

THE STATE OF BIODIVERSITY IN THE BATHURST BASIN

(Edited extracts from an informal scientific paper by W. Feebrey M.App.Sci. B.Ed)
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Biodiversity: *"The variety of all life forms – the different plants, animals and micro-organisms, the genes they contain and the ecosystems of which they form a part"*.
(State of the Environment Advisory Council 1996, Ch. 4, p.4)

The first Europeans to come across the 'Bathurst Plains', as they described this region, were the early explorers like G. Blaxland, William Cox and George Evans as well as early visitors like Governor Macquarie, Major Antill, Allan Cunningham, Charles Darwin and others. Descriptions given by these people of the 'Bathurst Plains' in their journals give us some clues to the historical situation in terms of the most obvious aspect of biodiversity – flora (and to a much lesser extent fauna).

Evans described the 'Bathurst Plains' in his Journal of December 1813 as:

"a fine plain of rich land.....the soil is exceedingly rich and produces the finest grass intermixed with a variety of herbs; The hills have the look of a park and Grounds laid out.....it is in general the sweetest of any open country." (Greaves 1961, p.3)

The description of "a park and Grounds laid out" and "open country" is suggestive of some sort of savanna grassland or savanna woodland community, with open grassy spaces between groupings of trees.

Governor Macquarie described the Bathurst Plains in his Journal of May 1815 as:

"one of the finest landscapes I have ever visited.....the soil is uncommonly good and fertile fit for every purpose of cultivation and pasture, being extremely well watered and thinly wooded" (Greaves 1961, p.6)

In his journal, Macquarie also makes reference to the sighting of emus and kangaroos, "two native dogs" (dingo) "a fine black swan" and "a very large water mole" ("duckbill platypus"). The later being shot near the Macquarie River headquarters. (Greaves 1961, p.6)

In his journal Evans expressed his astonishment at *"the exceedingly large fish that are caught in the river"*. (Greaves 1961, p.4)

These fleeting references hint at the diversity of fauna present here in the early 1800's.

A much fuller and more comprehensive overview of the early descriptions of the 'Bathurst Plains' by explorers, visitors and very interestingly, landscape artists (see Appendix Photographs A) can be found in **W.S Simple's Native and Naturalised Shrubs of the Bathurst Granites: Past and Present** in **Cunninghamia** Vol 5(1) 1997.

For example, Darwin in an 1836 description of Bathurst wrote:

“.....In the afternoon we came in view of the downs of Bathurst. These undulating but nearly smooth plains are very remarkable in this country, from being absolutely destitute of trees” (Semple 1997, p.57)

Much of the historical knowledge of the vegetation of this region is based largely on the early works of people like Cunningham, Clunies Ross, and Cabbage.

One of the first attempts to describe the vegetation of the region was made by **Allan Cunningham**, the botanist explorer, on his visit to the district in 1822. One of the districts best known riparian zone trees casuarina cunninghamiana or native she oak is named after him.

In 1898, **W.J. Clunies Ross** described the flora of the Bathurst region in relation to its geology in his article - **Notes on the Flora of Bathurst and its Connection with the Geology of the District, published** in the report of the seventh meeting of the Australasian Association for the Advancement of Science held at Sydney in 1898.

In 1902, **R.H. Cabbage** published his **Notes on the Botany of the Interior of New South Wales** in the proceedings of the Linnean Society of NSW, Volume 27. Here Cabbage describes the vegetation from Forbes to Bathurst.

Much more could have been known about the local biodiversity of this and other regions in Australia if the early settlers had bothered to consult the long time custodians of this land – the Aboriginal people. The local **Wiradjuri people** would have been able to provide us with a vast storehouse of information about the natural history and ecology of this region based on at least 40,000 years of occupation. Unfortunately a great deal of this local knowledge has since died out and been lost forever.

After the establishment of the township of Bathurst by Macquarie in 1815, the region was quickly taken up for pastoral interests. This along with the Gold Rushes of the mid 1800's lead to rapid population increases and subsequent clearing of land, soil erosion, environmental degradation and impacts on local biodiversity.

For example, the fire regimes that much of the vegetation of the region was adapted to began to change with European settlers putting out the lightning strike fires and a severe reduction in Aboriginal 'firestick farming'. This later practice often put forward as the reason for the absence of trees on lower hills and floodplains of the Bathurst Basin.

Settlers not only introduced their hard hoofed sheep and cattle to the region but were also responsible for the introduction of a large variety of other animal species like cats, dogs, rats, rabbits, foxes, hares and many others.

Exotic vegetation was also introduced like Willows and Blackberry as well as dozens of other garden plants that have since run wild. Farmers planted new species of pasture grasses windbreak and shelter trees. Poplars have been popular in avenues along the floodplains. In the towns and villages, parks, gardens and roadsides were planted with European trees and shrubs in an attempt to replicate the “mother country”.

This manifold variety of introduced plants and animals was to have significant negative impacts on both the environment and the biodiversity of the region that continues today.

It is important to note that not all of the impacts are necessarily negative. For example, a reduced fire regime has probably allowed more native trees to survive to maturity in some areas. Introduced plantings of trees in town and on farms probably mean that there are now more trees on the floor of the basin than ever before. Comparisons of Photographs of Bathurst taken in the late 1800's with today's vegetation situation would tend to support such a claim.

These trees, whether native or introduced, provide habitats for a range of fauna from insects to possums and importantly birds. It is highly probable that some species of birds are more numerous in the 'Bathurst Basin' today than before European settlement. The magpie comes to mind as its preferred habitat is duplicated in parks, gardens and on farms throughout the district.

The fencing off of land -especially along the rivers, the hunting of native fauna for food and sport, the impacts of domestic and feral animals, the changing nature of vegetation, has forced much of the wildlife to seek refuge in the more rugged, heavily wooded uplands surrounding the Basin. Over the years these upland areas have proved far less useful for agriculture and it is in these upland areas where much of the regions biodiversity can be found today.

This is not to say that the upland areas of the basin have been entirely free of human modification. Large tracts of native forest in the higher rainfall areas to the east, south and west of the basin have been replaced by conifer plantations of radiata pine.

Although about 50% of the regions birds and some small ground dwelling animals and large herbivores have been recorded within these plantations by State Forests, this altered habitat is generally less attractive than native forest. To quote State Forests "***unthinned pine plantationsform only a poor habitat for larger types of wildlife. Under extreme conditions (eg. snowfall) the plantations can provide valuable shelter.***" (Forestry Commission of NSW, 1987 p.12)

One of the most degraded ecosystems within the Basin since European settlement has been the riparian zone ecosystems of the streams that form the Upper Macquarie Catchment.

Poor farming practices along the river banks (like grazing stock to the waters edge) have seen much of the riparian under story disappear. Willows, blackberries and other exotic vegetation have taken hold "muscling out" the native riparian zone trees like Ribbon Gum (*e.viminalis*) and Apple Box (*e. bridgesiana*) in the higher catchments as well as the native river She Oak (*Casuarina cunninghamiane*) in the lower catchments.

Professor David Goldney suggests that aerial photography of the region show as much as 75% of the catchments streams are infested with various species of Willow.

Landcare groups in the region have been active in attempts to eradicate Willow from along the local waterways. An expensive, time consuming and difficult task but best practice methods are slowly emerging.

Willow and blackberry are not the only problems along the streams. A recent report by Green Corps volunteers working along the Macquarie from the Evans Bridge to the Eglinton Bridge identified at least 27 weed species infesting the river banks.

Willows and other exotic plants alter habitats making it difficult for some species to survive. It has been suggested that the dense matted root systems of Willows make it difficult for Platypus to burrow into stream banks, putting additional stress on an already reduced population of this species in the region.

So in summary, what is known about the regions biodiversity?

There appears to be a reasonably large amount of information available, both historical and contemporary, on the flora of the region, including the trees, shrubs and grasses of the region.

Bill Semple from Orange DLWC appears to be one of the major contributors to this contemporary knowledge.

There appears to be less information readily available about the fauna of the region, although the contemporary vertebrates appear to be reasonably well recorded by people like **Max Beukers** for NPWS. Historical records on fauna are slim. **Gary Howling** in his Remnant Vegetation Survey for the **Central West Catchment Management Committee**, 1997, observes that “*Baseline information for the catchment derived from the nineteenth century is virtually non-existent.*” (Howling 1997, p122)

He identifies only one source on the natural history of the Macquarie River Valley – **Suttor** (1842).

The situation is even worse for invertebrates, fungi and micro-organisms at both an historical and contemporary time scale. Despite their importance at an ecosystem level they appear to be poorly recorded and studied.

As Howling writes of invertebrates in his report “*a lack of appreciation of invertebrate diversity within both the scientific community and general public has seen invertebrates severely neglected. This neglect is reflected in the general lack of published taxonomic or ecological information available about invertebrates in the Central West Catchment; no detailed surveys of invertebrate diversity have been carried out within the catchment.*” (Howling 1997b, p.128)

The plight of the Yetholme Butterfly appears to be one of the few exceptions to this.

The general lack of scientific knowledge about invertebrates, fungi and micro-organisms is an area of major concern at both the local and national level. The 1996 Australia: State of the Environment Report discusses “*the strong bias in knowledge towards large conspicuous life forms*” despite the fact that “*most biodiversity is either invertebrate or microbial.*” It goes on to say that “*many of our invertebrate groups are poorly known, poorly collected and not yet adequately described.*” (State of the Environment Advisory Council 1996, p.30)

Howling and others stress the need for the collation of as much data as possible on these lower life forms. This information will be “*vital to the process of making sound decisions which are likely to impact on the long-term persistence of species on a local level.*” (Howling 1997b, p122)

The 1996 State of the Environment report puts it more succinctly:

“It is extremely difficult to respond to changes in the state of biodiversity if we do not possess the basic information about what it is and how it is distributed”

(State of the Environment Advisory Council 1996, p.30)

CONSERVATION RESERVES

Most of the reserves within this region are to be found on Crown Land in the higher rainfall upland ridges on poorer soils. These areas are generally much less useful for agriculture and this is largely why they are still intact today.

This is in keeping with the pattern of reserves found throughout Australia as discussed by **Recher** in his **1993** article **Why Conservation Biology? An Australian Perspective**. Recher writes of Australian Reserves that “*many, perhaps the great majority have been established on lands unsuited for other uses; land. that is infertile, remote, and rugged.*” (Recher 1997, p.7)

In the Bathurst region, several important conservation reserves can be identified, the main ones being:

- **Evans Crown Nature Reserve** – 2kms south east of Tarana consists of 425 hectares of open eucalypt woodland country overlooking Tarana and the Fish River.
- **Freemantle Nature Reserve** - 35 kms north west of Bathurst is made up of 361 hectares of dry open eucalypt woodland mainly red stringybark and box vegetation.
- **Peel Native Flora and Fauna Reserve** - 12 kms north of Bathurst consists of 142 hectares of Red Stringy bark – Red Box community, once the Peel village common
- **Wambool Nature Reserve** – 20kms east of Bathurst and comprising 194 hectares of dry open eucalypt woodland.

- **Winburndale Nature Reserve** – 30 kms north east of Bathurst;
This is the largest local reserve with 10,050 hectares of mixed eucalypt woodland and open forest on shales and quartzites with significant montane forest communities.
- **Macquarie Turon Heritage Lands** – the Bridle Track from Bathurst to Hill End.
This track, which follows the course of the Macquarie/Turon rivers to Hill End, contains some important and increasingly rare riparian reserves along the rivers including significant stands of *Casuarina cunninghamiana*.

As well as these reserves there are also significant areas of Native State Forests to be found, once again, on the more rugged ridge country especially to the east and south of Bathurst.

Some of the larger and more important of these include Sunny Corner State Forest, Turon State Forest, Hampton State Forest, Mount David State Forest, Vittoria State Forest and Macquarie Woods.

The reserves and forests above, with the exception of Winburndale, are generally small, fragmented and isolated from one another. As Recher and others point out, small and discontinuous reserves are likely to be unsustainable in the long run due to variables such as global warming and the inevitability of species extinctions within reserves caused by isolated breeding populations and shrinking gene pools. (Recher, 1997, p.6)

Whilst these reserves may be representative of the biota of the more rugged uplands of the ‘Bathurst Basin’, they cannot be representative of those areas of the region, especially on the more fertile granite country, that has been extensively modified by agriculture and other human activity.

Much of the original vegetation associations of the ‘Bathurst Plains’ described by the early explorers and botanists (ie. Grassy Box Woodland associations) may today only be found in small isolated fragments in places like village cemeteries, along road verges, railway easements and in isolated paddocks. The original river associations, as discussed earlier, are becoming even harder to find.

Surprisingly though, it has been suggested by local agronomist Bruce Clements amongst others that the native grasses of the region are more numerous than many people believe

According to Bruce many of the local native grasses such as Kangaroo grass, Wallaby grass and Red grass on the granite as well as Weeping grass and Corkscrew grass on the ridges are actually more numerous than presumed. The seasonal nature of many of these grasses means that they are “summer active and winter dormant”. A winter survey of local pastures might yield a result of 85% non-native grasses (introduced) and only 15% native. But a summer survey might yield 30% or more native grasses. (Bruce’s figures)

Bruce also argues that outside of the cultivated paddocks and pastures that these grasses are more numerous and widespread than is commonly thought.

Conclusion:

Is the knowledge of biodiversity adequate?

Adequate for what purpose? Assuming the purpose is conservation - the answer is probably not.

Whilst there seems to be a lot of information available about local flora including trees, shrubs and grasses as well as good information on the larger fauna there appears to be significant gaps in our knowledge of local invertebrates, fungi and micro-organisms. This appears to be a pattern common across Australia.

As Howling and others have pointed out it is very difficult to make planning decisions about remnant vegetation when we are unsure as to exactly what species might be in a particular locality. Without knowing the specific requirements of a myriad untold number of minor fauna it is difficult to know how to conserve them.

In his Remnant Vegetation Strategy for the Central West Catchment, Howling argues that our current lack of knowledge and the large number of species involved prevent us from adopting a species by species approach to their conservation. He suggests that *“the effective conservation of invertebrates can only be achieved through conservation of their habitat, a process which is dependent on the development of a comprehensive list of significant invertebrate habitats in the Central West.”* Such a list is yet to be compiled.

This idea is taken up by **Gary Meffe** et al, in **Principals of Conservation Biology**. These authors question the usefulness of a ‘species by species’ approach to conservation and argue instead for a larger scale ecosystem level approach to conservation. In protecting the ecosystem we protect all the species that are found within it. They talk not of endangered species but rather endangered ecosystems. They go on to say that **“the ecosystem level approach affords perhaps the best hope for biodiversity conservation at all biological levels”** (Meffe et al 1997 p.84.)

Is the level of Conservation Reserve adequate?

Once again the answer would have to be probably not.

Whilst there are some important conservation reserves in the Bathurst region, most notably Winburndale because of its size, most of the reserves are small fragments often geographically isolated from each other. These Reserves are generally found on Crown Land in the more rugged uplands of the region. They have poorer less fertile soils and, because of this and their topography, they are much less suited to agriculture. This is probably the reason they still exist today.

These reserves are reasonably representative of the dry open eucalypt woodland and forests that can be found on higher ridge country. What is missing from the reserve system is a viable representation of the grassland communities described by the early explorers on the lower slopes and plains of the region.

These grasslands have undergone major human modifications as described earlier in this paper.

Recher, amongst others, would argue strongly for the inclusion within the reserve system of land such as this, land “*with nutrient rich soil and low topographic relief having significant economic value for agriculture. Land that is already in commercial use.*” (Recher 1993, p.11)

It is these types of lands that are conspicuous by their absence in local and Australian conservation reserves.

As Recher points out these lands would require significant ecological restoration. The politics of reserving these lands would also be complex. (Recher 1993, p.11)

However, if carefully chosen, these lands could be used to link some of the fragmented reserves found on the higher ridges along the lines of the concepts of **integrated landscape ecology and bioregional planning** discussed in the 1996 State of the Environment Report. (State of the Environment Advisory Council 1996, p.47)

The Winburndale “Green Corridor” project provides a local example of this sort of “landscapes linkages” approach to land management. Although I think Recher has somewhat larger areas than river corridors in mind.

Whilst a useful start, river corridors may not be the best response to the integration of landscapes. The small relative size of river corridors may actually inhibit the support of viable wildlife populations. (Howling 1997b, p.133)

Some Final Words:

Whilst the knowledge of biodiversity and the levels of conservation are probably not adequate, as discussed above, this author believes that there are some very good reasons to feel optimistic about the future of conservation efforts in this region and throughout Australia.

For a start, community attitudes to the environment are changing for the better, with individuals and community groups more informed and more active than ever before. Groups such as Landcare, Rivercare, Conservation Volunteers, Greening Bathurst Boundary Road and Green Corps to name a few provide a great deal of hope for the future.

It is particularly pleasing to see young people becoming increasingly concerned and involved in conservation efforts within this region and across Australia. The Bathurst Macquarie Rivercare Schools Propagation Nurseries Project will provide local school students with a powerful response to a raft of negative environmental issues that they learn about at school or hear about in the media on a daily basis.

Mentioned earlier is the need for a more holistic and less fragmented approach to conservation management. Howling and others give great hope and encouragement that just such a coordinated and complementary approach is emerging.

Local councils, farmers, industry and big business as well as government departments and semi government authorities appear to be increasingly working cooperatively with individuals and community groups to develop the strategies required to combat the environmental degradation and loss of species that has characterised the first 200 years of European settlement.

It will be vital that these coordinated approaches are supported by significant local research and good science.

The signs for the future of conservation in this region are positive but much more will need to be done to prevent further degradation and species loss.

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@ <http://www.cbn.org.au/member/cbn/projects/bionet/bionet1.html>

- Department of Land and Water Conservation Website.

@ <http://www.dlwc.nsw.gov.au>

- Environment Australia Online

@ <http://www.environment.gov.au/>

- Environment Protection and Biodiversity Conservation Act (EPBC Act) Online Database.

@<http://www.environment.gov.au/epbc/>

- Murray Darling Basin Initiative.

@ <http://www.mdbc.gov.au/>

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@<http://www.environment.gov.au/bg/nrs/ibraimcr/ibrstate/nsw.htm>

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Informal Interviews: (all interviews conducted Feb/March 2001)

Michael Andrews – Australian Trust for Conservation Volunteers, Bathurst,
Steve Burrows – Author of ‘*Vegetation of the Oberon, Bathurst and Orange Regions*’
Bruce Clements – District Agronomist, Dept. of Agric., Bathurst Office,
Marcus Croft – Co-author of ‘*Forest and Woodland Cover in the Central Western Region of New South Wales Prior to European Settlement*’.
Clayton Miller – Catchment Advisory Officer, DLWC, Bathurst Office
Ray Morcom – Chairman Vale Creek Landcare Group, Bathurst,

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