

## **Biodiversity: Who Knows, Who Cares?**

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### **Abstract**

Biodiversity is an abstract concept, attracting various responses from different people according to where they have come from and what ecosystems they have been closely linked to. In theory, most people would agree that protecting biodiversity is an important process, but in practice, few people commit to actions on a local level. This paper explores a situation faced in the Northern Territory where environmental educators seek to engage hearts, hands and minds to protect biodiversity but it is difficult to gain commitment given a diverse and transient community such as exists in Darwin. The survey of 175 tertiary students at Charles Darwin University develops insights into how individuals perceive and name local mangrove and savanna ecosystems, and which areas they would want to conserve. Results have implications for local environmental education. Suggestions are made about how awareness of and actions for biodiversity in the Top End could be extended.

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### **Biodiversity: Who Knows or Cares?**

Reference to biodiversity has been included in Australia's formal education curriculum in physical and social sciences. Even so, the term, and the concepts linked to the term, may not be permeating into perceptions of the general public. This paper seeks to identify factors that influence recognition of and responses to visual representations of various ecosystems. Preparedness to act for biodiversity is also analysed from responses of a diverse population of university students in a survey conducted in 2005/2006. The research is driven by the wish to inform environmental educators so they can focus on clarifying terminology and developing programs that address deficiencies in understanding, particularly at a local level in the Top End of the Northern Territory.

"Biodiversity" is a relatively recent term, synthesised to help denote an urgency to recognise plant and animal species extinctions; rallying a worldview which includes respect for other species. Biodiversity is a term promoted by environmentalists such as Paul Ehrlich and Thomas Lovejoy since the late 1970s and gives a focal point for discussing environmental issues ranging from the effects of global warming to local park management (Harmon, 2001).

As Australia has lost 350 species in its recent past, it is important to understand public response to threats to biodiversity (International Union for Conservation of Nature and Natural Resources, 2004). Admittedly, much of this loss of diversity in various ecosystems has been caused by a lack of knowledge of the limits of agricultural

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practices and blindness to Indigenous people's understanding of biodiversity values in European colonial eyes in the past (Langton & Rhea, 2005). However, today, media coverage about biodiversity loss (ABC News 2006) and national education programs as reflected in the learning frameworks in the Northern Territory (Northern Territory Education Department, 2000), should have raised a general awareness of the importance of conservation and a willingness to reverse biodiversity loss in Australia. This paper seeks to raise questions about how to educate adults to identify and respond to biodiversity on a local level.

### **Responses to Australian Biodiversity**

Environmentalists, artists and social scientists have presented personal responses to Australian ecosystems. Analysis and interest in Australians' identification with and concern for natural environments has been explored in a number of texts which seek a post-colonial response to places in Australia (Bonyhady & Griffiths, 2002; Plumwood, 2002; Read, 2000; Seddon, 1997). These recounts are primarily narratives which engage with the writer's perspective about a particular area of land, and may in turn provoke the reader to reflect about their own perceptions of Australia's natural ecosystems. Further studies include accounts by Indigenous people, drawing on a deep, spiritual and long term understanding of the surrounding ecosystem of the land (Rose et al., 2003). Communicating this level of understanding about natural ecosystems to the general population is desirable as it may prompt consideration of the diverse nature of these places.

However these accounts do not necessarily reflect the thoughts and feelings of a large number of people and there is a need to typify perceptions of biodiversity in Australian landscapes. One project that quantifies perceptions of biodiversity in a broader population, sponsored by the Victorian Department of Environmental Horticulture and Resource Management, examined how people respond to native vegetation in rural landscapes by gleaning responses to images of various ecosystems in Victoria (Williams, Cary, & Edgar, 1998). This research indicated that a large number of respondents, while empathetic to these places, describing them as "natural" and "beautiful", had little understanding of the variety of ecosystems and plants in this rural landscape. Urban respondents often preferred images of grazed farmland with scattering of trees to areas with dense undergrowth. The researchers concluded that there was little understanding of diverse ecosystems. This research completed in the Northern Territory extends on this type of study.

To explore perceptions about biodiversity, research was undertaken with 175 students from diverse backgrounds, enrolled in a range of courses at Charles Darwin University in the Northern Territory. Tertiary students represent various ages, ethnicities and interests in the population and their language reflects how concepts related to biodiversity have filtered into general discourse. Students starting a common unit named "Northern Perspectives" and migrants completing advanced English were asked to participate in this survey/questionnaire during 2005 and 2006 to evaluate how they name and describe short sequences of video representations of local mangrove and savanna/tropical woodland ecosystems. They also indicated whether they would be prepared to act to conserve any natural environments, explaining why.

The sites used to explore concepts related to biodiversity represent two ecosystems in Casuarina Coastal Reserve which adjoins the main campus and suburbs. This reserve includes an eight kilometre stretch of dunes as well as mangrove and savanna/tropical woodland ecosystems. The biodiversity of the area is under threat from overuse by a growing urban, often transient, population (Parks and Wildlife Commission of the Northern Territory, 2002).

## Findings

### *Naming and Describing Ecosystems*

To clarify how people identify different local ecosystems, students were shown sequences of video images without sound and asked to name and describe (with four words) each of the ecosystems represented visually. Two of the sequences were filmed in the Casuarina Coastal Reserve, a short walk from the university. The first sequence students were asked to identify was of mangrove.

When asked to use four words to describe the images of mangroves, the most frequent response (80) was “natural”. This was followed with words in a range of twenty to thirty-five responses each, wherein students were describing the mangroves as wet, muddy/murky, isolated, creepy, untouched or interesting. Ten to twenty respondents used the words peaceful, quiet, humid, familiar, dirty, dangerous/unsafe or smelly. A few people (mostly Indigenous) noted the value of mangroves for bush tucker, fishing, good food and crabbing. A few noted mosquitoes, sandflies and itchy as descriptors and there were isolated cases where individuals used negative terms of infested and disgusting.

Another sequence of video images represented were of the local savanna/tropical woodland.

When asked to describe this representation of savanna/ tropical woodland, “natural” was the term most frequently used by 66 students followed by about 35 each for green/ish and dry; reflecting that both wet and dry seasonal aspects had been apparent in the images shown. Over thirty responses identified the area as isolated (even though it is only a short walk from the university) and over twenty responses claimed this ecosystem was home-like, familiar, interesting, untouched or lush. Between ten and fifteen people described this area as hot, wild, safe, beautiful, peaceful, fired or burnt and a small number (6) noted that that it was a place for food or bush tucker. Only a few individual responses used negative terms such as infested, colourless, hostile, harsh, boring or terrifying.

### *Acting for Conservation*

The question, “Is there any natural area that you have visited or know of that you would feel impelled to act to help conserve if it was under threat?” with a yes or no option was posed to help define the willingness of the student group to act to protect “natural

TABLE 1: Mangrove naming

<b>Name given to sequence of images</b>	<b>No. Students using this term</b>
Mangrove/ mangroves	102
Swamp	15
River/Creek	12
Unknown (?)	10
Tropical/rainforest	8
Wetlands	5
Water	5
Jungle/forest	5
Larrakia land/Indigenous home	2

TABLE 2: Savanna/tropical woodland naming

Name given to sequence of images	No. Students using this term
Bush/bushland	92
Forest	14
Unknown (?)	7
Woodland	7
Savanna/tropical Woodland	6
Dry/season	5
Rainforest/jungle	5
Burnt land	4
Outback	3
Scrub	3
Indigenous/Aboriginal land	2

areas". The question was presented so that general attitudes could be reflected. It was followed by two further questions. "If yes: which area?" and "Why?"

Students were also asked about the length of time they had spent in the north of Australia and where they had spent most of their life. (e.g., large or small city, rural area). This data reflects the high population turnover of the non-Indigenous population of the Northern Territory (ABS 2002).

Overall, two thirds of the survey group responded that they would be motivated to take action to conserve a place under threat. The most notable difference in making a positive response to taking action was in the age of the respondents. Even though

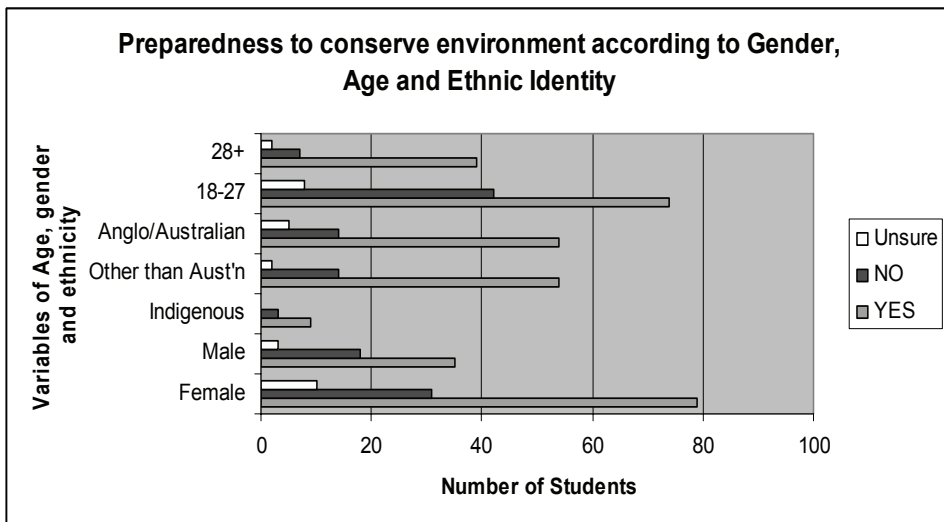


FIGURE 1: Demography of student responses to the question *Would you be impelled to act to conserve any natural environment if it was threatened?*

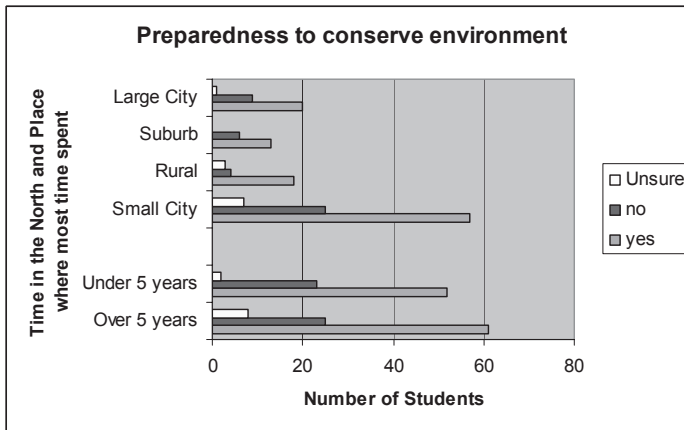


FIGURE 2: Demography of student responses to the question *Would you be impelled to act to conserve any natural environment if it was threatened?*

there were fewer students over 27 in this study, the willingness to take action appears to increase with age (Figure 1). There was also a notable influence if the students had spent most of their lives in a rural area (Figure 2). Ethnic identity had little influence on whether people would be prepared to act or not.

### *Specific Places*

Where the respondents acknowledged their willingness to act for conservation, they were asked which area they would feel impelled to act to conserve. These responses covered a broad range of places but there were discernable trends overall.

Of the 114 “yes” responses only a few were unsure of which place they would act to conserve. 24% named a general ecosystem such as beach, rainforest, mangrove, forest or coast. The highest proportion (44 people) listed a place in the Northern Territory. Within this group, seven people identified parks and reserves within the Darwin region, seven identified Litchfield Park and ten specified the iconic Kakadu National Park.

There were an equal number of responses (nineteen each) identifying other places in Australia and places overseas. Responses indicating a willingness to conserve other areas in Australia were distributed across all states fairly equally with little duplication of sites. Sites named included Ningaloo Reef, Great Barrier Reef, Eyre Peninsula, 90 mile beach, Strezleki Ranges, Walhalla Rainforest and South Gippsland, Daintree, Hervey Bay, Wolondily River, the Kimberley and New England National Park.

The nineteen people who named overseas places also identified a very broad range of places including the Solomon beaches, Kanas Lake in Africa, forests in the Philippines, Lombok in Indonesia, Mabiri forest in Uganda, the Mediterranean Sea, mountains of Burrendi, Tanzania, Okinawa in Japan, Yellowstone National Park in the USA and the New Zealand coastline.

As might be predicted, most of the people (bar two) who listed overseas sites for conservation identified themselves with overseas ethnicity. It was also predicted that the people who identified Northern Territory sites would have lived for a longer time in this area but over half who listed the NT had lived here under ten years. The common motivation was not necessarily extended contact with a particular place. The next question extended reasons why people would be impelled to conserve a particular area.

### *Why People Would Act to Conserve a Place*

The open question “Why would you want to conserve this area?” brought a broad range of responses which are categorised as ecosystem, memories, anti-development, recreational, aesthetic, spiritual and heritage reasons.

Within the aesthetic category most people used the word *beautiful* or *pretty* as well as natural to explain why they valued the area named. Students who emphasised resistance to development for their motivation to conserve included comments related to resistance to tourist ventures, real estate in outer suburban areas and complicity of governments in selling land to development. A small number of respondents (only four) focussed on the recreational uses of the area such as swimming and camping.

A number of heritage comments included concern for *my children’s grandchildren*, *future generations*, *a link to the past*, *historical place* and *one of the world’s seven wonders* while the people whose memories were the main focus of their comments considered slightly different reasons for their possible actions. Most comments in the memory category referred to the place being close to home or an area where holidays were spent in childhood. Memories of visiting the place for camping was also mentioned a number of times. A few comments are quoted below as these tended to be the more detailed and poignant responses.

It is my home. You wouldn’t let your home fall down around you, would you?

Even though I am a white Australian I feel a strong connection to this place where I grew up.

When I was in high school we were planting trees every year in this place with not many trees. It was fun and very nice that we could help our environment a little bit.

I identify with the land there; feel my spiritual roots there; connected there as I played there as a child; no words to quantify my feelings towards my home.

The last comment was not made by a person identifying as Indigenous but most of the people who made comments about spiritual connectedness identified as Indigenous Australians. One notable comment in this category was

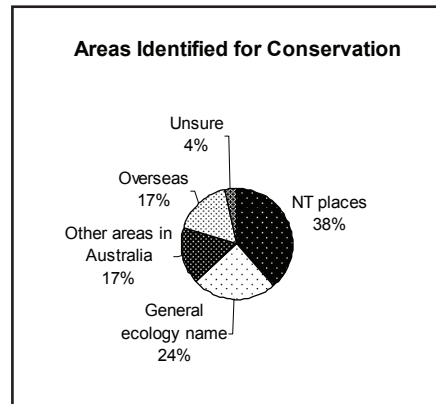


FIGURE 3: Areas that respondents identified they would feel impelled to conserve

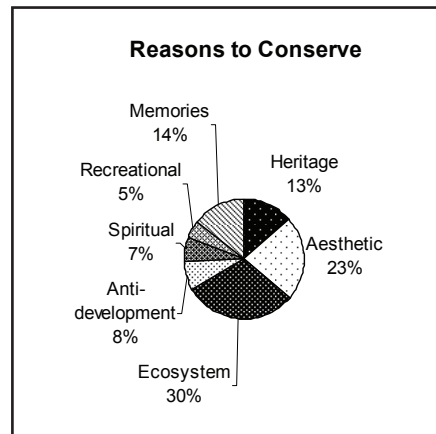


FIGURE 4: Categorised responses to explain why respondents would be impelled to act to help conserve a natural area if it was under threat

It is my ancestors' country and mine, connecting spiritual, cultural, dreaming connections to country. I have my area to protect and look after.

The final category, and the most prevalent type of response, was tied to protecting the ecosystem values of a place. Explanations of why a particular place should be conserved included reasons such as that it is *unique, special, is full of wildlife and/or rare plants that need protecting*, has particular animals such as *whales or turtles* or particular elements such as *forests or geysers*. Only one person responded specifically to *conserve biodiversity* but about a third of these responses implied the concept of biodiversity by using terms such as rare and unique plants and animals.

### Implications for Education

In analysing the data from the survey, there are some positive and negative implications in educating about biodiversity. Within the Northern Territory frameworks, biodiversity is a notable concept to be taught in Science and within Studies of Society and Environment. Preparedness to act for the environment is considered an attribute needed for good citizenship. Within this analysis, the importance of categorisation of ecosystems will be discussed as well as the implications when people name ecosystems and give reasons for conserving places.

Firstly, let's examine the naming and describing of local ecosystems. "Bush" is a friendly and familiar term to most Australians and it is used to name various ecosystems around Australia. It is a very general term which can be used for "a stretch of land covered with bushy vegetation or trees" or "the countryside in general, as opposed to the towns (Delbridge, 1982)". When 55% of the students named the sequence of images *bush* or *bushland* I returned to the images to check that they clearly showed the wet and dry, grassed and treed nature of the savanna or tropical woodland that is represented in the Casuarina Coastal Reserve as well as a large part of the Top End. I'm sure that the visual representation was adequate to identify this area but obviously the colloquial description of "bush" over-rides any formal naming of this type of ecosystem as only six people (3%) identified it as savanna and the same percentage named it woodland. Of the people who identified it as savanna only one, an Indigenous person, had been in the north for over two years. Two of these respondents were from African areas which are principally savanna.

As apparent in the data relating to naming and describing the mangrove and savanna/ tropical woodland ecosystems, scientific labelling, while systematic and effective for categorisation, are often removed from everyday speech and descriptions of relationship to a particular ecosystem. This in itself may not be an issue but if there is no clear shared definition of a particular ecosystem, it creates problems in defining and understanding the biodiversity of this environment. I consider it problematic that within an institution which houses the national Cooperative Research Centre for Tropical Savannas such a small proportion of students can identify the savanna/ tropical woodlands in specific terms (see Table 2) as this reflects a poor recognition of what constitutes this ecosystem. In turn, when conservation of savanna is proposed it is likely there will be little response unless people have terminology to discuss this particular ecosystem as they do when discussing mangroves or rainforests.

When describing both the mangroves and the savanna, respondents rarely used terms which relate to concepts of biodiversity with only a handful of people describing it as *interdependent, cyclic, connective, varied, with lots of trees/plants, renewed or unique*. Two noted *ecosystem* in their descriptions of mangroves. Both the representations of savanna and the mangrove ecosystems invoked terms which could mostly be categorised as positive responses to these ecosystems but which reflect little recognition of their



biodiversity or a strong connectedness to these ecosystems in the student population. This has implications for educators to systematically enhance awareness of biodiversity in the local area.

On a positive note, two-thirds of all respondents, whether male or female, whether identifying as Australian or with a different ethnicity, stated there was an area which they would be impelled to act to conserve if it was under threat. People who had spent most of their life in a rural area were slightly more likely (75%) to respond positively than those from small and large city areas, indicating some influence may be attributed to this variable. In addition, age was a factor in this response with a higher proportion of people over 27 responding they would be prepared to act than people under this age. This indicates that there is a general willingness to act for conservation and this is positive for educational programs in the area.

Sites in the Northern Territory were highly represented in places that would be included for action. This reflects a valuing of ecosystems in the region. However, analysing reasons for conserving a particular ecosystem rarely reflected recognition or appreciation of the biodiversity of the area in general explanation of why people would want to conserve a place. Only single individuals used the word diverse, complex or unique. This implies that such terms are not in common usage when discussing or describing ecosystems.

## Conclusion

Tertiary and school environmental educators in Australia constantly need to address the fact that many people move from place to place, city to city, and may not feel strongly about the local environment in which they find themselves. In many cases teachers in the Northern Territory are not confident in their knowledge of the biodiversity represented within the place they are living and so may not include content about savannas and mangroves. While this is being addressed in the curriculum of primary and secondary education, there needs to be greater promotion of local ecosystems at the tertiary level. This research identifies some factors that influence tertiary student's attitudes to and perceptions of the local environment of the Top End and could be extended to analyse how trained educators perceive and teach about the local ecosystems. The research could also be extended to explore the types of actions people would be prepared to take to conserve an area; such as writing letters, signing petitions or blocking inappropriate development.

Further study could also be undertaken to find out why one third of the surveyed population would not feel impelled to conserve any place. Differentiating the particular ecosystem in the tropical woodland/savannas from generalised terminology that names visual representations of these places as "bush" or "bushland" will give a starting point to discuss particular values and special characteristics that are worth valuing and protecting. I suggest that ways of promoting greater understanding of these ecosystems could be developed with public education strategies that go beyond the iconic representations of the Top End for tourism.

Furthermore, within tertiary study, there should be greater opportunities to raise awareness of local areas as many students remain in the places they have studied after they graduate. This is particularly apparent in the need to educate for understanding about the savanna/tropical woodland ecosystem in the Northern Territory as these areas become increasingly threatened by development and the population grows with people who have had formative environmental experiences elsewhere.

From the responses to the survey, it is apparent that "biodiversity" is not yet a term in common usage, but concepts linked to ecosystem protection are apparent in many of the reasons people give for conservation. Concepts and terms should be highlighted



in public education programs to encourage greater discourse about protection and maintenance of biodiversity in the tropical woodland/savanna and mangroves of the Top End as these are generally undervalued. Greater encouragement should also be given to people to be active in conserving biodiversity in these ecosystems.

*Keywords:* biodiversity; ecosystem; Northern Territory; perception; savanna.

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