



## Present status of coral reef in India

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### Introduction

The South Asian countries with coral reefs or coral communities are Bangladesh, India, Maldives, Pakistan and Sri Lanka, as well as the United Kingdom overseas territory of Chagos (British Indian Ocean Territory, BIOT). The major coral reefs include atolls along the more than 2000 km Lakshadweep-Maldives-Chagos ridge; fringing and patch reefs in the Andaman and Nicobar Islands, India, around the Gulf of Mannar in India and Sri Lanka, and along the south western and eastern coastline of Sri Lanka.

Coastal and marine ecosystems and resources provide large benefits to the countries of the region through fisheries and tourism, which are highly important economic sectors in the Maldives, India and Sri Lanka Hoon et al., (2008). Many people throughout the region are directly dependent on reef resources, however, poverty is widespread, especially among coastal populations (which are also dependent on other natural resources).

Climate change is the main regional threat to coral reefs in South Asia. Impacts from higher temperatures, more variable precipitation, more extreme weather events and sea level rise are already being felt in South Asia and will continue to intensify. A reduction in calcification rates caused by rising ocean acidification may be equally severe or even more so. However, reefs are also facing severe direct human stresses from over-fishing and destructive fishing, coastal development, runoff from land and increased sedimentation.

### Status of reefs until 2004:

Coral reefs in South Asia suffered large-scale bleaching in 1998 with a catastrophic reduction in coral cover. The impact was variable, with up to 90% mortality in many areas, including most reefs along the Lakhadweep-Maldives-Chagos ridge (these make up more than three quarters of the region's reefs), as well as most reefs in Sri Lanka. Other areas



showed much lower bleaching mortality, such as the Indian coast of the Gulf of Mannar, and the Andaman and Nicobar Islands. Unfortunately, there were no baseline data on the coral and reef fish communities in large parts of the region to determine the full extent of the 1998 bleaching damage. Coral bleaching has been observed almost yearly in the region since 1998, but mostly at a local scale and during the warm and calm period in April-May.

#### **Status of reefs until 2008:**

No clear and consistent regional trend in coral reef status in South Asia can be identified; although some broad patterns can be distinguished. These include an overall increase in coral cover in recent years but these gains are often threatened by continued human stresses. The tsunami had a much lower impact on coral reefs than the bleaching in 1998, and much lower than the chronic human stresses Cattermoul (2013).

#### **Chagos (BIOT):**

The last surveys in 2006 show strong recovery of coral cover after the mass mortality in 1998 in the Chagos archipelago. There were significant differences in reef bottom composition between atolls and different depths, as well as between sites in the same atoll. However, living corals and other animals far exceeded non-living substrate at all sites

and depths, except for Egmont Atoll. Lagoon patch reefs showed generally higher coral cover at 25 m depth than did outer reef slopes. Coral larval recruitment was very strong, such that the lowest Chagos recruit densities were at least 10 times higher than rates of recruitment at most other reefs in the central and western Indian Ocean

There have probably been several minor shallow-water bleaching events in Chagos in the past few years, including a substantial, but localised, coral mortality at Egmont Atoll where more than 95% of the corals died in 2005.

#### **The Maldives:**

Coral cover is increasing at all sites across most atolls in the Maldives that were surveyed between 2006 and 2008; but reef recovery is highly variable. Live coral cover ranges from less than 10% to more than 80%, with much higher coral cover generally found on western atolls than those along the eastern chain. The Acroporasppecies that were virtually wiped out during the 1998 bleaching, now dominate the coral community at most lagoon sites. This is the dominant genus where there have been large increases in coral cover, and large table corals more than 1 m in diameter are common. Coral diseases, such as white band and black band, are less frequent than previously observed at some reef sites, while the



sponge Terpiosshoshinota is common at some sites where it overgrows and kills several coral species Tamelander(2010

**India:**

Detailed information is reported on the main Indian reef areas, including the Lakshadweep Islands, Andaman and Nicobar Islands, and Gulf of Mannar, with limited and largely anecdotal information for reefs elsewhere in the country. The impact of the 2004 tsunami was examined in detail on the Andaman and Nicobar Islands in 2005 and 2006. More than 100 km<sup>2</sup> of shallow reef area was damaged in the Andaman Islands with most of this due to tectonic uplift and aerial exposure, as well as by the tsunami waves carving channels between islands.. Good coral larval recruitment has been reported from the Andaman Islands, while in the Nicobars it remains negligible. In some parts of the Nicobar Islands hard corals are facing competition from soft corals.

Average live coral cover around the 21 islands in the Gulf of Mannar is 35%, a slight increase over the past 5 years. The highest coral cover occurs in the Keezhakkarai island group (44%) and the lowest in the Tuticorin Group (29%): 117 coral species were recorded in the area in 2005, including 13 new records. Habitat structures, in particular live corals, play a major role in

enhancing fish diversity and 50 reef-associated fish species in 27 families were observed in 2005. The Gulf of Mannar coral reefs are under considerable stress due to the proximity of the mainland and high coastal populations, urban centres and land-based activities. Sedimentation from numerous sources is high, including monsoonal runoff, sewage disposal, industrial discharge and coastal development, and the destructive fishing methods used in the area cause considerable re-suspension of sediment activities.

The state of Gujarat has a 1650 km long coastline with a broad continental shelf: it contains 35% of India's total shelf area, including 7350 km<sup>2</sup> of the shallow Gulf of Kachchh. Coral communities (total area, 460 km<sup>2</sup>) are found around 20 of the 42 islands, 20 islands have mangroves, while 6 'islands' are submerged. Industrial development is intense in the Gulf, with 11 ports and 21 major salt industry sites producing >70% of India's total salt production.

Table 1: Status of coral reefs in India

Particulars	Geographical location	Area of the reef (in Sq. Km)	Destruction during bleaching	Potential for recovery
Gulf of Mannar	21 islands, South East Coast of India 140 km, between Tuticorin and Rameswaram	94.3	60-80 percent loss of live cover. Only 25 percent live corals remaining	Medium Low
Gulf of Kutch	40 islands, Northern side of Saurashtra peninsula	325.5	50-70 percent	Medium Low
Andaman and Nicobar Islands	530 islands	1021.46	15-20 percent	Good
Lakshadweep Islands	Uninterrupted chain of coral atolls-stretch of 2000 km	933.7	70-90 percent loss of live cove	Good

**Socio economic monitoring:**

A South Asia regional GCRMN SocMon Node was established at IUCN

through the Coral Reefs and Livelihoods Initiative (CORALI, [www.coralweb.org](http://www.coralweb.org)), a collaborative initiative involving IUCN, CORDIO, ICRAN, SACEP and IMM Ltd as well as national institutions, NGOs and CBOs (community based organisations). Regionally appropriate methods for socioeconomic monitoring have been developed and tested through CORALI pilot site initiatives in 6 locations around the region, and a regional SocMon manual has been prepared by IUCN and CARESS. CORALI has adopted a people-centred and poverty-focused approach to working with people who depend on coral reef resources for a key part of their livelihoods.



Fig 2: Coral Biodiversity

### Status of mangroves, seagrasses and Fisheries:

The 6000 km<sup>2</sup> Sundarbans between Bangladesh and India is the largest mangrove area in the world. Other major mangrove areas in South Asia include the Indus delta of Pakistan, the sixth largest mangrove area in the world, the Gulf of Kachchh in India, and the Puttalam, Trincomalee and Batticaloa areas of Sri

Lanka. There is very little mangrove growth in the Lakshadweeps, Maldives and Chagos. Surveys of mangroves in and around the Gulf of Kachchh identified 13 true mangrove species, 3 of which are abundant; but 4 have not been seen for more than 20 years. Presently Gujarat is the only Indian state where mangrove cover is increasing. This is due in part to a large reforestation program, however, the need for land for industrial development and human settlement remains a major threat.

Fishing pressure is also increasing on some resources previously comparatively less exploited. This includes an increasing grouper fishery in the Lakshadweep islands and the Maldives driven by the high export value of these reef fish. It is feared the growth in the fishery will result in severe over-harvesting, as seen throughout the world, faster than management.

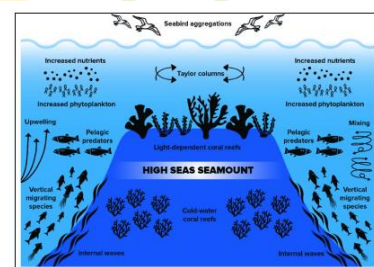


Fig 3: Ecological significance of corals

Interventions can be implemented. A regional interview survey of fish spawning aggregations, by IUCN and CORDIO in collaboration with national organizations, in 2006 and 2007 found little indigenous knowledge of spawning



aggregations. Several potential reef fish spawning aggregation sites were identified but the results cannot be verified and thus are indicative only.

### **Conclusion:**

There has been a positive trend in reef status across South Asia since 2004 if coral cover is used as the sole indicator. However, the region is still struggling to recover from the massive impact of bleaching in 1998 and the smaller impacts of the Indian Ocean Tsunami of 2004. It is clear that the rate of recovery, with some notable exceptions, is mostly moderate or slow, largely due to direct human stresses. Similarly, many reefs in the region have changed considerably from their original state in terms of species composition and ecological functionality.

There are also no significant regional changes in the number and magnitude of threats to coral reefs, mangroves and seagrass beds in South Asia. In many areas localised stress is becoming increasingly severe, especially around urban centres and highly populated areas, from over-fishing and pollution from the land. There is also a positive trend in coral reef monitoring and research in the region with an increasing number of skilled professionals emerging from tertiary training and other capacity building initiatives. Improved monitoring and research is on-going, with increased

geographic coverage. Although there are some notable exceptions, marine and fisheries management remain poor due to capacity and funding constraints, difficulty in harmonizing needs of many diverse stakeholders and a lack of political will. As a consequence, many MPAs in the region remain paper parks with little active management and widespread breaches of regulations.

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