

Marine Tourism in the Kimberley Region of Western Australia

JOHN H. COLLINS

School of Earth and Geographical Sciences, University of Western Australia, 35 Stirling Highway, Crawley, WA 6009, Australia.

Email: collinsj@cyllene.uwa.edu.au

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Abstract

Marine tourism is an important component of nature-based tourism in the Kimberley Region of northern Western Australia. It offers a wide range of passive and active recreational activities in near-pristine wilderness areas. Marine tourism in the region is recognised as a growth sector having expanded rapidly since 2000, and it is unusual in that growth has been limited by a lack of vehicular access points to the coast. This unplanned growth has been irregular. A marked downturn in visitation by yachts has coincided with an increase in visits by charter boats. Although only five bush camps are established along the coast, boat visits occur at approximately 216 locations that are all subject to potential environmental damage. The extent to which this unplanned industry can be sustained without jeopardising environmental, social and economic values remains open to question.

KEY WORDS *ecotourism; sustainable development; marine tourism; Kimberley*

ACRONYMS

DAFF	Department of Agriculture Fisheries and Forestry
DEH	Department of Environment and Heritage
DPI	Department for Planning and Infrastructure
KDC	Kimberley Development Commission
KLC	Kimberley Land Council
NNTT	National Native Title Tribunal
TWA	Tourism Western Australia
WATC	Western Australian Tourism Commission

Introduction

The characteristics of nature-based tourism and its governance in the Kimberley Region of northern Western Australia are identified in this paper. It also examines links between marine tourism and natural resource management as a first step to a wider risk assessment of environmental impacts. The development of a framework for mitigating environmental impacts of marine tourism and enhancing sustainability of the industry is the overall aim.

Marine tourism is an important component of nature-based tourism in the Kimberley. It comprises scenic and cultural tours, as well as fishing trips incorporating overnight stopovers (Zell, 2003). It is recognised as a growth industry that provides an opportunity for a wide range of passive and active recreational activities in near pristine wilderness areas along the Kimberley coastline (Mitchell, 2005). Whether the industry is environmentally, socially and economically sustainable given its rapid growth and natural resource dependence is open to question.

Marine tourism includes all activities associated with the coast and adjacent waters. It includes a wide range of activities such as four-wheel driving, beach camping, sea-kayaking, marine wildlife observation, sport fishing and sightseeing trips. The origins and definitions of marine tourism have been reported by Orams (1999), Garrod and Wilson (2003) and Murphy and Norris (2005). Consequently, generic definitions are not discussed here. Instead, Jafari (2003) has been used as a source for key terms, concepts and definitions related to tourism. In the local context, nature-based tourism has been defined by Crawford (2000, 94).

Tourism is recognised globally as causing ecological problems (Butler, 1991; Hall, 1991; Orams, 1999; Gunn and Var, 2002; Harris *et al.*, 2002). Tourism has experienced sustained worldwide growth since the 1980s and is now considered to be the world's largest industry, with marine and coastal tourism being its fastest growing sector (Nelson, 1999; Hall, 2001; Murphy and Norris, 2005). Much of this rapid growth has focused on nature-based tourism and is largely unplanned (Moore and Carter, 1993; Flaherty and Sampson, 2005). Concomitant with industry growth, concern about the impacts of tourism on the environment has increased. Tourism now represents a major threat to the destination environment in many areas.

In Western Australia marine tourism is administered by Fisheries WA using Fishing Tour, Aquatic Eco-Tourism, and Restricted Fishing Tour Operators licences that are empowered by the Fish Resources Management Act 1994. These licences are intended to protect fish stocks and habitats but do not appear to integrate other facets of natural resource or tourism management. Neither does there appear to be sufficient integration with other agencies responsible for similar activities (Fisheries WA, 2000a; 2000b).

Recreational activities such as boat launching and informal off-road vehicle tracks contribute to natural resource degradation in coastal areas (Buckley and Pannell, 1990; Hall, 2001; Priskin, 2002). Highway access in the Kimberley to the coast is limited to the towns of Broome, Derby and Wyndham; unsealed roads service Aboriginal settlements on the peninsula north of Broome and at Kalumburu in far north Western Australia (Figure 1); and only a few informal off-road vehicle tracks provide access to the coast. Extreme isolation, lack of established access and the very rough state of these tracks restrict visitation to low levels (Wilson, 1994; Guého, 2003; Zell, 2003; KLC, 2004; Kneebone, 2004). The limited access

also limits the natural resource degradation from terrestrial sources that may make management strategies for marine tourism easier to implement.

Regional setting

The rugged landscapes and biota of the Kimberley make the region attractive for a variety of tourism purposes. It is one of fifteen biodiversity hotspots in Australia (DEH, 2005). The biota include an outstanding variety of native plants and animals associated with unique ecosystems.

The Kimberley Region covers approximately 42.2 million hectares or one sixth of the State's total land area (WATC, 2001). It is defined by the boundaries of the Shires of Broome, Derby West Kimberley, Halls Creek and Wyndham East Kimberley (KDC, 2003). The project area (Figure 1) comprises the coast and adjacent waters from Broome north to the Western Australian-Northern Territory border.

Kimberley tourism

Most tourists visiting the Kimberley are terrestrially based with more than 64% travelling to the region in private vehicles (WATC, 2001). Marine areas remote from settlements are accessed by light aircraft and by boats from Broome, Derby, Wyndham and Kalumburu. Broome is the main destination and departure point for commercial marine visitation.

Tourism is a significant contributor to Australia's Gross Regional Product for industries using natural resources. In 2002 minerals and petroleum generated \$665 million, tourism \$238 million and the pearling industry \$149 million compared with \$91 million from the combined pastoral and agricultural industries (in 2000) (KDC, 2003).

Flaherty and Sampson (2005) reported that by 1998, Australian coastal and marine tourism generated \$36 billion per year, far exceeding the economic return of other marine-related industries. The economic performance of marine tourism in the project area has not been quantified. Estimates from within the Kimberley indicate that marine tourism generated \$100 million in 2005.

Despite growth of the marine tourism industry, there has been an overall decline in tourism visitation to the region since 1999 (KDC, 2003). Domestic overnight stays have declined by approximately 7% measured against a State increase of less than 0.5%, while the international rate of decline is approximately 10% whereas visitor numbers to the State have been steady (TWA, 2004; 2005). The decline has been linked to the

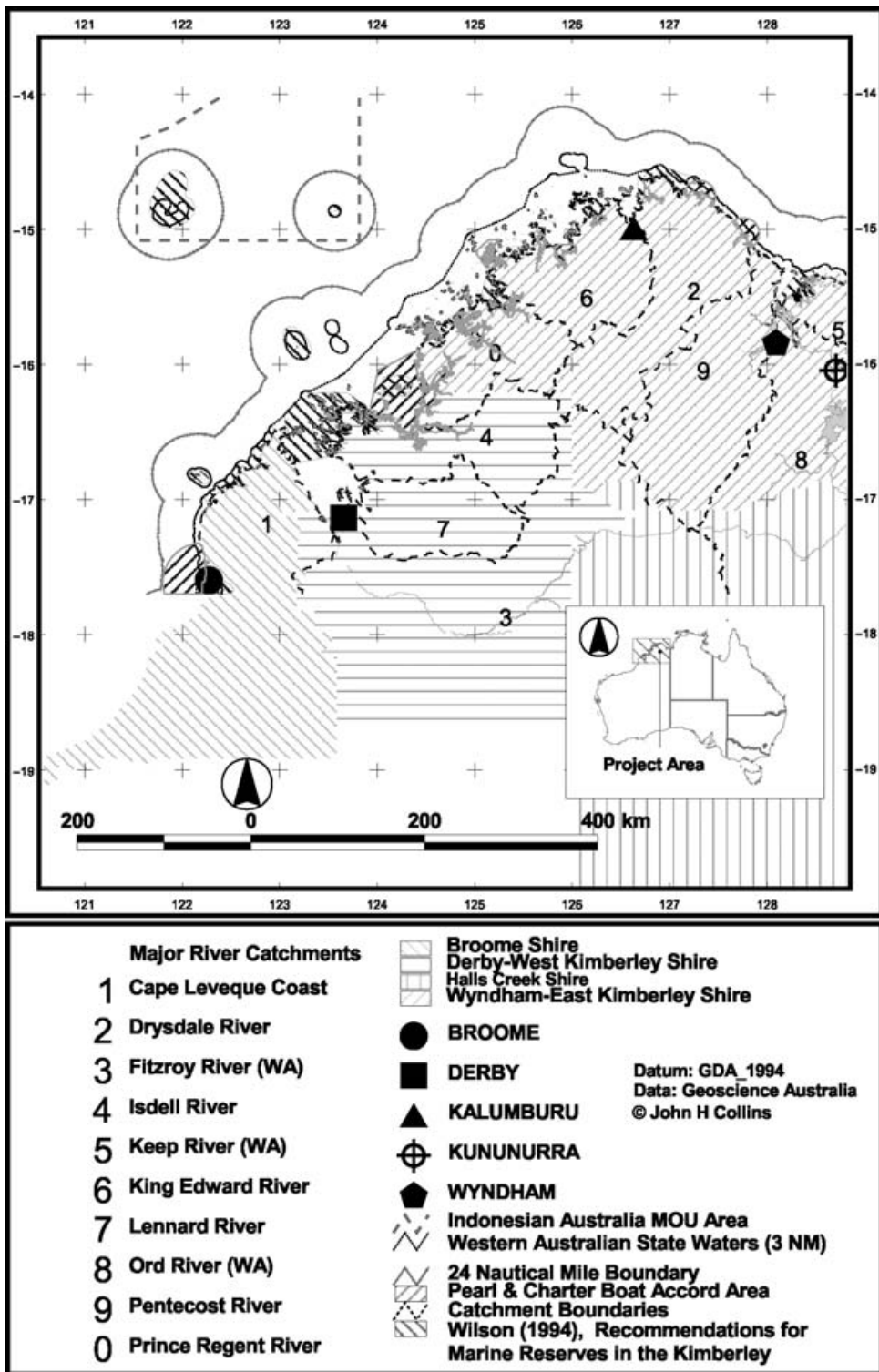


Figure 1 Maritime boundaries, river catchments, local government areas and towns in the Kimberley Region of North Western Australia.

2001 terrorist attack on the United States (KDC, 2003). However, it is difficult to comprehend how or why events in the USA should be linked to Kimberley tourism.

Methods

The project combined field surveys from 1985 to 1996 and in 2005 with desktop analyses of available information. In the first decade, the author participated in seven detailed surveys of Kimberley coastal areas associated with the Northern Australian Quarantine Strategy (DAFF, 2006) and numerous other natural resource management programs. The visitor records reported in this study have been collected and compiled by Tourism Western Australia (TWA) or other State Government agencies.

Field survey

In April 2005 a 14 day survey of coastal sites visited by marine tourists was undertaken by charter boat travelling from Wyndham to Broome. The surveys were intended to check earlier observations to determine the range and types of sites visited by tourists. Sites were identified with the cooperation and assistance of marine tourism operators. Spatial locations were recorded with GPS equipment. Field observations were recorded using still and video photography to complement earlier field survey data.

GIS data collation

Spatial locations and attribute data relating to sites visited by marine tourism were recorded on ArcView 3.3[®] GIS software. Collation with spatial data provided by the various custodians has been used to determine the level of natural resource use associated with the marine tourism destinations. ArcView[®] was also used to analyse data provided by the Australian Customs Service obtained from *Coastwatch* vessel sightings ($n = 53\,471$) between Broome and the Western Australia-Northern Territory border extending seaward from the coast to the 24 nautical mile (45 km) contiguous zone limit. Nautical miles are used in this paper to ensure standardised nomenclature with the marine boundary definitions (Geoscience Australia, 2005b).

Unfortunately, *Coastwatch* has the only record of coastal activity that provides a consistent time series describing the intensity of use for waters adjacent to the shore. It is assumed that *Coastwatch* designed the flights to ensure a statistically reliable vessels surveillance system. Tabulation of the attribute data to provide yearly totals and

a three-year moving average of vessel sightings was completed using Excel[®] functions.

ArcView[®] was used to determine shoreline length using a biological definition that is landward of the Highest High Water Level at a point where the salt-mudflat meets land that is not ocean salt affected, following the Kay and Alder (1999) description of 'coastalness'.

Marine tourism between Broome and Wyndham

Rapid growth of coastal and marine tourism in the Kimberley region has followed a world-wide trend reported elsewhere by Nelson (1999), Hall (2001) and Murphy and Norris (2005), but is unusual as development of the Kimberley coastal zone has been restricted terrestrially. This is partly due to the land tenure. Most of the coastal land is Aboriginal owned, forms part of the conservation estate, is reserved for public recreation or is a mixture of these forms of ownership (Wilson, 1994). Tourism access to much of this land is difficult as it requires pastoral lease transition. These factors have combined to prevent proliferation of off-road vehicle drive tracks to the coast. Further, coastal tourism may have limited development potential due to a small regional population and high travel costs, with previous attempts to establish remote fishing bush camps proving uneconomical (Wilson, 1994).

Tourist access to the coast is largely provided by commercial charter boats, fishing boats and cruising yachts. Operation of vessels between Broome and Wyndham is not subject to access restrictions comparable to those applying to the terrestrial environment. The earliest marine tourism operations were off-season use of fishing vessels based in southern ports or local people operating a part-time lifestyle business. Wilson (1994) noted that several small boat owners provided live-on multi-day trips to a selection of scenic locations and that the remote offshore islands were so bleak they had little tourism potential.

Growth in marine tourism operations is difficult to track due to a lack of records. The first operations using purpose-built vessels developed during the 1986–1987 Americas Cup series of yacht races, and grew between 1995 and 2002 when approximately six marine tourism vessels operated from Broome. In 2007, 26 vessels offered marine tourism packages along the Kimberley coast. This is an increase of more than 300% in available berths, with vessel passenger capacity ranging from four to 106. These vessels operate mainly within Western Australian State

Waters, between the territorial sea baseline and three nautical miles (5.5 km) seaward (Geoscience Australia, 2005e). A number of the operators employ helicopters to transfer passengers mid-voyage to light aircraft connections to Broome or Kununurra, as well as providing access to remote locations not normally accessible (Todd, 2004; Kimberley Cruise Centre, 2005).

Coastwatch sightings within coastal waters of the project area increased from 3296 vessels in 1996 to 9256 vessels in 2004 (Figure 2), with cruising yacht sightings declining from 966 in 1998 to 292 in 2004 (Figure 3). Reasons for this decline are unclear, and reports indicate the

demographic character of yacht visitors may have changed. Interestingly, the decrease in Kimberley yacht sightings follows the declining domestic overnight stays trend that commenced in 1999.

A substantial increase in maritime surveillance by *Coastwatch* flights was required to detect illegal fishers or vessels attempting to smuggle people to Australia. In 1996 there were 3031 surveillance flights that required 14 598 flight hours, increasing to 4510 flights requiring 21 417 flight hours in 2004.

Growth in use of State Waters by tourists and other visitors raises questions concerning the

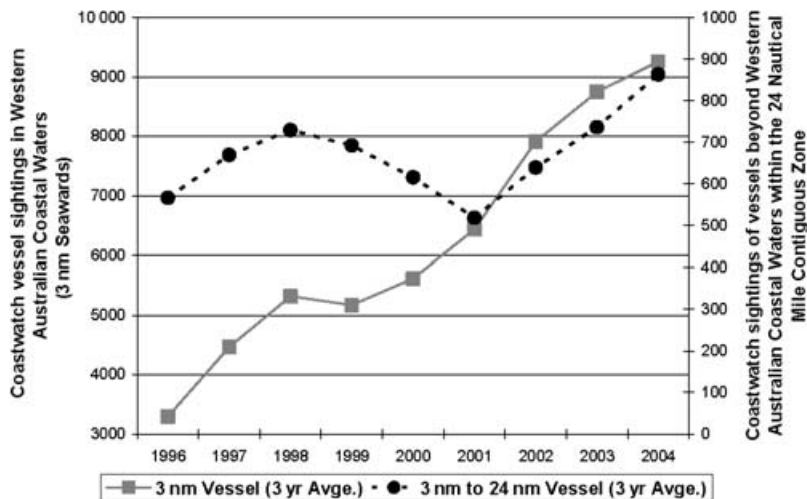


Figure 2 Frequency of vessels using State and Territorial waters, respectively seawards to 3 nautical miles, and between 3 and 24 nautical miles (approximately 5 km and 44 km) from the shore.

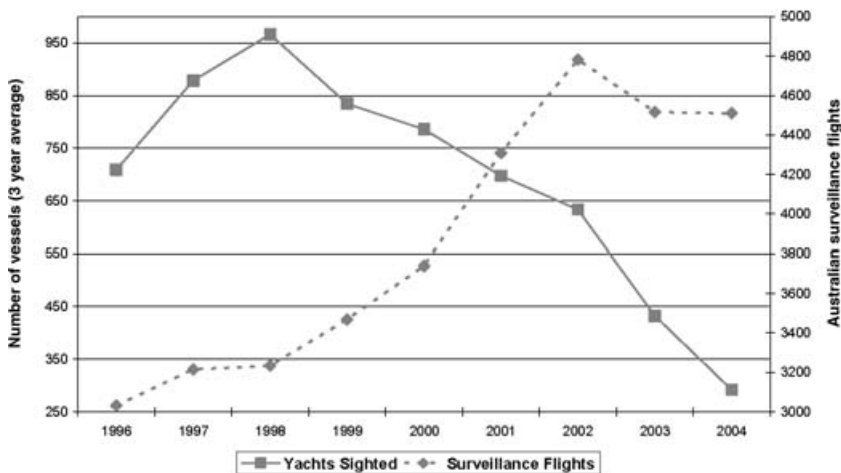


Figure 3 Frequencies of Australian Customs Service *Coastwatch* surveillance flights and sightings of cruising yachts (Source: From information provided by the Australian Customs Service in 2005).

capacity of the natural resource base to support them. The first step to determine the real and potential impact of tourists on the environment requires identification of the natural resource usage.

The natural resource base

Maritime boundaries used by the Australian Government meet specific international obligations described in the United Nations Convention on the Law of the Sea (Geoscience Australia, 2005d). The area of major interest to Kimberley tourists is the State Waters and follows Ketchum’s (1972) definition of a coastal area. It extends up to three nautical miles (5.5 km) seawards of the territorial sea baseline and the marine tourism management area recommended for the Kimberley (Figure 4). Large areas landwards of the territorial sea baseline, such as mudflats, could be considered part of the Western Australian inland waters.

Data provided in Table 1 are based on the region between 129° East longitude and the eastern

edge of the Broome Town Beach. Islands are defined as land with a shoreline length of 100 m or more at the highest high water level. This yields a management shoreline of approximately 19 200 km and approximately 3200 islands that are within State Waters. Geoscience Australia (2005a; 2005c) states that Western Australia officially has 3747 islands and 20 781 km of coastline.

Sites of greatest interest to marine tourists include places to fish, areas for sightseeing and secluded locations for general relaxation. The best known fishing sites include distant offshore reefs and the ten major river mouths in the region. Only five bush camp businesses were in use during April 2005. These were Faraway Bay, Alligator Camp, Kimberley Coastal Camp, One Tree Bay and Freshwater Cove.

Potential impacts

Potential impacts of marine tourism in the Kimberley are related to accessing the coast via estuaries or from offshore, as well as pressures exerted

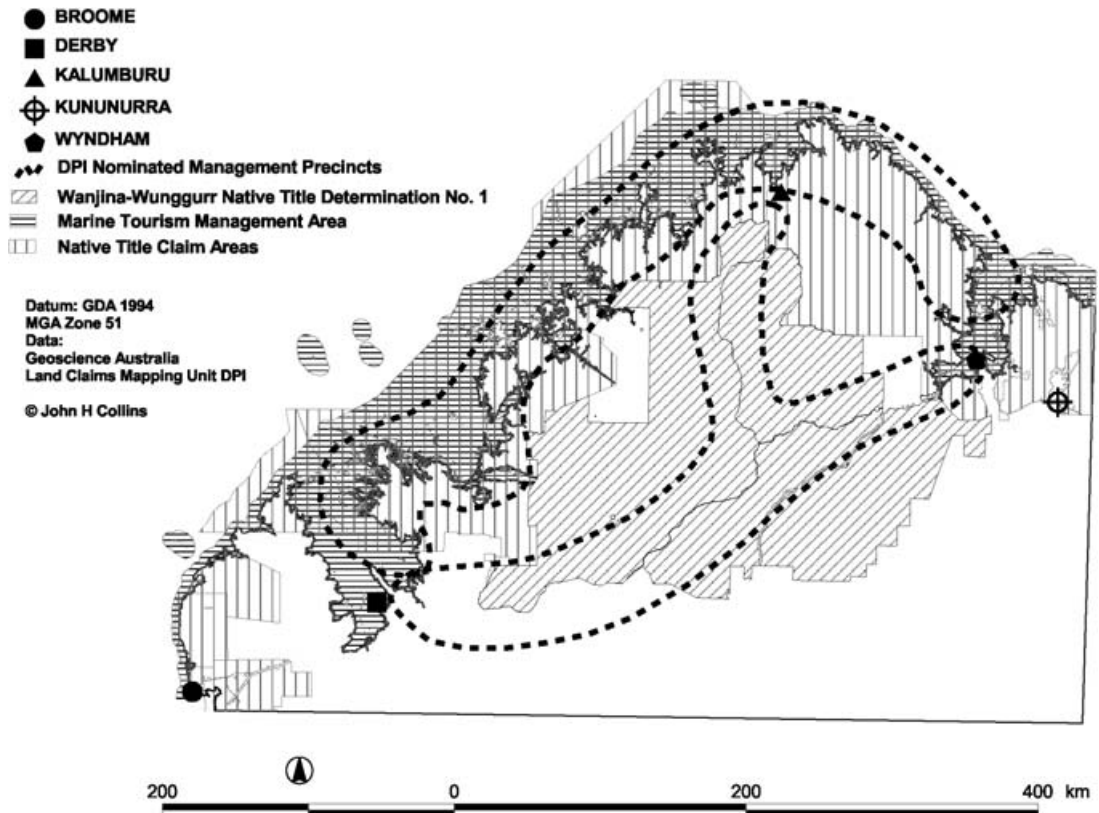


Figure 4 Native Title claims, planning precincts and the recommended marine tourism management zone in the Project Area.

Table 1 Natural resources of the Kimberley coast between 129° East longitude and the eastern edge of the Broome Town Beach (*Source*: extracted from data provided by the Departments of Conservation and Land Management and Fisheries, Western Australia and from data provided by the Fremantle Sailing Club).

Approximate Number of Islands (shoreline >100 m) at Highest Water.	3255
Approximate Shoreline length	12 644 km
Approximate Shoreline Length of Islands (shoreline >100 m)	6642 km
Aquaculture leases in 2005	134
Aboriginal owned aquaculture leases in 2005	35
Approximate area of aquaculture leases in 2002	89 366 ha
Geographical locations used by marine tourism and/or cruising yachts between Broome and Wyndham	216
Coastal fishing camp of fly-in-fly-out bush camps	5

on the marine environment through dumping from vessels and depletion of biota by extractive activities. However, natural resource management also needs to incorporate a catchment-to-coast-to-marine approach in order to increase the sustainability of the tourism industry and to protect the natural resources upon which it depends (Flaherty and Sampson, 2005). Poor land management practices have been identified as a major threat to the marine environment elsewhere in Northern Australia. Nursery-Bray and Pedder (2004) point out that insufficient consideration is given to the quality and quantity of water affected by poor terrestrial land management practices.

Infrastructure supporting terrestrial tourism in the North Kimberley is located on pastoral leases and operated by pastoralists with diversification permits issued by the Pastoral Lands Board of Western Australia for low-key tourism activities (Yu and Yu, 2003; Greiner and Larson, 2004). Outside of the Lennard River and Cape Leveque Coastal catchments (Figure 1), only two pastoral leases within the Department for Planning and Infrastructure (DPI) management precincts (Figure 4) have small coastal boundaries. This further limits opportunities to diversify and use maritime or coastal resources for tourism.

Potential problems directly linked to maritime activities are greatest in areas intensively used by boats, notably landing places. Approximately 216 locations between Broome and the Western Australian-Northern Territory border are visited by vessels engaged in tourism. Cruising yachts regularly use 138 of these sites (Fremantle Sailing Club, 2001). Approximately 30% of the 216 locations used are within areas recommended by Wilson (1994) as candidate areas for marine conservation. Use of natural resources in the areas recommended by Wilson (1994) for the potential proclamation of marine reserves and marine

protected areas has risen steadily since 1996. *Coastwatch* vessel sightings increased from 2401 in 1996 to 3343 in 2004 (Figure 5). A peak of vessel sightings within State Waters occurred in 1998 (Figure 2), coinciding with maximum yacht sightings (Figure 3). Since 2001, the increased numbers of vessels sighted within candidate areas for marine conservation follows a similar trend to the increase in available cabin capacity. Total surveillance effort (Figure 3) by *Coastwatch* also has increased since 2001 making the information difficult to interpret.

Confidential site use data indicate that the majority of operators target the same fishing areas, and that approximately 20% of all of the identified sites are used for fishing. The accord between the marine tourism and pearling industries further concentrates sport fishing in the agreed tourism nodes (Rogers, 2003). Fieldwork suggests use of these sites is related to trip sailing plans rather than being targeted as fishing grounds. Most of the fish caught are released and only a limited number are taken.

The survival rate of capture and released game-fish species is open to question (Fennell, 2000), and the capture and release survival rate of Kimberley fish unknown (J. Ford, Minister for Fisheries, personal communication, 2005), as is the impact of increased visitor fishing. A small fishing camp operator reported a population reduction in target fish species and has identified injuries to fish that included cuts or abrasions associated with fishing hooks. High ambient temperatures, contact with hot dry vessel decks, or other inappropriate handling, may compound injuries associated with sport fishing.

Increased visitation and use by other maritime industries also increase the rate of accumulation of marine debris, a problem throughout Northern Australia. Debris includes plastic and rubber items, fishing nets and other fishing equipment

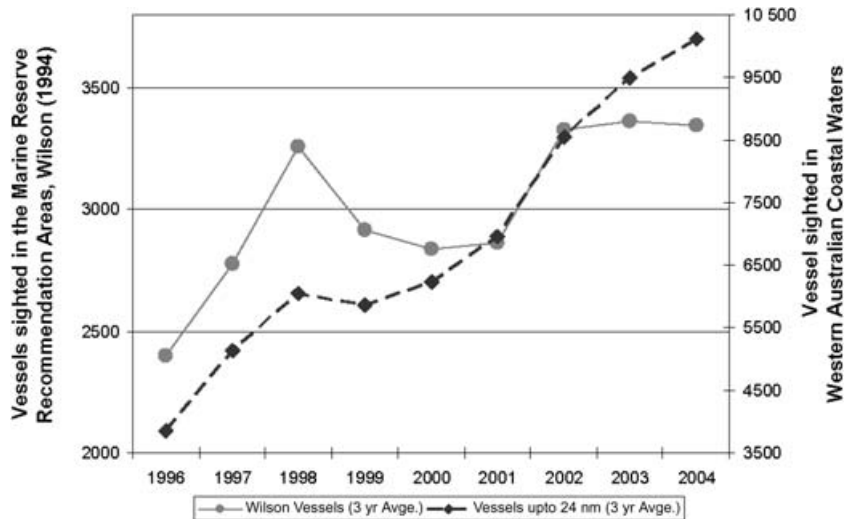


Figure 5 Vessel use of marine waters nominated for consideration as marine parks and reserves by Wilson (1994) as well as vessels sighted within 24 nautical miles (45 km) of the shore.

(Nursery-Bray and Pedder, 2004). Debris recorded on beaches in the Kimberley during fieldwork had a similar composition, and affects the attractiveness of the coast.

The operation of helicopters to provide scenic flights and to transfer passengers from marine tourism vessels to shore destinations has liability issues and generates a form of environmental degradation. More than 30% of ground users to National Parks in some Kimberley locations found helicopter scenic flights caused a loss of environmental amenity (author's unpublished data). Amenity loss experienced by marine tourism clients is unknown, but reports indicate that helicopter noise disrupts the sense of remoteness in the project area. The crew of one vessel reported they had undertaken a difficult hike with clients to a secluded freshwater river pool for a swim. Shortly after arrival a helicopter based on-board a marine tourism vessel landed nearby. The occupants asked the group already swimming to remove personal items from a rock shelf immediately adjacent to the swimming hole to facilitate the helicopter landing passengers at the pool's edge. Helicopters are reported to have caused wildfires on islands and/or other environmentally significant areas. This issue warrants further investigation, if only to clear operators of accusations of poor environmental practices.

Aboriginal cultural sites are used by the marine tourism industry and visits to Aboriginal sites are advertised by many of the operators. Aboriginal cultural images are reproduced in

promotional material used to attract clients to the Kimberley coast. The extent to which such exploitation is culturally insensitive and unethical is not known. Reports by local operators indicate that some culturally significant sites have been damaged, artefacts stolen and burial sites pillaged. However, these reports require verification by the custodians. It is unclear what cultural and physical damage has occurred, whether visits are in accordance with the wishes of the Aboriginal Traditional Owners, and whether the visitors have appropriate authorisation to enter sites. Closer examination of these issues is beyond the scope of this paper but they warrant detailed assessment.

Current management practices

Tourism in Western Australia is not treated as a *bona fide* land use and there is no single government agency with statutory responsibility for its planning and management (Collins, 2001; Priskin, 2003). Priskin (2003) found that, while the statutory frameworks are available to plan and manage tourism sustainably, a lack of integration between government agencies resulted in the Western Australian nature-based tourism industry being unplanned, uncoordinated and without a strategic approach to promote sustainable development.

A largely pearling aquaculture industry holds 134 leases along the coast and an accord allocates natural resources to the tourism and pearling industries (Rogers, 2003). It is unclear whether this accord was based on strategic planning principles

that protect natural resources and fully serve the public interest.

A DPI (2005) discussion paper recommends the formation and management of two distinct planning precincts for the North Kimberley (Figure 4). It identifies a coastal planning and management precinct as well as a terrestrial precinct relating to the road network servicing Derby, Kalumburu and Wyndham, with separate committees to steer planning in each precinct (DPI, 2005). This recommendation is inconsistent with the concept of providing a firm foundation for natural resource management by using the holistic catchment-to-coast-to-marine approach recommended by Flaherty and Sampson (2005), and is further flawed in the absence of an independent scientific reference group. Adoption of two planning and management precincts in the North Kimberley also has ramifications for integrated management, as they split the catchments.

Marine tourism in the Kimberley Region is more reliant than other tourism sectors on Aboriginal-owned natural and cultural resources. Marine access to the coast commonly places visitors on land currently occupied by Traditional Owners. There is little evidence of this tourism industry establishing or developing links to Aboriginal Traditional Owners. It is essential that the tourism industry engage with Aboriginal people to develop suitable partnerships and ensure appropriate access to Aboriginal owned natural and/or cultural resources in the Kimberley.

Some of the eleven Native Title Claims current in the region extend into the Territorial Sea (Figure 4), approximately 24 nautical miles (45 km) seawards. As of August 2005, there had been no determination of these claims. Under the *Native Title Act 1993*, if the court determines that native title exists, people holding the rights are identified, and the extent and interests of the native title delineated. The native title holders must establish a prescribed body corporate that may hold and/or manage native title for the whole group (NNTT, 2004). Implementation of the determination cannot be finalised until a prescribed body corporate has been established. It is unclear how determination of these eleven claims may affect tourism and natural resource management.

A framework for sustainable natural resource management

Marine tourism in the Kimberley is a complex activity that uses a range of natural, cultural and social resources. It requires application of holistic,

adaptive management techniques to ensure its sustainability. A management framework may be developed from documents written by the International Organisation for Standardization (ISO).

Credibility, international recognition and efficient use of resources are recognised reasons for using ISO 14 000 environmental management systems, strategies which do not appear to be fully integrated in current natural resource management programs in the project area (Harrington, 1999). For this reason the author has constructed a management framework (Figure 6) suitable for use by management agencies in the Kimberley. Although agencies are encouraged to use the framework, recent experience with a non-government tourism organisation in the region revealed a low level of appreciation that provisions in the Commonwealth Environmental Biodiversity and Conservation Act (1999) and the Western Australian Sustainability Act (2004) for environmental sustainability are legally binding. This lack of understanding was accompanied by a disinclination to plan or act to ensure sustainability.

The central hierarchical pyramid (Figure 6) shows available environmental management instruments and a suggested scale for implementation. National and State strategies or policies provide guidance at scales coarser than 1:250 000. State and Local Government policies and regulations provide guidance at scales from 1:10 000, becoming coarser up to 1:250 000. Site level plans provide guidance at scales finer than 1:10 000.

The framework is a continuous improvement cycle such as that previously described by Scholtes *et al.* (1993). Here it incorporates adaptive management principles. The objectives of the cycle are to develop a suitable strategy for action (Plan), smoothly introduce the strategy (Do), monitor its on-ground effectiveness (Check), evaluate changes resulting from its implementation (Act) and refine the strategy as required (Scholtes *et al.*, 1993). The cycle is useful for auditing, risk assessment processes, management procedures, pollution control, and for benchmarking other continuous improvement systems used for similar purposes (Wever, 1996).

Discussion and conclusions

Marine tourism in the Kimberley has grown rapidly and irregularly over the past decade without the benefit of strategic planning. This has entrained a number of major issues for future governance and industry maintenance. Assessment

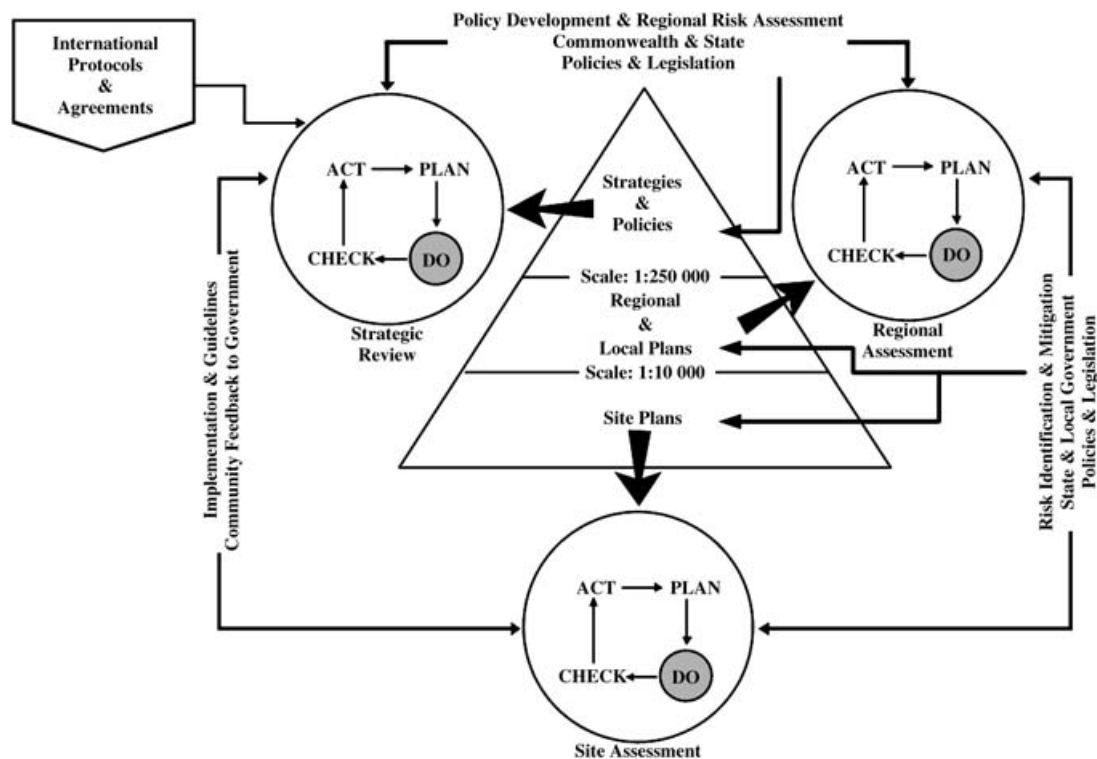


Figure 6 Proposed framework for natural resource management in the project area.

of risk associated with these issues is difficult. There is a lack of detailed environmental information describing the region, and a notable lack of data describing the spatial use of State Waters by the marine tourism industry. Although the *Coastwatch* program has been designed and is operated for State security, vessel sightings recorded by the program are the most comprehensive data available. It is not a marine tourism monitoring and management tool. *Coastwatch* records provide the only indication of increased use of the marine environment, including the use of near-shore areas proposed as marine parks and reserves. There is scope for Fisheries WA and/or the Department of Environment and Conservation to refine their current *Coastwatch* tasking requests to obtain specific information suitable for some management issues. For example, island wildfires can be regularly monitored by *Coastwatch* to establish a fire history and links to illegal activities.

Marine tourism data captured daily for Fisheries WA could usefully include additional information appropriate to natural resource management. The system needs to be spatially

accurate and captured at a suitable scale for management of the terrestrial natural resources being used by marine tourism. Ideally, automated monitoring similar to the electronic vessel monitoring system used to track merchant vessels in Australian waters is needed to improve the present manual technique.

While marine tourism in the Kimberley has grown, terrestrial tourism has reportedly undergone a downturn. Trips to scenic locations by boats, particularly charter vessels, account for most of the growth. As the number of trips by charter vessels has increased, visitation by cruising yachts has fallen. The number of charter boat trips has grown rapidly and based on private value projections may already be an economically dominant sector. Further research is needed to better understand the changes being experienced, the economic value of the marine tourism industry in the Kimberley, and how marine tourism may be managed to ensure it is diversely based as well as environmentally, culturally and economically sustainable.

Tourism is reliant on a healthy and attractive environment. The natural resources used by the

marine tourism industry are largely those in the State Waters of the Kimberley, and this stretch of coast must be managed to mitigate otherwise inevitable degradation of natural resources in the region due to a combination of natural processes and human activities.

At present, the marine waters of the Kimberley are isolated and remote, meaning the environment is currently not subject to the development pressures present in more populated parts of Australia. The principal threats to the environment and biodiversity result from inadequate or poor management practices. Isolation has resulted in large parts of the region being neglected by government and has led to a general lack of scientific knowledge pertaining to the region. For example, large-scale reviews of the current and potential impacts of land management have not been undertaken in the project area, unlike other parts of the continent. Neglect is compounded by resource management agencies failing to enforce existing sustainability legislation intended to protect land condition and, by implication, the coastal resources used by marine tourism. It is open to question which agency or organisation, if any, has sufficient resources and community support to ensure current environmental protection legislation is applied to protect the globally recognised biodiversity and cultural significance of the region.

Natural resource management in the project area is possible using current legislative instruments and organisations (Environment Australia, 2002). For example, Kneebone (2004) lists more than 100 strategies, policies and legislative instruments designed by the Australian or Western Australian Governments to manage natural resources. However there is a reluctance on the part of agencies charged with natural resource management to apply existing legislation to protect the condition of the land or to tighten the duty-of-care for biodiversity on pastoral land (Environment Australia, 2002; 2005a; 2005b). Although the natural resources of the coast and near-shore waters are regarded as being in near pristine condition there are a number of threatening processes. They include changing wild fire regimes, grazing pressure, spread of weeds, changed hydrology and, in some places, tourism practices (Environment Australia, 2005a).

The rapid growth of marine tourism in the Kimberley has resulted in intensive use of natural resources in coastal waters. The area is equivalent to approximately 10% of the Region or approximately 2% of the State. Considerable sections

of this area have been recommended for inclusion as part of the conservation estate. The size of the marine region, its biodiversity and proposals for commercial use as well as for conservation bring into question the adequacy of current governance and management systems for this task.

Marine tourism in the Kimberley is growing whereas tourism overall appears to be in decline. Development of the industry has been largely unplanned and it is difficult to know what contributes to the apparent downturn or to know how it is likely to affect marine tourism. The natural resources used by marine tourism are also exploited by extractive primary industries. A lack of data for the Kimberley prevents quantification of environmental change resulting from current use of the contiguous terrestrial and marine environments. Additional research and data collection strategies are required to address this lack of basic knowledge. Without a clear understanding of the extent, condition and value of the resources being used by industries in the project area, it is unlikely that a structured management regime can be implemented. The management framework proposed aims to ensure that the natural resources in the project area can be developed, managed and provide outcomes that are sustainable in line with existing legislation.

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REFERENCES

- Buckley, R. and Pannell, J., 1990: Environmental impacts of tourism and recreation in national parks and conservation reserves. *Journal of Tourism Studies* 1, 24–33.
- Butler, R.W., 1991: Tourism, environment, and sustainable development. *Environmental Conservation* 18, 201–209.
- Collins, J.H., 2001: Fly-in-fly-out bush camp tourism: Faraway Bay in the Kimberley, Western Australia. Unpublished B.Sc. (Honours) thesis, Department of Geography, The University of Western Australia, Perth.
- Crawford, S., 2000: Designing tourism naturally: a review of the world best practice in wilderness lodges and tented safari camps. Western Australian Tourism Commission, Perth.
- DAFF (Department of Agriculture Fisheries and Forestry), 2006: Northern Australia quarantine strategy (NAQS). Retrieved 5 October 2006 from <<http://www.affa.gov.au/content/output.cfm?ObjectID=4043ACCA-1540-4945-9FE2C20733351712&contType=outputs>>.
- DEH (Department of Environment and Heritage), 2005: Australia's national biodiversity hotspots. Retrieved 19 May 2005 from <<http://www.deh.gov.au/biodiversity/hotspots/facts.html#15>>.

- DPI (Department for Planning and Infrastructure), 2005: North Kimberley land use and infrastructure investigations discussion paper. Western Australian Planning Commission, Perth.
- Environment Australia, 2002: Australian Natural Resources Atlas V2.0: Mitchell (Northern Kimberley 1). Retrieved 19 September 2003 from <http://audit.ea.gov.au/ANRA/vegetation/bio_asses/case_study.cfm>.
- Environment Australia, 2005a: Australian Natural Resources Atlas: Biodiversity and Vegetation – Biodiversity Assessment, Dampierland. Retrieved 19 September 2005, from <http://audit.ea.gov.au/ANRA/vegetation/vegetation_frame.cfm?region_type=WA®ion_code=DL>.
- Environment Australia, 2005b: Australian Natural Resources Atlas: Biodiversity and Vegetation – Biodiversity Assessment, Northern Kimberley. Retrieved 19 September 2005, from <http://audit.ea.gov.au/ANRA/vegetation/vegetation_frame.cfm?region_type=WA®ion_code=NK>.
- Fennell, D.A., 2000: Comment: ecotourism on trial – the case of billfish angling as ecotourism. *Journal of Sustainable Tourism* 8, 341–345.
- Fisheries Western Australia, 2000a: Assessment of applications for the granting, renewal or transfer of fishing tour operators licences and aquatic eco-tourism operators licences: Ministerial Policy Guideline No. 12. Fisheries WA, Perth.
- Fisheries Western Australia, 2000b: Fisheries Ministerial Policy Guideline No. 12. Assessment of applications for the granting, renewal or transfer of fishing tour operators licences and aquatic eco-tourism operators licences. Fisheries WA, Perth.
- Flaherty, T. and Sampson P., 2005: *Taking NRM Beyond the Shore: Integrating Marine and Coastal Issues into Natural Resource Management*. M. Grady and T. Allen, Marine and Coastal Community Network, Yeronga, Queensland.
- Fremantle Sailing Club, 2001: Western Australian Cruising. Fremantle Sailing Club, Fremantle.
- Garrod, B. and Wilson, J. (eds) 2003: *Marine Ecotourism: Issues and Experiences. Aspects of Tourism*. Channel View Publications, Clevedon.
- Geoscience Australia, 2005a: Coastline lengths. Retrieved 10 October 2005 from <<http://www.ga.gov.au/education/facts/dimensions/coastlin.htm>>.
- Geoscience Australia, 2005b: Computing Australia's maritime boundaries. Retrieved 12 September 2005 from <<http://www.ga.gov.au/nmd/mapping/marbound/computation.jsp>>.
- Geoscience Australia, 2005c: Islands. Retrieved 10 October 2005 from <<http://www.ga.gov.au/education/facts/landforms/largisle.htm>>.
- Geoscience Australia, 2005d: Maritime boundary definitions. Retrieved 25 August 2005 from <<http://www.ga.gov.au/nmd/mapping/marbound/bndrs.jsp>>.
- Geoscience Australia, 2005e: Relationship of maritime features, limits and zones. Retrieved 25 August 2005 from <http://www.ga.gov.au/image_cache/GA5597.pdf>.
- Greiner, R. and Larson, S., 2004: The relationship between landholders and tour operators: an investigation of the areas adjoining the Gibb River Road in the North Kimberley. CSIRO Sustainable Ecosystems, Townsville, Queensland and Tropical Savannas CRC, Darwin.
- Guého, R., 2003: *Icons of the Kimberley: An A to Z for Guides and Travellers*. Northern Habitat, Broome.
- Gunn, C.A. and Var, T., 2002: *Tourism Planning*. Routledge, New York, 4th ed.
- Hall, C.M., 1991: *Introduction to Tourism in Australia: Impacts, Planning and Development*. Longman Cheshire, Melbourne.
- Hall, C.M., 2001: Trends in ocean and coastal tourism: the end of the last frontier? *Ocean and Coastal Management* 44, 601–618.
- Harrington, H.J., 1999: *ISO 14000 Implementation: Upgrading your EMS Effectively*. McGraw-Hill, New York.
- Harris, R., Griffin, T. and Williams, P. (eds): 2002: *Sustainable Tourism: A Global Perspective*. Butterworth Heinemann, Oxford.
- Jafari, J. (ed.) 2003: *Encyclopaedia of Tourism*. Routledge, London.
- Kay, R. and Alder, J., 1999: *Coastal Planning and Management*. Spon Press, London.
- Ketchum, B.H., 1972: The water's edge: critical problems of the coastal zone. Proceedings of the Coastal Zone Workshop, M.I.T. Press, Woods Hole, Mass.
- Kimberley Cruise Centre, 2005: True north: five star Kimberley cruising. Retrieved 24 August 2005 from <http://www.kimberleycruises.com/boats_tn05.htm>.
- KDC (Kimberley Development Commission), 2003: Kimberley economic perspective: an update on the economy of Western Australia's Kimberley region. Department of Local Government and Regional Development, Perth, Western Australia.
- KLC (Kimberley Land Council), 2004: How Traditional Owners of the North Kimberley want to look after their country. Department of Planning and Infrastructure, Perth, Western Australia.
- Kneebone, P., 2004: Kimberley Natural Resource Management Plan. Rangeland Co-ordination Group, Perth, Western Australia.
- Mitchell, B., 2005: A Strategy for Managing the Natural Resources of Western Australia's Rangelands. NRM Co-ordinating Group, Perth, Western Australia.
- Moore, S. and Carter, B., 1993: Ecotourism in the 21st century. *Tourism Management* 14, 123–130.
- Murphy, L. and Norris, A., 2005: Understanding Great Barrier Reef visitors: segmentation according to reef trip benefits. *Tourism in Marine Environments* 1, 71–87.
- Nelson, J., 1999: An introduction to tourism and sustainable development with special references to monitoring. In Nelson, J., Butler, R. and Wall, G. (eds) *Tourism and Sustainable Development: Monitoring, Planning and Managing*. University of Waterloo Press, Waterloo, Canada, 3–23.
- NNTT (National Native Title Tribunal), 2004: What is a prescribed body corporate? NNTT, Canberra.
- Nursery-Bray, M. and Pedder, A. (eds) 2004: *Key Conservation Issues in the Northern Marine Planning Area: A Report to the National Oceans Office*. Australian Marine Conservation Society, Darwin.
- Orams, M., 1999: *Marine Tourism: Development, Impacts and Management*. Routledge, London.
- Priskin, J., 2002: Physical impacts of four-wheel drive related tourism and recreation in a semi-arid, natural coastal environment. *Ocean and Coastal Management* 46, 127–155.
- Priskin, J. 2003. Regional planning for nature-based tourism in the Central Coast Region of Western Australia. Unpublished PhD thesis, School of Earth and Geographical Sciences, University of Western Australia, Perth.
- Rogers, P., 2003: *Accord for the Location of Pearling Leases and Charter Boat Operations in Waters North of 80 Mile Beach to the West Australian Northern Territory Border*. Department of Fisheries, Fisheries Western Australia, Perth.
- Scholtes, P.R., Joiner, B.L., Braswell, B., Finn, L., Hacquebord, H., Little, K., Reynard, S., Streibel, B.J. and Weiss, L. 1993: *The Team Handbook: How to Use Teams to Improve Quality*. Joiner Associates, Madison, Wisconsin.

- Todd, R., 2004: The quest: the ultimate Kimberley experience. Pearl Sea Coastal Cruises, Australia.
- TWA (Tourism Western Australia), 2004: *Kimberley Tourism Perspectives 2003*. Tourism WA, Perth, Western Australia.
- TWA (Tourism Western Australia), 2005: *Kimberley Tourism Fact Sheet 2004*. Tourism WA, Perth, Western Australia.
- WATC (Western Australian Tourism Commission), 2001: *Draft Kimberley Region Tourism Infrastructure and Product Development Plan 2001–2005: an Initiative of Partnership 21*. WATC, Perth, Western Australia.
- Wever, G.H., 1996: *Strategic Environmental Management: Using TQEM and ISO 14000 for Competitive Advantage*. John Wiley and Sons, New York.
- Wilson, B., 1994: *A Representative Marine Reserve System for Western Australia: Report of the Marine Parks and Reserves Selection Working Group*. Department of Conservation and Land Management, Como, Western Australia.
- Yu, P. and Yu, S., 2003: *The Impact of Tourism on the Gibb River Road*. CRC for Tropical Savannah Management, Broome, Western Australia.
- Zell, L., 2003: *A Guide to the Kimberley Coast Wilderness – North Western Australia*. KTA, Broome.