chazal, Mark DA Rounsevell, Land-use and climate change within assessments of biodiversity change: A review, *Global Environmental Change*, vol 19, 2009, 306-315. See also Auld, Tony D.; Keith, David A. Dealing with threats: Integrating science and management, *Ecological Management and Restoration*, vol 10, Supplement 1, May 2009, pp. S79-S87(9).
- 11 Bob Webb, *Impacts of Climate on the Canberra Nature Park : Risks and Responses*, Report for the ACT Office of the Commissioner for Sustainability and the Environment, February 2011, p40
- 12 [http://www.monash.edu.au/research/sustainability-institute/assets/documents/seminars/msi-seminar\\_10-07-26\\_steffen\\_presentation.pdf](http://www.monash.edu.au/research/sustainability-institute/assets/documents/seminars/msi-seminar_10-07-26_steffen_presentation.pdf) accessed 13 September, 2011.
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- 15 Hess, Scott, Imagining an Everyday Nature, *Interdisciplinary Studies in Literature and Environment* 17.1 (Winter 2010), 85-112; see also Roszak, T, Gomes, M, Kanner, A (Eds) *Ecopsychology. Restoring the Earth, Healing the Mind*. San Francisco: Sierra Club Books, 1995; N. Jardine, J. Secord and E. Spary, eds, *Cultures of natural history* (Cambridge, Cambridge University Press, 1996).
- 16 For example, Copenhagen has set a goal to add two new pocket parks a year in its central area.
- 17 The Office of the Commissioner for Sustainability and the Environment *Report on ACT Lowland Native Grassland Investigation*, March 2009 <http://www.environmentcommissioner.act.gov.au/investigations/investigation>
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