

Ecological Integrity in Parks and Protected Areas in Australia: Concept and Reality

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Abstract

Land use decisions represent great press for governments. Governments can demonstrate their commitment to the environment with the creation of 100's of new Parks and Protected areas and their commitment to industry with the creation of resource security. If the process is sufficiently consultative with the relevant stakeholders, the outcomes tend to be durable. However, this is where government commitment ends. Concepts such as "ecological integrity" and "ecological sustainability" are clearly laudable goals, but the monitoring of how well Parks and Protected areas are performing in the greater landscape is clearly well down on the priority list. The reality of land use decisions is that they represent a vast ongoing landscape experiment where Parks and Protected areas represent the "static" component of a system of retained habitat ("quasi controls") while the managed landscape represents the "dynamic" component of that system (treatment). The effectiveness of these systems in conserving biodiversity is only as good as the sum of their parts. The "treatment" component receives considerable attention, but the "control component" (Parks and Protected areas) are largely ignored. These concepts are discussed from an Australian perspective. In addition, current issues and future directions for Ontario are also discussed.

Introduction

Conserving, restoring and maintaining ecological integrity is the core of Parks Canada's Mandate for National Parks. Parks Canada's definition for ecological integrity is: "An ecosystem has integrity when it is deemed characteristic for its natural region, including the composition and abundance of native species and biological communities, rates of change and supporting processes". In plain language, ecosystems have integrity when they have their native components (plants, animals and other organisms) and processes (such as growth and reproduction) intact (Parks Canada, 2000). My own interpretation of this is that, biodiversity and its supporting ecological processes within a given Park are maintained in perpetuity.

Clearly, this is a worthy goal to strive for, but what does it mean in practical terms? I examine this concept specifically as it relates to Parks and Protected areas in the forests of Northeast, New South Wales, Australia (hereafter NE NSW). I discuss our approach for the identification of Parks and Protected areas and ultimately what we achieved (i.e. the Concept). I then discuss the practical reality of achiev-

ing ecological integrity in greatly modified landscapes and ultimately the future of ecological integrity in Parks and Protected areas as part of an ongoing landscape experiment in adaptive management.

“Concept”

The forested areas of Australia are minute by comparison to Canada. However, what we lack in area, we make up for in biodiversity. Within NSW alone, there are an estimated: 70 Amphibian species, 209 Reptile species, 474 Bird species, 174 Mammal species and more than 15, 930 plant species, and most of these occur in NE NSW (EPA, 2000).

For over two decades in Australia the competing demands of conservation and industry on our forests have been an area of debate and controversy. In an attempt to settle this controversy, the then government devised the National Forest Policy statement, which defined a long-term plan for Australia’s forests (Commonwealth of Australia, 1992). This initiative was established to ensure resource security to the timber industry and the long-term conservation of forests. Fundamental to this was the achievement of a CAR reserve system in concert with ecologically sustainable forest management in the intervening landscape. The principles of a CAR reserve system include:

- *Comprehensiveness* – which aims to secure biodiversity across all forest communities based on an agreed national scientific vegetation classification,
- *Adequacy* – which is based on reserve areas being of sufficient size to maintain the viability and integrity of native forest populations, species and communities and
- *Representativeness* – which seeks to ensure that the diversity within a native forest community is conserved across its environmental and geographic range.

These over-arching principles provided the foundation for the development of the Nationally Agreed Criteria (JANIS) for the establishment of a CAR reserve system for forests in Australia (Commonwealth of Australia 1996). This pivotal document, negotiated between the Commonwealth and States, was the primary driver for the reserves. The final process developed for NSW included:

- Interim protection of forests that could contribute to a CAR reserve system,
- Comprehensive regional assessments (CRA’s) of environmental, economic and social values of forests within a region, and
- Negotiation of regional forest agreements (RFA’s) between Commonwealth and State governments and stakeholders for long term management and use of forests within each region.

The Interim Assessment Process (IAP), Comprehensive Regional Assessments (CRA’s) and Regional Forest Agreements (RFA’s) would each fill an entire PRFO publication by themselves. I will therefore focus on the salient points of the process, critical products and developments and the final results achieved.

One of the most visionary points in the process came when the Commonwealth and State Governments made a commitment to the allocation of 4.6 million dollars, specifically for the development of the best possible biodiversity data layers and targets to inform their decisions. Moreover, these funds were allocated in accordance with a strategic framework that was directly linked to the JANIS criteria. These data were compiled across all tenure for the UNE and LNE CRA Regions, an area of 10 million hectares (Figure 1) and enabled extremely effective bioregional planning.

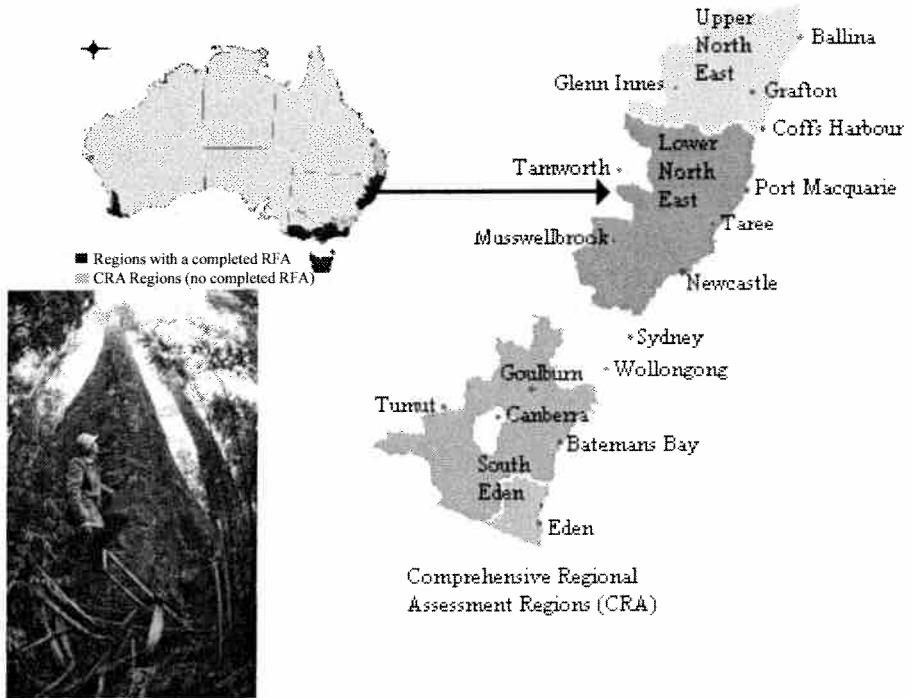


Figure 1. UNE and LNE CRA Regions in NE NSW, Australia, and an example of the forests.

I was personally responsible for all biodiversity projects in NE NSW. We had 18 months to: (1) conduct a comprehensive audit of all existing vegetation, fauna and flora data, (2) build databases to store and manage these data, (3) identify environmental and geographic gaps in all data sets, (4) conduct systematic vegetation and fauna surveys to fill the gaps, (5) conduct targeted fauna and flora surveys for priority species (i.e. SAR), (6) develop and model a new forest ecosystem classification, (7) develop an old-growth data layer, (8) model all priority fauna and flora species, (9) identify all areas of high quality wilderness, and (10) develop additional data layers including centers of endemism, refugia and areas of high biodiversity.

We also developed the associated reservation targets for all biodiversity data layers including: 206 forest ecosystems targets, 195 Old growth targets, 144 priority fauna species targets and 840 priority flora species targets. We then used C-Plan to assimilate this vast quantity of data and targets, and to develop our reserve options (Pressey, 1999), and FRAMES to determined sustainable wood volume associated with each option (NSW Government, 1999c).

For the UNE and LNE CRA regions, we established a total of 405,000 ha of new Parks and Protected Areas with 85 new parks and 37 additions. This was a 17.8% increase in the Parks and Protected area system within the UNE and LNE regions combined, (see Table 1) and increased the total area of Parks and Protected areas in NSW to 6.2%.

Table 1. New Parks and Protected Areas established in the UNE and LNE CRA Regions as part of the CRA/RFA Process.

Parks and Protected Areas	Number	Hectares
Parks and Protected Areas < 1996		1,758,400
New Additions		
National Parks and Nature Reserves	85 New, 37 Additions	382,000
State Forest Flora Reserves		3,818
Crown Reserves		20,080
Total		405,898
Total Parks and Protected areas 2000		2,140,400
Industry (279,000m ³) High Quality Saw Logs/yr (80% of the NSW Production)		
% Increase 1996-2000		17.8

“Reality”

With the establishment of the new Parks and Protected Areas, the government and public believed that, all biodiversity was safe in perpetuity. The reality is:

1. Political vs. an Ecological decision

Even with the best available data and best possible tools, a scientific decision ultimately becomes a political decision. The conflicting expectations of a CAR reserve system and a sustainable Timber Industry resulted in a compromise where many conservation biodiversity values were not represented in the CAR reserve system.

2. Biases in the reserve system

Our final reserve system in the UNE and LNE CRA regions was biased toward steep, unloggable, and infertile areas (Figure 2). The reality is that we were not starting with an undisturbed landscape. The landscape had been subject to anthropogenic disturbances for 200 years. All flat fertile areas were largely cleared for

agriculture and all remaining areas with intermediate fertility and slopes were the heartland of the timber production areas. In addition, our negotiations were constrained to Public Land only. What this meant was that our ability to create a CAR reserve system was greatly constrained due to our inability to consider the least represented areas; flat, fertile and Private Lands.

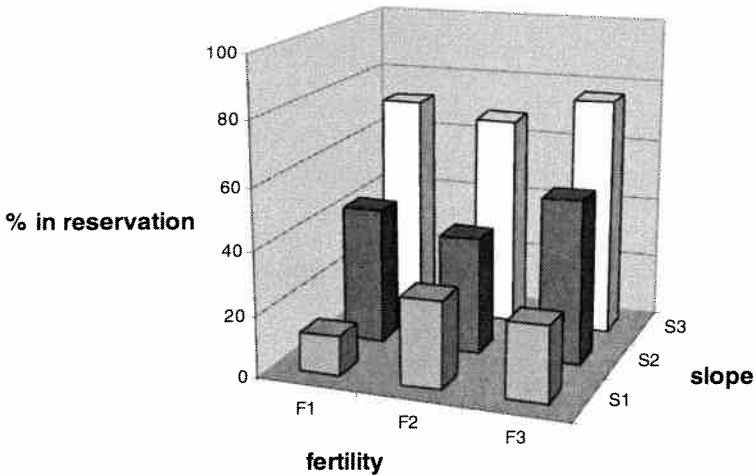


Figure 2. The percentage of different slope and fertility classes protected by reserves on Public Land in the Southern CRA Region, where: F1= High fertility, F2=Intermediate fertility, F3= Low fertility; S1= Flat, S2=Intermediate Slope, S3=Steep (NB: The Pattern for the UNE and LNE CRA Region is similar).

3. Meeting Targets

In the UNE CRA region there were a total of 162 forest ecosystem targets and 144 old growth targets (NSW Government, 1999a). Likewise for the LNE CRA Region, there were a total of 198 forest ecosystem targets and 169 old-growth targets (NSW Government, 1999b). In both regions, although some forest ecosystem and some old-growth targets were met (18-42%), many were not (58-82%). Moreover, many of the forest ecosystems and old growth units not captured in the reserve system were highly vulnerable (33-52%) (see Table 2).

Table 2. The achievement of forest ecosystem targets in the final CAR reserve system for the UNE and LNE CRA Regions.

	Total Targets	Number of Targets met	Number of Targets not met	Number ranked as highly vulnerable
Upper North East CRA Region				
Forest Ecosystem Targets	162	59	103	74
		36.4	63.6	45.7
Old-growth Targets	144	26	118	76
		18.1	81.9	52.8
Lower North East CRA Region				
Forest Ecosystem Targets	198	83	115	87
		41.9	58.1	43.9
Old-growth Targets	169	59	110	56
		34.9	65.1	33.1

4. Species at Risk

The selection of the CAR reserve system was based largely on the achievement of representation targets for forest ecosystem and old growth, with less emphasis placed on the selection of priority species. This meant that many of the targets for Species at Risk were not met within the reserve system. In NSW alone, 321 species are presumed extinct, 367 endangered, 77 vulnerable, 87 threatened (see Table 3). Representation targets are easier to achieve than species targets. Almost all Species at Risk in NSW are subject to ongoing threatening processes (see below). Moreover, many of these processes continue to operate irrespective of tenure. That is, even with the establishment of the best possible reserve system, there are no guarantees that certain species or communities will persist. Key threatening processes in NE NSW include:

- The invasion of native plant communities by pest species including: Bitou bush, Camphor Laurel, Broom, cat's claw vine, Lantana;
- The presence of vertebrate pest species within Parks and Protected areas and in particular the predation of native fauna, such as critical weight range mammals (0.5-5kg) by the European Fox (*Vulpes vulpes*) and the domestic cat (*Felis catus*). For example, Foxes occur in 73% of reserves and cats occur in 56% of reserves;
- High frequency of low intensity fires resulting in the disruption of lifecycle processes in plants and animals and the loss of vegetation composition and structure critical for other taxa (EPA 2000).

Table 3. Species listed under the Threatened Species Act in NSW

Taxa	Species presumed extinct	Endangered Species	Vulnerable Species	Threatened Species	Endangered populations	Estimated total species in NSW
Amphibians	9	14		33		70
Reptiles	6	25	1	15		209
Birds	25	76	12	1	2	474
Mammals	13	47	27	34	6	174
Invertebrates	7			1	1	
Plants	261	205	37	3	8	15,930
Total	321	367	77	87	17	16,857

In addition, many space demanding species, such as the Koala, Owls and Quoll move freely on and off reserve areas. The critical point is that losses incurred outside the park are not sufficiently great, that the long-term viability of these populations is compromised. In addition to the above issues, the process for developing recovery plans for terrestrial flora and fauna is slow. Of the total of 680 recovery plans required, 3 have been approved, 8 have draft recovery plans exhibited for public comment, 39 have been completed to first draft and 97 are in preparation (EPA, 2000).

Ecological Integrity

For NE NSW, given that Parks and Protected areas: (1) were based on a final decision that was political rather than ecological, (2) tend to be constrained to steep, infertile or inaccessible areas, primarily on Public Land, (3) that numerous representation targets were not met for vulnerable forest ecosystems and old-growth, (4) that many targets for those elements most in need of protection (i.e. Species at Risk) were not achieved, and (5) that many threatening processes continue to operate irrespective of tenure, then, how can we expect our Parks and Protected areas to support a full range of biodiversity, let alone the ecological processes that support it?

The reality is that Ecological integrity is a much larger issue than the parks themselves. To ignore the intervening landscape in which parks and protected areas are embedded is foolhardy. The reality is that Parks and Protected areas represent the static component of a system of retained habitat. The management guidelines applied to the intervening landbase represent the dynamic component of that system (i.e. the retained habitat is dynamic in space and time). Ultimately Parks and Protected areas in concert with the management guidelines applied to the intervening landscape create a “system of retained habitat” designed to conserve all elements of biodiversity.

The outcomes of any landuse decision like the CRA/RFA process in Australia or the OLL process in Ontario, represents a vast landscape experiment. The landuse decision in Australia was fortunate to have been based on vast quantities of high quality biodiversity data and sound reserve selection criteria which included priority species and a process that was at least initially more scientific than political. In contrast, the OLL landuse decision in Ontario was based on the representation of broad landscape surrogates (i.e. unique combinations of vegetation and landform within a site district), with only limited consideration of viable populations of Species at Risk.

Irrespective of the limitations of the two processes outlined above, both represent vast landscape experiments in adaptive management. For space demanding fauna species, Parks and Protected areas likely act as “source” habitat, while the intervening landscape may act as a “sink”. The critical issue is that Parks and Protected areas in combination with forest management guidelines must ensure that in the long term, the effects of source habitat are greater than or equal to the effects of sink habitat. This means that Park Organizations on the whole need to step outside their silos and start to view Parks in a Landscape context.

The adequacy of any system of retained habitat needs to be evaluated to ensure that it is doing its job, that is, maintaining biodiversity and its supporting ecological processes. The RFA's in Australia span a period of 20 years, with a review every 5 years and annual reporting on a range of indicators. It was recognized that

in any budget cuts, the first thing to be cut would be monitoring and inventory programs. Governments have difficulty reporting the successes of monitoring programs. In a world of deliverable's and good news stories, governments are reluctant to commit to long term monitoring programs. Instead, they require projects with short- term "positive" deliverables and success stories that operate within a political term.

Recognizing this, the Ecologically Sustainable Forest Management (ESFM) Committee produced a rationalized set of indicators that are to be trialed during the first five year period of the RFA's to ensure that they are: practical, measurable, cost effective and capable of being implemented at a regional level (ESFM Technical Committee, 1999). Although \$11.6 million/year has been allocated to the management of the CAR reserve system, there is no commitment, by either the Commonwealth or State Governments regarding allocation to ecological monitoring. To date, agreement has been given to the monitoring of category A indicators (i.e. those for which considerable data is already available such as forest extent, extent of forest types within reserves, etc). All other indicators, (i.e. those which require the gathering of new or additional data), require further consideration.

Long term, financial commitment from governments and other partners, such as the timber industry, beyond a political term are essential to evaluate the effectiveness of both our Park and Protected areas and the ecologically sustainable forest management on the intervening landscape. In addition, large Wilderness Parks have the potential to act as controls in the greater landscape. Ultimately an integrated, long-term, cost effective approach to ecological monitoring and adaptive management are essential for the maintenance of biodiversity and ecological integrity on into the future. Australia is taking its first tentative steps in this direction.

Conclusions

This essay was, by necessity, broad. The bottom line with ecological integrity in Parks and Protected areas is that there are certain values within Parks that can be dealt with within the boundaries. However, the integrity of Parks and Protected areas as a system, requires a landscape view of the world and effective consideration of the role of Parks and Protected areas in a landscape context. This requires good seamless biodiversity data sets such as vegetation composition and growth stage and priority species as a minimum. At the present time, Parks and Protected Areas in Ontario are the largest holes in landscape biodiversity data sets, or any biodiversity data sets for that matter. This means that Ontario Parks has no ability to evaluate ecological integrity within its Parks let alone on a landscape scale. In addition, the areas selected in OLL were based on achieving representation targets within site districts using coarse surrogates based on vegetation and surficial geology. The most vulnerable elements, viable populations of Species at Risk were considered in only a limited way or not at all. If Ontario Parks is serious about ensuring the ecological integrity of its Parks and Protected areas then it needs to

do a few things:

- Firstly, Ontario Parks needs to make Protection and Ecological Integrity its highest priority and this needs to be reflected in the Act, as Parks Canada has done,
- Secondly, Ontario Parks needs to collect fundamental baseline data that is equivalent to the intervening landbase, (e.g. Forest Resource Inventory data) and data on sensitive taxa such as Species at Risk, so that seamless data are available across all tenure, and
- Finally, a cost effective, integrated, ecological monitoring program, that targets specific indicators needs to be established to ensure that those values most in need of protection are effectively considered.

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