International Journal of Advanced Innovation and Research
Vol 3, Issue 2, February 2025
ISSN: 2584-2129

INTERNATIONAL JOURNAL OF
ADVANCED INNOVATION AND RESEARCH
journal homepage: www.ijair.in

Invironmental Problems In Indo-Pacific

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Keywords

Environment, Climate, temperatures, region, indo-pacific

ABSTRACT

Climate change-induced phenomena such as extreme weather events and rising ocean temperatures adversely affect the reproductive patterns and quality of aquatic life in the Indian and Pacific oceans. These impacts are already evident in regions adjacent to the Indian Ocean, exemplified by the Sundarbans area in India.

Introduction:

Environmental threats in the Indian Ocean Region have far-reaching security implications that have the potential to shape the strategic equation between the bordering nations. For instance, the modern phenomenon of Somali piracy is a consequence of what was earlier an environmental problem—i.e., diminishing fish stocks. Overfishing by extra-regional fishers compelled local fisher folk to turn to piracy to secure a livelihood; the problem aggravated over time. Exacerbated by the lapse of governance in the country, this ―non-traditional‖[a] threat of maritime piracy today not only endangers the fishing vessels operating in these waters, but also generates more traditional or state-centric lateral concerns,[1] such as the militarisation of the ocean space, seen for example in the construction of the Chinese naval base at Djibouti.[b],[2]

The case of Somali piracy is an example of how a seemingly manageable environmental problem, when left unchecked, can evolve into a significant security concern. Thus, environment-related threats in the Indian Ocean should not be treated as isolated concerns. To understand the degree of the potential impacts of environmental issues, it is important to analyse their interaction with traditional strategic challenges. In the Indo-Pacific Region, there are three environmental concerns that could have larger strategic impacts on the countries in the region.

First is the threat of natural hazards such as cyclones and tsunamis. The Indian Ocean is often referred to as the ―World Hazard Belt.‖[3] Natural disasters, both climatological (meaning cyclones) and geological (causing earthquakes leading to tsunamis), are recurring phenomena in the region.[4] The magnitude of devastation caused by cyclones and tsunamis occurring in this maritime space has drawn global attention, for instance, during the tsunami of 2004. Second is Illegal, Unregulated and Unreported (IUU) fishing, as well as overfishing, that is rampant in both Indian and Pacific Oceans. As large populations of the littoral states are dependent on fisheries both for animal protein and incomes, IUU fishing has the potential to damage relations amongst these nations.

Third is the threat of marine plastic. Garbage patches have already been found in the Indian Ocean, the North Pacific Ocean, the South Pacific Ocean, and the Bay of Bengal. These garbage patches pollute the ocean‘s waters, affecting marine life and people‘s livelihoods.

These transnational environmental concerns have the potential to disturb inter-state relations and impede cooperation in this geostrategic realm. This report examines their strategic implications,

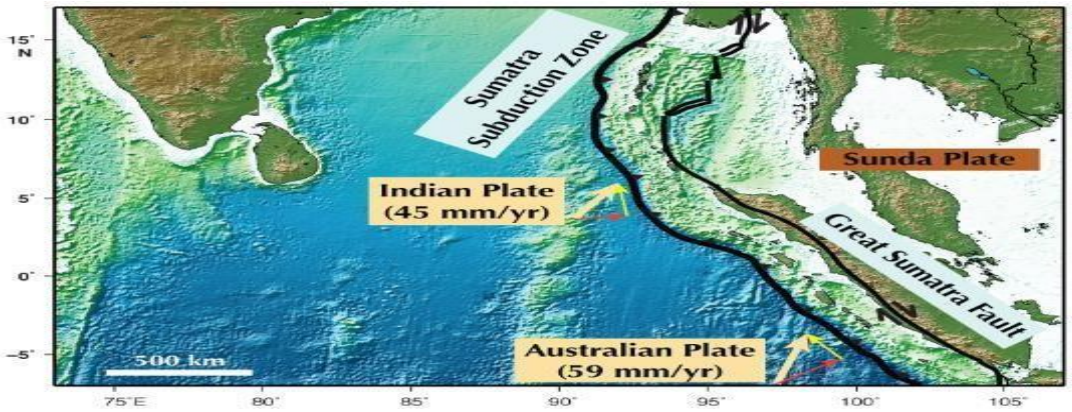
and outlines recommendations to reduce their toll.

Cyclones and Tsunamis

One of the inevitable impacts of climate change is the marked increase in the frequency of natural hazards such as cyclones. ―In the 2000s, about 150 major floods were recorded worldwide, triple the number in the 1980s. According to one major global insurance group, the incidence of Category 5 storms—the most severe—also tripled.‖[5] Geographical areas already vulnerable to such calamities are at even greater risk than they were before. Asia and the Pacific Ocean region are bearing the brunt of this trend, as natural disasters are now four times more likely to affect people in the region than those in Africa, and 25 times more likely than those in Europe.

An index mapping climate change vulnerability indicates that all seven cities globally classified as being at ―extreme risk‖ are in Asia: Dhaka, Manila, Bangkok, Yangon, Jakarta, Ho Chi Minh, and Kolkata[6]—four of which are in Bay of Bengal littoral countries. Thus, while disaster vulnerability is common throughout much of the Indo-Pacific, it is particularly pronounced in the northeastern offshoot of the Indian Ocean—the Bay of Bengal. This is largely due to the Bay's triangular shape, low and flat coastal terrain, and shallow depth; the presence of easterly waves; and cyclonic winds from the Pacific Ocean, in the absence of any large mass at the intersection of the two seas. Furthermore, parallel to Andaman and Nicobar Islands lies the Andaman-Sumatra Subduction Zone (See Figure 1), where collision of the Sunda plate with the Indian and Australian tectonic plates generates earthquakes that in turn cause tsunamis.[7]

Figure 1: The Andaman-Sumatra Subduction Zone



Source: *Incoming! Oblique Subduction at the Sunda Subduction Zone.[8]*

Between 1891 and 2018, the Bay of Bengal region was hit by 41 severe cyclonic storms and 21 cyclonic storms.[9] From 1996 to 2015 alone, the Bay littorals have lost 317,000 lives to disasters, and more than 16 million people have been displaced.[10] (See Figure 2) The Bay littorals are Sri Lanka, India, Bangladesh, Myanmar, Thailand, and Indonesia.

Figure 2: Cyclones and Tsunamis on Bay Littorals (2004-2021)

Year	Disaster	Impacts
2004	Indian Ocean Tsunami	Sri Lanka suffered 30,000 fatalities and loss of US$1.5 billion.[11] In India 10,273 people died, and 22,750 hectares of agricultural land were damaged.[12] Myanmar officially pegged the death toll at 86.[13] Thailand witnessed thousands of deaths and losses of US$508 million.[14] Bangladesh reported two deaths[15] but no significant economic loss.
2017	Cyclone Ockhi	In India, 350 people died[16] and coastal fisheries suffered losses worth INR 821 crores.[17] In Sri Lanka, 414 were killed and 32,000 houses were damaged.[18]
	Cyclone Mora	In Bangladesh, 200,000 people were displaced and six were killed.[19] In Sri Lanka, 150 people died.[20] Damage was inflicted on Rakhine (Myanmar).[21]
2018	Cyclone Titli	In India, eight people died and almost 2,000 electric poles were uprooted.[22]
	Cyclone Gaja	In India, 45 people died.[23] Damage to houses was estimated at INR 3.4 lakh.[24] Nearly 1,000 homes were damaged in Sri Lanka.[25]
	Palu Tsunami	4,340 people in Indonesia died as a result of the tsunami, and thousands of buildings were damaged or destroyed.[26]
2019	Cyclone Fani	In Odisha (India), 64 people died[27] and over 10 million people were affected.[28] In Bangladesh, almost 12 people were killed.[29]
	Cyclone Bulbul	12 people were killed in India and another 12 in Bangladesh. The latter evacuated 2.1 million people to cyclone shelters.[30]
2020	Cyclone Amphan	In India, almost 98 people were killed[31] and thousands of non-permanent houses were destroyed.[32] Economic damages reached nearly US$13 billion. Bangladesh suffered losses of US$130 million.[33]
2021	Cyclone Yaas	In India, four lives were lost[34], almost 10 million people were affected and three lakh houses damaged.[35]Two deaths were reported in Bangladesh.[36]

Source: *Authors' own, from various sources.*

Note: In a span of five years, Indonesia has been hit by three cyclones and two tsunamis, but their impact has not been included in the chart as these disasters did not originate in the Bay.

Measures for Management

The management of disasters is critical for the countries outlining the Indo-Pacific maritime space, and is undertaken at three levels: local, national, and regional.

1. Local: The communities that live along the coastlines of the Indo-Pacific nations are the worst affected and the first to respond during a disaster until external assistance arrives. Thus, it is important to train them in disaster preparedness to equip them to save themselves and minimise the impact of the calamity. This calls for decentralisation in the operational structure of disaster management. Community-based disaster risk management (CBDRM) is a two-way process, since it requires training the community in modern methods while also imbibing their indigenous practices of disaster preparedness, which have been developed over time and are contextually applicable. Since 2015, CBDRM has gained significant traction, after 187 countries (including the Bay littorals) signed the Sendai Framework on Disaster Risk Resilience 2015-30, which emphasises the role of local communities and their networks in disaster management.[37] National disaster management plans, too, are being amended to accommodate this new aspect, to build flexible strategies that can be moulded to fit local needs and incorporate community efforts.[38]
2. National: A central authority on disaster management is at the core of any kind of disaster management initiatives that the country undertakes, both at micro or macro levels. While each Bay littoral country has its own system of disaster management, in most cases, these are inadequate on their own in the event of a calamity. The only exceptions are India, which possesses capabilities in disaster management and thus receives bilateral requests for Humanitarian Assistance and Disaster Relief (HADR) support;[39] and Bangladesh, which has been able to flip the narrative of relief dependency to become a provider of HADR. As bilateralism continues to be the main paradigm for seeking HADR, the role of partners becomes critical in disaster management. Such partnerships, forged through relief assistance and by engaging in joint disaster-preparedness exercises, have strengthened diplomatic linkages and trust-building amongst the nations.Countries are engaging with both littorals and non-littoral powers in building collaborative disaster management, giving extra-regional powers an opportunity to build their presence in the region. For example, in the aftermath of the Indian Ocean tsunami of 2004, the United States, Japan and Australia came together with India to lend relief to the region. This formed the basis of what would later emerge as the Quadrilateral Initiative in 2007, devoted to addressing state-centric concerns.[40]At the same time, natural disasters can undermine the sovereignty of affected states by compelling the government of the

affected country to seek relief assistance from others. Indeed, since the acceptance of the terms laid down by the nation providing relief assistance is left to the discretion of the recipient country,[41],[c] there have been instances where affected nations have refused to accept relief aid. For example, during the 2007 Cyclone Sidr, Bangladesh restricted India‘s HADR to the Port of Chittagong; in 2008, Myanmar refused the US‘s relief assistance in the aftermath of Cyclone Nargis.[42]

3. Regional: Regional formations are important to minimise the dependence on bilateral aid, as well as to ensure collective action in mitigating the transnational threat of natural disasters. While some multilateral collaborations have been formed in the Bay region and across the Indo-Pacific, the Indian Ocean Region has few such effective forums. Consequently, when the oil spill incident occurred in Mauritius in September 2020,[43] several countries rushed to extend assistance, duplicating relief efforts. Regional arrangements can help ensure the proper coordination of relief assistance. However, participation in such forums have so far remained limited to the armed forces; to expand the horizon of cooperation, civilian agencies must also be represented. One example of an effective regional forum is the Indo-Pacific Environmental Security Forum (IPESF), the US Indo-Pacific Command‘s (USINDOPACOM) program for exploring solutions to environmental security issues throughout the Indo-Pacific Region. Its mission is to inform and educate regional militaries on these issues and the responsibilities of environmental stewardship. Additionally, the IPESF coordinates with civilian agencies and NGOs in its efforts.[44] With Asia accounting for almost half of the estimated global economic cost—close to US$1 trillion— caused by natural disasters since the early 1990s,[45] the Indian Ocean region urgently requires more such forums.

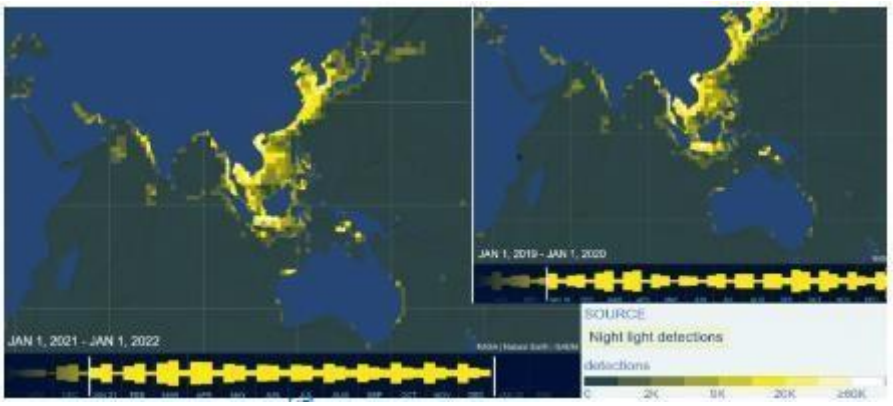
1. In the long run, diplomatic relations developed through bilateral or multilateral initiatives in disaster management can enhance inter-state cooperation. This, in turn, can facilitate the mitigation of challenges.

IUU Fishing

Illegal, Unreported and Unregulated (IUU) Fishing contributes to the overexploitation of fish stocks and impedes the recovery of fish populations and ecosystems to more productive levels. Thus, IUU fishing can have critical negative impacts on food security. Amongst countries in the Pacific Island, South Asia, and Southeast Asia, vast populations of coastal communities rely on fisheries for their livelihood and food security.

It is difficult to estimate the extent of IUU fishing in these oceans, as it involves activities that are often unrecorded and unobserved—and taking place potentially thousands of miles from the reach of surveillance systems located in Exclusive Economic Zones (EEZs) and the High Seas. Remotely sensed data—gathered using systems that detect vessels at sea by the light that they emit—is often indicative of the scale and spatial distribution of fishing activities. Though not exclusive to fishing vessels, such a vessel is detected when it uses lights to catch fish or conduct operations at night. According to estimates, more than 85 percent of the detected fishing vessels lack transponders for Automated Information System (AIS) or Vessel Monitoring System (VMS).[46]

Figure 3: Night-Light Detection of Vessels at Sea in the Indo-Pacific Maritime Space through Visible Infrared Imaging Radiometer Suite, Pre-COVID-19 and during COVID-19



Source: *Global Fishing Watch.[47]*

MRAG Consultants has undertaken quantification studies on IUU fishing—the ―gold-standard estimation‖—in the Indian and Pacific oceans, published in 2015 and 2016, respectively. For 17 countries of South Asia and Southeast Asia, the total annual value of illegal and unreported losses between 1990 and 2013 was found to be between US$6 billion and US$20.75 billion. These values represented between 4.5 and 14.4 million tonnes of marine catch. Within this region, the highest rates of IUU fishing are from the nations that have weak state control and enforcement regimes while being surrounded by nations that host large fishing fleets, such as Pakistan and Thailand. Small island states such as the Maldives and British Indian Ocean Territory have the lowest estimated rates of IUU fishing, due to strong enforcement of laws, backed by effective Monitoring, Control and Surveillance (MCS) activities.[48] In the Pacific, 306,440 tonnes of tuna are harvested or transhipped using IUU activities, and the ex-vessel value of the best estimate figure is US$616.11million. The main IUU risk category here was found to be reporting violations and non-compliance with other licence conditions, indicating that IUU fishing in the Pacific waters is dominated by the licensed fleet.

There is ample scope for knowledge exchange between the Pacific and the Indian Ocean in terms of key lessons for

managing IUU fishing. The key ones are discussed in the following paragraphs:

1. Collective Initiative for MCS Activity and Enforcement of Laws: The grouping of eight countries that are Parties to the Nauru Agreement (PNA) has been instrumental in establishing a robust and effective Vessel Monitoring System (VMS) in the Pacific region. Every boat is tracked via the VMS from port to port, at intervals of one hour or 30 minutes. This system complements observers in fishing vessels and ensures that data is available near-real-time and can be triangulated with records to establish authenticity.
2. Regional Fisheries Surveillance Centre (RFSC): Situated in Honiara, Solomon Islands, and operated by the Pacific Islands Forum Fisheries Agency (FFA), the RFSC carries out various MCS operations in the Pacific waters. The most recent such initiative was operation ―Kurukuru,‖ which brought together 15 Pacific FFA member nations and Pacific QUADs (Australia, France, New Zealand and the US) to deploy vessels, aircraft and modern technology, including satellite-based systems for carrying out the operation in the EEZs of the Pacific FFA members and the adjacent high seas.[49] In addition to these specialised operations, the RFSC's role is paramount in analysing information and data across FFA members, filtering it and processing satellite-based surveillance imagery to create and validate a regional surveillance picture.[50]
3. Regional Observer Programme (ROP): The objective of the ROP is to collect verified catch data and other scientific data related to the fishery from the Convention Area, as well as to carry out management measures. The Pacific Islands Regional Fisheries Observer (PIRFO) was developed primarily to train staff, who would be associated with observer programmes that meet international expectations and can withstand scrutiny by third parties. Its membership includes representatives from PNA, FFA, and the Western and Central Pacific Fisheries Commission (WCPFC). Pacific nations have been able to tackle illegal transhipments through the ROP.[51] The development of a similar common ROP can be beneficial for the Indian Ocean and its two regional fisheries management organisations—the Indian Ocean Tuna Commission (IOTC), for managing tuna, which is a highly migratory species, and the Southern Indian Ocean Fisheries Agreement (SIOFA).
4. Centralised Data Reporting: There is wide variance in the formats for reporting on catch data in the Indian Ocean region across the different fishing bodies. A structure for centralised data reporting, as practised in the Pacific region, can bring parity in data reporting. A common format will enable the data to be readily processed and utilised, as well as allow for comparative studies and assessments across spatial and temporal scales.
5. Other Learnings from the Pacific: The enforcement of the minimum terms and conditions to fish in EEZs has been a highly effective strategy in preventing fishing fleets belonging to distant-water fishing nations from usurping living marine resources from the EEZs of Pacific island nations.[52] Port-state controls, too, can be useful for curbing the market entry of marine catch in the high seas through IUU methods.[53] Finally, independent scientific assessments and quantification studies are key to arriving at effective protocols for the management of the industry and should be a priority area for improvement in the Indian Ocean Region.

There are many other threats to the marine environment and human security in the Indo-Pacific. They include dangers from sea-level rise and anthropogenic pressures on the deltaic environment and mangrove ecosystems, oil-spills and increased risk of contamination due to increased maritime traffic, emergence and expansion of marine ―dead zones,‖ and coral-bleaching.

Marine Plastic Pollution

Marine plastic litter is a potent global environmental threat that remains largely absent in public consciousness. Such is the challenge of plastic pollution—now the marker of the geological age of Anthropocene. Recent research has argued that despite the uncertainty regarding the recognition of plastic as a novel entity in the planetary boundaries framework, the pathways and mechanisms for thresholds and global systemic change are easily identifiable.[54] Rivers act as conduits for the transport of plastic debris from their land-based sources to the oceans. Research shows that plastic debris loads—comprising both microplastic and macroplastic—are positively related to the bulk of mismanaged plastic waste generated in the river catchments. Moreover, populations living in the catchment of large rivers generate waste that is disproportionately higher than the waste generated at other rivers. A 2017 study estimated that 90 percent of the global input of plastic from rivers to oceans comes from only 10 river systems.[55]

Eight of these rivers are in Asia, while the remaining two are in Africa. Figure 4 shows the near-continuous stretch of coastline from Karachi (Pakistan) in the east, near the mouth of the Indus, to Sinuiju (North Korea), near the mouth of the Yalu river in the west. The peak in rainfall over the river catchment further supports the hypothesis that water is the most active agent for the transportation of plastics (See Figure 4).[56]

Figure 4: Global Plastic Outfall

Source: *The Ocean Cleanup[57] (modified by authors).*

Much of the outfall of plastics, as well as the concentration of garbage patches, can be seen within the geostrategic region identified as the Indo-Pacific (See Figures 4 and 5). The majority of countries in the region are developing nations, with poor regulatory infrastructure to manage plastic waste and insufficient capacity for recycling. Moreover, the region is the growth engine of the world, with South Asia, Southeast Asia, and East Asia projected to continue their upward trajectory of economic growth and prosperity in this century. Thus, a crisis is already unfolding in the form of a burgeoning population that consumes more and generates excessive plastic waste, without the necessary policy measures to deal with that waste.[58]

Endnotes

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