

# The Extraordinary Cape Range Area, WA

**M**ost Australians know of Ningaloo Reef as an outstanding natural environment. Few are aware that the reef is just part of a unique reservoir of natural and cultural heritage, which makes the Cape Range region of Western Australia a place of world significance.



Satellite Image Courtesy of the Remote Sensing and Application Centre

# A Unique Marine Wonderland

The waters surrounding Cape Range peninsula are the habitat for a diverse suite of marine animals, plants and seabirds whose occurrence is due to an unusual confluence of factors which come together at Cape Range.

Firstly, the peninsula is at the latitude where tropical and temperate marine environments overlap, so animals typical of each intermingle at the extremities of their ranges, along with species which are unique to this overlap zone. Secondly, the peninsula is the Australian 'landfall' of the Leeuwin Current, which brings tropical oceanic waters and animals from other parts of the Indo-Pacific. Finally, the peninsula separates two vastly different types of marine environment. To the east are the turbid waters of Exmouth Gulf, where 'mainland' organisms typical of the North West Shelf dominate. This contrasts with the clear oceanic waters of Ningaloo Reef to the west, where 'oceanic' species are found.

Ningaloo Reef is approximately 260 km in length and Australia's longest and most spectacular fringing reef. Its clear blue waters and colourful coral reefs are in striking contrast with the rugged red hinterland of Cape Range. The reef is habitat for a vast diversity of coral reef animals including more than 200 coral species, 600 different molluscs, and 500 species of fish, many of which rely on the reef lagoon as an important nursery ground. In addition to resident fish, widely ranging pelagic species such as spanish mackerel, wahoo, cobia and tuna also occur behind the reef front, and the sea off Ningaloo is one of the few places in the world where aggregations of several species of big game fish occur, including sail fish and black, blue and striped marlin.

The area is perhaps most renowned for the annual appearance of the world's largest fish, the whale shark. Predictable aggregations occur each autumn, probably in response to a proliferation of rich planktonic food sources at this time, including



Image Courtesy Brad Norman

coral eggs and larvae from the spectacular synchronous coral spawnings on the reef. Whale sharks have been central in establishing the area as an internationally recognised tourist mecca. Apart from the autumn visitations however, the life cycle of whale sharks remains largely unknown. The species is hunted in some parts of the world and its future survival is far from certain. Ningaloo Reef is one of the few places where whale sharks are fully protected, and provides an important research site to enhance understanding and conservation of this species\*.

Less well known are the marine mammals which frequent the area, including humpback, minke, fin, blue and killer whales, bottle nose dolphins, dugongs and Australian sea lions. Exmouth Gulf supports one of WA's most important dugong populations, and these mammals are sometimes seen in small numbers where seagrasses occur to the west of the peninsula, including Norwegian Bay and north of Bruboodjoo Point. Exmouth Gulf is also a major resting area for humpback whales on their annual southerly migration from breeding areas off the Kimberley region, providing a refuge for cows with calves.

The marine ecosystem of Exmouth Gulf is in stark contrast with that of Ningaloo Reef. Its waters

*Ningaloo Reef is a crucial part of the life cycle of the world's largest fish, the whale shark, which predictably arrive in the waters off North West Cape each autumn .*

“.....consideration to.....the nomination peninsula as a Heritage site”

contain significant mud and sand flats, each with their own unique animals. Extensive mangrove stands occur along the length of the eastern shoreline and the Gulf's shallow waters support vast sea grass beds. It is these habitats on which turtles and dugongs as well as extensive prawn populations depend, the latter forming the basis of a large gulf trawl fishery.

Over 25 bird species listed in international agreements aimed at protection of migratory birds, are known to occur in the region. Tidal flats are important as feeding and nesting sites for migratory and other waders during summer, with Mangrove Bay on the western shore of Cape Range being a particularly well recognised habitat for birds. The offshore waters of the reef are essential feeding areas for numerous sea birds, and coastal areas and islands provide valuable breeding rookeries and nesting sites. The islands and coastal beaches adjacent to Ningaloo Reef are also important nesting sites during the summer months for a number of turtle species, including the endangered green and hawksbill turtles.



*Ningaloo Reef and Exmouth Gulf support rich, complex and diverse communities of marine plants and animals*

Is there an acceptable risk for impacts affecting unique values?

\*The Australian Marine Conservation Society has conducted whale shark research at Ningaloo Reef, made possible with funding support from Coastwest/Coastcare.

Image Courtesy Brad Norman

# The Secret World of Cape Range

Hidden from view beneath the arid exterior of Cape Range peninsula lives an extraordinary collection of cave-dwelling and aquatic animals found nowhere else in the world. These subterranean creatures are a remarkable living time capsule echoing past changes in sea level and climate, and offering a window to the time of Gondwana.

The habitat for these unique animals is the 'karst' of Cape Range - a massive system of sinkholes and caves etched over millions of years out of the limestone formations that make up much of the peninsula. The caves provide a cool humid atmosphere for an amazing diversity of terrestrial animals, called 'troglobites', adapted over eons to an underground existence. Below the caves lies a vast freshwater aquifer, salty at its edges under the coastal plain from tidal movement of seawater up to 3.5 km inland from the adjacent Ningaloo Reef. This aquifer and salty interface is the home for yet another unique group of underground aquatic ani-

mals, collectively known as 'stygo fauna'.

The troglobites and stygo fauna are of particular significance because of their remarkably different origins and because of what this reveals about the history of the area. Amazingly, the closest living relatives of the aquatic stygo fauna are in the Caribbean region and the Canary Islands off Africa. This extraordinary distribution of relatives suggests a common origin over 180 million years ago, when the ancient supercontinent of Pangea, on the shores of the Tethys Sea, broke up. As the landmass forebears of today's continents, amongst them Gondwana, began drifting apart, they carried these common ancestors with them, including the ancestors of the stygo fauna of Cape Range.

In contrast to the stygo fauna, the closest living relatives of the cave troglobites are animals found in the litter on the floor of tropical and southern temperate forests of Australia. Cape Range is now an arid area, but the troglobites show that wet and humid conditions and rainforest must have existed there within the past 20 million years, when the Cape Range formation was deposited and the caves began to form. Some of the forest floor animals must have been driven underground as the area became progressively more arid. Having persisted in these caves long after climatic changes eliminated their surface ancestors, they are a living reflection of past climates. They became permanent cave dwellers and began evolving adaptations to a strictly subterranean life, such as loss of eyes, wings and pigment, or elongation of feelers.

The karst system of Cape Range is already renowned for having one of the most diverse and species rich subterranean faunas in the world, even though most of the secret lives hidden there

still remain to be discovered. Amongst the animals found so far are amphipods, shrimps, snails and millipedes, schizoids and spiders, archaeognaths, thysanurans and fish. Of these 54 species, 10 genera and at least one class occur nowhere else. The cave systems also support many other spiders, millipedes and molluscs which are evolving adaptations towards underground life. These species and their true subterranean cousins contribute to the complexity of cave communities, which are thought to be the richest and most diverse of any karst system in the world.

At present, 11 species of the subterranean fauna are considered rare or likely to become extinct, and are listed under the Western Australian Wildlife Conservation Act. It is like-



Images Courtesy WA Museum



Unique subterranean creatures of Cape Range, including the blind cave eel (top), schizomid and remiped (bottom), depend on protection of the fragile karst system of the peninsula, and its marine and aquifer waters

ly that many more from the area will be similarly recognised and protected in the future.

The astounding level of endemic species and community complexity comes from evolution progressing in a unique habitat isolated from comparable ones elsewhere in the world. But similar processes are happening within Cape Range itself. At this finer scale, the Cape Range caves function like an archipelago of islands, separated from each other by distance or conditions inhospitable to the cave occupants. As a consequence, animals within individual caves are becoming adapted to and dependent on the specific conditions of their particular caves, and are evolving away from their relatives in adjacent caves.

Both the troglobites and stygo fauna can only survive if their unique habitats are preserved. The rich cave fauna is ultimately dependent on the presence and maintenance of the limestone karst system of the peninsula as a whole, and of individual caves. But it also depends on the surface plants and animals, from where food sources are derived and carried into the caves with rainfall. Similarly, the stygo fauna lives a precarious existence dependent on maintenance of the aquifer and the quality of its waters, and of the waters of the adjacent reef system.

The potential to destroy or to protect the karst and its inhabitants rests on our decisions.

should be given  
on of Cape Range  
a site of World  
gnificance"

Report to the Western Australian Department of Environmental Protection, March 1998

Limestone formations of Cape Range provided shelter for the peninsula's earliest human inhabitants as well as its unusual subterranean animals - Yardie Creek, Cape Range



Image Courtesy WA Museum

# A Rich Human Record

Cape Range harbours an ancient history of Aboriginal habitation, providing a fascinating story of the life and culture of these first inhabitants, as well as a unique human record of environmental and biodiversity changes.

The first European to set foot on Cape Range was Captain L. Jacobzoon of the 'Mauritius' in 1618, but significant subsequent settlement, primarily for pastoralism, did not occur until the late 19th century. The history of the previous 30,000 years of human habitation is unfolding from painstaking study of artefacts, middens and rock shelters, amongst which is one of the oldest reliably dated archaeological site in northern Western Australia, at Mandu Mandu Creek rock shelter.

The lives of the earliest inhabitants of Cape Range were intimately tied to the climate and coastline of the area. These people made use of caves and rockshelters, leaving deposits stratified over time recording shelter use and the resources which sustained human existence.

These deposits show the crucial role the sea and coastal resources played in the economies of the Aboriginal people of Cape Range. Rock shelters such as Mandu Mandu, which documents human habitation for at least 32,000 years, contains evidence of the collection and use of fish, shellfish and crabs throughout its occupational history. The presence of emu and macropod bones shows that a diversity of terrestrial resources was also used, probably as people traversed the coastal plain from the sea to the foothills.

The present coastline is a little over 1 km from the range, but as glaciation intensified during the last major ice age, the coastline at Cape Range retreated westwards as sea levels fell as much as 150 metres below present. During this period, which peaked approximately 20,000 years ago and brought extreme aridity to the peninsula, the coastline was 10-12 km from the foothills.

It is evident from the contents of rockshelters that the use of the then far hinterland of Cape Range was only occasional and probably seasonal. The offshore reef system at Cape Range provided a resource sufficient to support viable social groups on the coast, and use of the hinterland become increasingly opportunistic. The change in proximity of this resource and increased aridity is reflected at Mandu Mandu, where there is no evidence of use of the rockshelter between 20,000 and 5,000 years ago. It was only reoccupied when the coastline was again adjacent to the foothills of the peninsula. However rockshelters at Pilgonaman and Yardie Creeks record ongoing Aboriginal occupation of the peninsula throughout this period.

The importance of Cape Range in understanding the lives of coastal Aboriginal Australians cannot be overstated. The peninsula is unique in being the nearest point of the Australian continent to the edge of the Continental Shelf. Consequently rockshelters and other sites were always relatively close to the sea and used intermittently by coastal communities even during the glacial maximum. Records of this aspect of human settlement of Australia has elsewhere been drowned with the post-glacial return of the sea over the broad coastal areas that formed the



Image Courtesy WA Museum

*Midden sites, such as the one above on the shores of Ningaloo Reef, and rockshelters reveal the importance of marine resources in the survival of Cape Range's earliest inhabitants.*

coastal zone during the last glacial age.

The rockshelter deposits of Cape Range are also unique in providing the earliest evidence for human decorative traditions in Australia, through the apparent use and modification of conus and other shells as ornamental beads. These artefacts and other evidence suggest that development of culture in Australian Aboriginal communities has an antiquity rivalling that known from Europe.

In addition to reflecting the climatic and sea level history of the area, the record of human habitation adds to our understanding of other environmental and biodiversity changes

which the area has experienced. Amongst these is evidence from midden sites that up to about 5,000 years ago, communities used a readily available supply of mangroves for wood and other resources. This suggests that mangroves were far more widespread along parts of the western coast of the peninsula than at present. Similarly, the presence of bones of the agile wallaby well outside its modern species range suggests that this species was distributed in the past over a greater range of ecological conditions than modern records indicate, or that climatic and vegetation regimes on the peninsula were such that it could inhabit the area.

## Threats to the Values of Cape Range

Human activities are already impacting on the outstanding natural and cultural heritage values of the Cape Range region, or have the potential to do so. Unless these activities are adequately planned and controlled, those values face an uncertain future.

On the peninsula, the karst system and its unique subterranean creatures, as well as the distinctive surface plants and animals of the area, face threats from limestone quarrying, onshore oil and gas exploration/ development, groundwater extraction and pollution, expansion of settlements, construction of coastal roads, municipal activities and pastoralism.

The marine environment is affected by commercial and recreational fishing, prawn trawling and aquaculture, as well as from the potential for offshore oil and gas development.

Even tourism, which can help protect the environment through education and understanding, has the potential to harm those values on which it is reliant.

### What you can do

Write to the WA State Environment Minister asking that the area be protected under an Environmental Protection Policy.

Write to the Commonwealth and WA State Environment Ministers asking that the area be formally assessed for the international significance of its values.

Join and support organisations working actively to protect the area, such as the Australian Conservation Foundation (ph. 1800 332 510) and the Australian Marine Conservation Society of WA (ph. 08 9420 7209).



*Modified marine shells used as ornamental beads by Aboriginal people at Cape Range are the earliest record of decorative traditions in Australia.*

Images Courtesy WA Museum