A KERMADEC ISLANDS MARINE RESERVE?

Fishing has changed and in places decimated mainland New Zealand's inshore marine ecosystems, and therefore one of the major objectives of marine reserves is to restore such ecosystems to their natural states. But, New Zealand is fortunate in having a few remote islands which have so far remained largely unfished, and which could still be preserved in their natural states. Malcolm Francis of MAF's Fisheries Research Division here describes the fascinating world of some of these islands.

Insignificant in size though they may be, New Zealand's Kermadec Islands are of national and international importance, and certainly deserve to be marine reserves on scientific grounds.

Lying 400–530 nautical miles north-east of New Zealand and about half way to Tonga, the Kermadecs have only been lightly fished. The summits of volcanic pinnacles which arise from the narrow Kermadec Ridge, the four main island groups are separated from each other by depths greater than 900 metres. These groups, from north to south, are: Raoul Island and the Herald Islets (28 km² in land area, about the size of Little Barrier Island), Macauley Island (3 km²), Curtis and Cheeseman Islands (less than 1 km²), and L'Esperance Rock (a small rock less than 50 metres long). The Kermadec Ridge is flanked by the deep waters of the Kermadec Trench to the east and the Havre Trough to the west.

Massive geological forces continue to shape the Kermadecs, which lie near the boundary of the Pacific and Australian plates. As the Pacific plate slides under the Australian plate, the volcanic impact is felt from Tonga in the north to Mt Ruapehu in the south. (In 1964 Raoul Island was witness to the most recent Kermadec eruption; today there is still considerable thermal activity on Raoul and Curtis Islands, and underwater vents have recently been discovered around Curtis Island and off Havre Rock (near L'Esperance Rock).

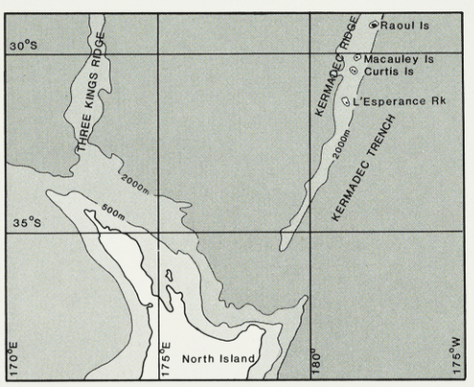
The Lands and Survey Department administers the Kermadecs as a nature reserve; humans make a home only on Raoul Island where a Lands and Survey ranger and several Meterological Service weather staff are stationed.

Subtropical waters

Subtropical waters bathe the Kermadecs with average temperatures ranging from 18.6 °C to 23.7 °C. As a result the marine flora and fauna comprise an interesting mixture of warm temperature New Zealand species and tropical species which are not found around mainland New Zealand.

The lush forests of brown kelp that are so characteristic of mainland coastal waters are absent from the Kermadecs. Instead, algae are generally small and inconspicuous, but they nevertheless form the essential base of the food chain for many animals. New Zealand's only reef-forming corals occur at the Kermadecs. Coral colonies may grow to two metres in diameter but do not form the massive coral reefs found in tropical waters. The size, abundance and diversity of corals declines going southwards through the islands, indicating that coral growth is limited by winter water temperatures. Distribution of the coral-browsing crown-of-thorns starfish (*Acanthaster planci)* parallels that of its prey — it is found occasionally at Raoul Island, rarely at Macauley Island, and is so far unrecorded from the southern two island groups.

A considerable number of animal species are endemic to the Kermadecs. However, the proportion of endemic species varies from zero for algae and 4 percent for coastal fishes, to 34 percent for molluscs and 44 percent for starfish. Many Kermadecs plant and animal species do not occur in mainland New Zealand (and



vice versa). Only 12 percent of the Kermadecs molluscs, 30 percent of the algae, 44 percent of the starfish and 60 percent of the coastal fishes are found in New Zealand. The abundance of animals also varies between the Kermadecs and New Zealand. For example, of 27 coastal fishes recorded as abundant at the Kermadecs, 18 occur in New Zealand, but only six are common or abundant here. Thus the fauna of the Kermadecs is unique in that (a) it has a considerable number of endemic species, (b) it has a large number of species not found elsewhere in New Zealand, and (c) the species which are abundant at the Kermadecs are not the same as those that are abundant around the mainland.

The only other islands in the Southwest Pacific at a similar latitude to the Kermadecs are Lord Howe Island and Norfolk Island, both of which belong to Australia. These islands have well-developed coral reefs and predominantly tropical floras and faunas.

International importance

Because the marine ecosystems of the Kermadec Islands differ substantially from those in New Zealand and elsewhere, they are of national and international biogeographic importance, and certainly qualify for marine reserve status on scientific grounds.

Despite their scientific importance, we know very little about the Kermadecs marine ecosystems. On a recent expedition to the Kermadecs, 36 species of fishes were recorded from the Kermadec Islands for the first time; 20 of these had not previously been recorded from mainland New Zealand. Similar discoveries undoubtedly await investigators in other fields.

Although the case for a marine reserve around the Kermadec Islands appears to be good, it is likely to take several years to create one. Recent developments indicate that the marine ecosystems will not remain unmodified until then, and interim controls on fishing are urgently required. Most fishermen have been deterred from going to the Kermadecs by their remoteness, and high costs involved, and the lack of suitable trawling grounds. Fishing has so far been restricted to a few vessels longlining for hapuku and bass, mainly on the banks south of the Kermadec islands.

However, interest in the area is currently escalating for two main reasons. First, the major hapuku fishing grounds around Northland and the Three Kings Islands are overfished and the Ministry of Agriculture and Fisheries (MAF) intends to introduce restrictive quotas in October to reduce catches. This has already encouraged fishermen to look further afield. Second, in February this year the Ministry of Transport reduced the size of vessels which could be granted a marine survey to fish at the Kermadecs from 21 m to 12.2 m, thus making the Kermadecs acceptable to many more small longliners.

Intriguing carnivore

One of the largest and most intriguing fish of the shallow reef ecosystem, the spotted black grouper *(Epinephelus daemelii)* is very vulnerable to fishing. Growing to a sizeable 1.2 metres long, the groupers are the main carnivores of the reef. Their population density is low, since a large reef area is required to support each fish. They partition the reef into territories and probably spend much of their lives in one area, and because the Kermadec Islands pinnacles are so steep, the grouper's habitat is very limited in area.

Furthermore the biology of the species makes it particularly sensitive to fishing pressure. They grow slowly: average-sized adults have been aged at between 29 and 50 years. Spotted grouper also change sex (from female to male) halfway through adult life, and therefore large fish are predominantly males. Since fishing tends to reduce the average age and size of fish in a population, this could lead to an imbalance in the sex ratio, a breakdown in the