

# Sustainable camping at Ningaloo Reef, Western Australia: overcoming methodological challenges

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**Abstract** — This paper outlines issues relating to campsite assesment along the Ningaloo coastline, Western Australia. A solution to methodological challenges, through the utilisation of both qualitative and quantitative data collection techniques are suggested. The Ningaloo coastline is gaining popularity as a remote camping destination in Western Australia. Camping activities in this semi-arid environment are largely unrestricted, and gradual environmental degradation is observable in many locations. The following factors make the Ningaloo camping experience unique within Australia: A remote, semi-arid environment; multiple management/ownership of land; off-road vehicle accessibility to campsites; elaborate camp set-ups (often with a campervan and four-wheel drive); and the long average length of stay (47 days). Existing literature largely focuses on camping impacts within a wilderness environment, with short visitor stays, pedestrian-only access and a single management regime. This research will undertake an initial environmental assessment of sample campsites within different locations along the Ningaloo coast. Campers' daily activities, resource (water, energy) use and waste production will also be determined. This research is highly significant from a local and regional perspective, given government plans to develop multiple camping 'nodes' along the Ningaloo coast by 2015. The data will therefore contribute to a stronger understanding of campsite sustainability, with regard to campsite placement and facilities. This research will also address information gaps within the field of recreation ecology

**Index Terms** — Australia, environmental impacts, methods, Ningaloo, recreation

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1 INTRODUCTION

Ningaloo Reef, 1, 200km north of Perth, Western Australia is the only fringing coral reef in Australia, and is gaining an international reputation for nature-based tourism. Housing a diverse range of marine species, the Ningaloo Marine Park (Fig. 1) extends 260km along the northwest coast of Western Australia. The majority of the 200, 000 annual tourists to the Gascoyne region are international/interstate tourists who use official accommodation and campgrounds [1]. However, informal camping de-

velopments have increased rapidly in recent years. Increasing numbers of remote campers select undesignated coastal campsites along 200 kilometres of coastline within the Marine Park. Campsite numbers increased from 131 in 1995 to 318 in 2002 [2] in two stations, Waroora and Ningaloo. Land utilised by the campers is either leased by remote pastoral stations, or owned by the Commonwealth Department of Defence (CDD). There is growing government and community concern regarding the environmental impacts of unstructured camping, particularly during the peak months of June and July. Concerns include the impacts of off-road vehicles for access to campsites and activities, trampling of dunes, removal of firewood, lack of effective waste and sewerage disposal, and unman-aged boating, fishing and snorkelling activi-

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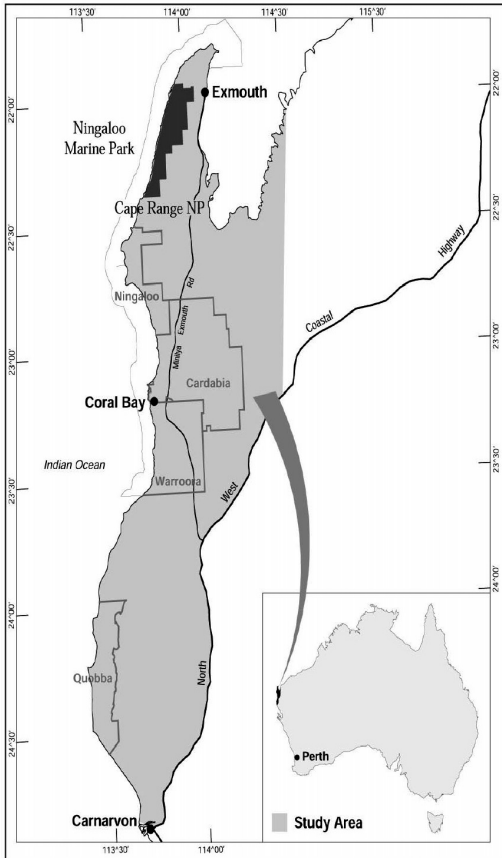


Fig. 1. Ningaloo Coast, incorporating Warroora, Cardabia and Ningaloo stations, and Cape Range National Park [8].

ties [3]. In response to increased visitors to Ningaloo, the West Australian Government has established the Ningaloo Sustainable Development Office. Additionally, the Department of Planning and Infrastructure has released a Regional Strategy [4] to become effective in 2015, proposing multiple official camping 'nodes' along the coast in response to an anticipated increase in visitation and camping demand.

However, except for two surveys [5] there have been no known studies undertaken to gain specific, quantitative information concerning the impacts of unregulated camping, to aid planning and management in the Ningaloo Marine Park.

Outcomes from this research include the development of campsite monitoring indicators to assist management authorities. Additionally, a layered map synthesising research data will provide a snapshot of the suitability of designated camping 'nodes'.

## 2 CAMPING IMPACTS WITHIN THE RECREATION ECOLOGY LITERATURE

### 2.2 Literature review

The environmental impacts of camping have been well researched within the recreation ecology literature. Reviews synthesising the research literature and management applications of recreation ecology have been published (See [6],[7]). It is asserted that most campsite research has focused on soil and vegetation impacts within the United States, in designated wilderness and forested or alpine environments.

Camping impact research within Australia has also focused on forested environments [9]. As Ningaloo is a semi-arid environment, many of the impacts and methodologies within this literature do not apply. This project will thus draw on the limited literature relating to camping impacts in coastal and semi-arid environments (See [10],[11]).

## 3 CHALLENGES UNIQUE TO NINGALOO

In addition to being located in a semi-arid environment, unregulated camping at Ningaloo has unique characteristics. These can create challenges when drawing methodologies from the recreation ecology literature.

### 3.1 Mixture of management/ ownership

Cardabia Station, Warroora Station and Ningaloo Station are managed by pastoral lessees. The CDD owns/controls a stretch of coast between Ningaloo station and the Cape Range National Park. Additionally, the Department of Environment and Conservation (DEC)

operates structured camping areas within the Cape Range National Park north from Yardie Creek. The pastoral leases expire in 2015, at which time DEC will take management control of a 2km coastal strip from the aforementioned stations. Until this time, each station provides different facilities and practices different levels of control over campers, which has the potential to create inconsistency when assessing a variety of campsites. However, this also presents an opportunity to explore how impacts vary with different facilities and controls. Therefore, information on facilities and management regime will be factored into the assessment parameters.

### 3.2 Off-road accessibility of campsites

The majority of environmental impact studies in protected areas are focused on recreation in a wilderness environment. 'Wilderness' can be considered a remote area essentially unaffected and unaltered by modern society, including the presence of roads. Ningaloo is therefore a non-wilderness setting due to its pastoral use and vehicle accessibility. These additional disturbances must be taken into account when relating impact outcomes at Ningaloo, to those at wilderness areas within the literature.

### 3.3 Large camp set-ups/long average length of stay

Campers characteristically require camping, boating and 4-wheel drive equipment for this remote camping experience [Fig.2]. Many travel north for the winter from the temperate south, the average length of stay being 47 days [5]. The usual length of stay in most backcountry wilderness settings has been described by the literature as 1-3 nights. It is therefore likely that popular sites are only available at certain times in the year (October through April) for assessment purposes. The data collection period is limited, as fieldwork should be avoided during December and January due to high temperatures. Campsites are located both on the beach, as well as behind dunes in some locations.



Fig. 2 A typical undesignated beach campsite. This camp contained a caravan, annex, chemical toilet, generator, chest freezer and 4wd vehicle.

Campsites located on the beach may be hard to identify due to lack of vegetation clearing and mobile sand. It may be necessary in this instance assess impacts to access points in addition to those at campsites.

## 4 METHODS

### 4.1 Campsite selection

Campsites will be selected to gain a representative sample of: heavily used (Over 6 months/yr) and lightly used (less than 2 months/yr) sites, in different management locations (CDD, DEC, Pastoral lessees). Additionally, campsites both on the beach and behind the dunes will be assessed.

### 4.2 Estimate individual environmental load and activities

A questionnaire will be used to determine environmental load and activities of campers. Questionnaires are commonly used by managers in leisure and tourism. The questionnaires will provide both qualitative and quantitative data. Questionnaires are a thorough and cost-effective method [12] to effectively gain information concerning both environmental load and activities of campers for this

research. Questionnaires will provide data on:

1. Demographic information and camping preferences.
2. Resources brought from home, bought from local shops, and sourced from the land/water surrounding the campsite.
3. The amount of energy and water used, and composition of waste produced.
4. Access and distance to daily activities.

Data will be analysed statistically using the computer program SPSS.

#### 4.3 Undertake an initial assessment of impacts and facilities at campsites

Campsite assessment protocols were developed and applied by both the National Park Service [13] and the USDA Forest Service [14] for forested areas. These were later modified by Monz [11] for the semi-arid environment of coastal Baja, Mexico, which is more applicable to the Ningaloo environment. Inventory parameters and impact parameters used within Monz's [11] study will be modified to suit the Ningaloo Environment. Parameters will potentially be selected as indicators for future campsite monitoring by DEC. Data will be analysed statistically using the computer program SPSS. Data from the questionnaires and campsite assessments will be overlaid on an aerial photograph to further understand movements and environmental load of visitors in different locations. This data may assist in future campsite 'node' selection.

#### 4.4 Research hypothesis

Hypothesis to be tested in this research include:

1. Campsites with higher use will have greater environmental degradation.
2. Campsites located on the beach will have less impact than those located behind the dunes.
3. Campsites with more facilities will have less environmental degradation through both activity access and environmental load.

4. Campsites are located within one kilometre of activity sites.

This research is highly significant from a local and regional perspective, given government plans to develop multiple camping 'nodes' along the Ningaloo coast by 2015. A number of studies exist which document both an increase in visitation to Ningaloo and a lack of tourism planning in the region. However, there is little understanding of the current impacts of camping along the Ningaloo coast. The data will therefore contribute to a stronger understanding of campsite sustainability, with regard to campsite placement and facilities.

This research will also aim to address the following research gaps within the international recreation ecology literature:

1. Impact comparison of one research area operating under different management regimes.
2. Impacts of camping over extended periods.
3. Impacts of camping in remote areas incorporating off road vehicle access.
4. Impacts of camping with a large, caravan-sized camp area.

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