

Marine Ecosystems of Western Sumatra

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OVERVIEW

The island of Sumatra comprises 470,000 km² (6°N to 6°S; 96°E to 106°E). In contrast to the eastern coast, where coastal plains with large rivers, peat swamps and mangroves dominate, the western coast is characterised by rocky and sandy shores and coral islands.

The climate of western Sumatra is characterised by more than nine consecutive wet months (up to 6000 mm/y) and a maximum of two consecutive dry months. The average surface water temperatures range from 28°C in December to 30°C in May. The salinity and density values are very stable throughout the year ranging from 33–34 ppt and 1020–1021 kg/m³ (DHI, 1990) for most of the area. The regional oceanography is largely unknown. It is characterised by exchange processes between the Andaman Sea and the Malacca Strait in the north and between the Pacific and Indian Oceans, via Sunda Strait, in the south. Upwelling develops off the southwest coast during the northeast monsoon from December through March.

In contrast to most western Indonesian seas, western Sumatra is characterised by a narrow shelf with steep continental slopes and steep islands. A 1700 m deep trench is less than 80 km west off the mainland. Only 100 km west of the

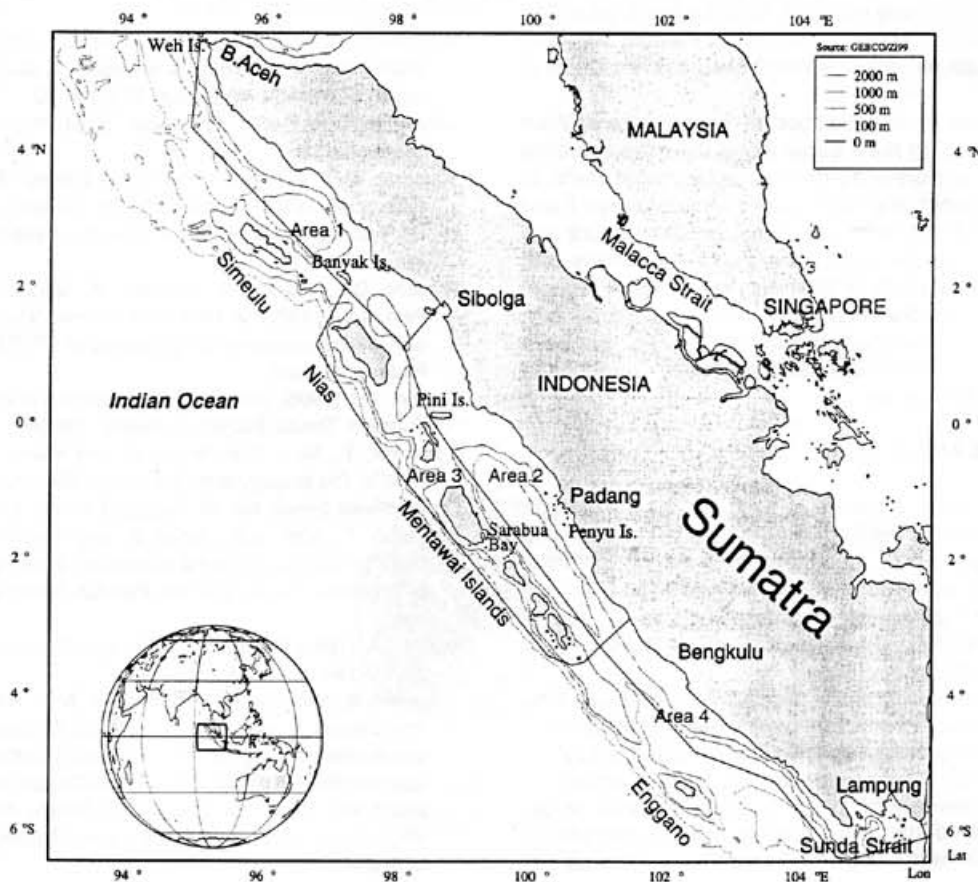
Mentawai Islands, depths of 5000 m are common. From a geosciences perspective, the very active Sumatra subduction zone shows characteristic features, such as trench, ridge, fore- and back-arc basin and volcanic arc (island). The large sedimentary basins of North Sumatra, Sibolga and Bengkulu are little studied areas, but are thought to host considerable demersal fish resources (Lohmeyer, 1983).

The territorial waters of western Sumatra (70,000 km²) constitute 2% (8% including EEZ) of the total for Indonesia. In 1995, 10% of Indonesia's total catch or 250,000 t of marine fish were produced here, including 15,000 t reef fishes. In contrast to the Fisheries Department, the Ministry for Environment claims that shrimps are fully overexploited and reef fishes are heavily overexploited.

MARINE ECOSYSTEMS

The marine ecosystems of western Sumatra are poorly documented. Exceptions are the reefs of West Sumatra (Kunzmann, 1997; Steffen, 1998) and Lampung (Wiryanan, 1999).

Apart from coral reefs, mangroves, seagrass/seaweed, mudflats, rocky shore, beaches, swamps, estuaries, we also find deep-sea environments. Especially in West Sumatra, all



these very different systems occur in a comparatively small area, with a mixed fauna of Pacific and Indian Ocean species, which more closely resembles the Pacific Ocean fauna rather than that of the Indian Ocean (Kunzmann et al., 1999; Wallace, 1997). The Joint Indonesian-German Sumatra Expedition JIGSE planned for 2001 is expected to produce a comprehensive understanding of the area.

The sandy beaches, north of Padang reaching lengths of hundreds of km, are colonised by *Pescaprae*—and sometimes *Barringtonia*—formations. Sand and ghost crabs (*Ocyropsis*, *Dotilla*), as well as molluscs (*Tellina*, *Pinna*, *Arca*) inhabit these beaches. Nesting sites of sea turtles are common in the south, but only two species (*Chelonia* and *Eretmochelys*) are seen regularly.

The rocky shores, in contrast to the sandstone of the East, are formed of old limestone (Aceh) or volcanic rock (Padang). Barnacles, oysters, limpets and Nerita snails are common and crabs (*Grapsus*) and rockpool blennies occur. The volcanic rock south of Padang hosts few corals.

Approximately 60% of the 1.5 million ha of mangroves in Sumatra lie on the east coast. The only large mangrove area in the west is the Tomak estuary. Few publications exist on this area or on the smaller areas of Painan and Air-Hadji further south. The Mentawai Islands also host mangroves, which are increasingly and illegally deforested. For more details, see Whitten et al. (1984) and Mastaller (1992).

Little work has been done on macroalgae and seagrass. *Ulva*, *Halimeda* and *Padina* are found on reefs. Mixed meadows of *Thalassia* and *Enhalus* are found on a few fringing islands. Larger shallow areas with seagrass are only documented from the Tanahmasa and Pini Islands, where dugongs are occasionally reported. As seagrass is grazed on by green turtles, their abundance close to Padang suggests there must remain as yet unreported seagrass resources in the area.

Coral reefs are most developed in the province of West Sumatra. Few fringing reefs occur along the main shoreline and most reefs are breaking or submerged patch reefs, or fringing reefs surrounding high islands lying between 1 and 26 km offshore. The Mentawai islands (Siberut, Sipura and Pagai), 160 km to the west, host many coral reefs and mangroves with the roots of *Rhizophoras* sometimes reaching large *Porites* blocks in locations such as Sarabua Bay. Further north along the coast, preliminary studies have been completed on the reefs of Banyak (Stehmann, unpubl.) and Weh Islands, both in Aceh.

DISTURBANCE AND STRESS

Unfortunately, most systems are under heavy human pressure. Destructive fishing with dynamite, poison and trawls (Kunzmann, 1998), coral and shell mining, pollution and sediments from settlements, logging and mining activities, as well as natural disasters such as the recent occurrence of red tides (Praseno et al., 1998) pose a major threat to the coastal ecosystems.

Due to repeated disturbance, succession is halted and the reefs are in a process of constant resettlement. This seems to favour either fast-growing species (small island areas) or species with a high tolerance for siltation (inshore areas).

Mangrove areas are reduced to small patches of degraded vegetation dominated by *Nipah*. This frequently leads to coastal erosion with narrow beaches. The replacement of

mangroves with tambak ponds for shrimps and fish stopped only after dramatic drops in Penaeid shrimp yield. Many jobs were lost, since other species of economic importance, such as *Scylla* crabs, *Acetes* shrimps and fishes (*Chanos*, *Mugil* and *Lates*) also disappeared due to loss of habitat.

The over-exploitation of turtle eggs and adults has resulted in considerable reduction of turtle populations. Of the four species formerly abundant, only two are still regularly observed. Even on Pulau Penyu, a Marine Protected Area specifically dedicated to turtles, where sometimes the rare *Dermodochelys* is seen, eggs are exploited regularly in large quantities.

While the prognosis is poor for the future, the area is of special interest to national and international projects, like MAREMAP, COREMAP and JIGSE and it is hoped that, with more attention focused on the west coast of Sumatra, the mounting human impacts on coastal and marine systems can be reduced and the resources and unique habitats of the area preserved.

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