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The world's oceans are witnessing a continuous growth in illegal, unreported, and unregulated (IUU) fishing. Chinese fishing fleets, in particular, are emerging as a significant threat contributing to this global challenge. While India recognizes the gravity of this global issue, IUU fishing has yet to receive the level of priority it arguably deserves within the country's economic and security strategy.[1] A comprehensive study on the scale and implications of IUU fishing for India is therefore essential to spotlight this pressing challenge.

This article examines the scale and impact of Chinese IUU fishing operations globally and identifies the nature of the challenge posed by IUU fishing in the Indian Ocean Region (IOR). It also investigates why existing maritime law and international frameworks have struggled to address this growing threat. By highlighting the gaps in current legal frameworks and regional cooperation mechanisms, this article uncovers why IUU fishing persists despite international efforts to combat it. This article also offers suggestions for India to prepare to combat this challenge in its exclusive economic zone (EEZ) and across the IOR.

Introduction

IUU fishing is widely recognized as a severe threat to the sustainable management of ocean resources. It undermines food security and disrupts fragile marine ecosystems. The unchecked spread of IUU fishing depletes fish stocks, jeopardizing the livelihoods of coastal communities that rely on these resources. This exploitation is often facilitated by complicity or neglect by local governments that fail to enforce regulations effectively or turn a blind eye due to corruption or political pressure. Unlike the extraction of physical resources, like timber or minerals, that are visible and easily monitored, IUU fishing occurs at sea, making

it difficult to detect and track. The huge expanse of the sea makes it nearly impossible for any state to continuously monitor all its waters. The challenge extends beyond the sovereign rights of coastal states to the high seas, where enforcement mechanisms are minimal, and therefore, challenges are even bigger. Beyond these economic and environmental impacts, IUU fishing poses a strategic challenge for coastal states worldwide.[2] Its ties to organized crime, like piracy and smuggling of drugs and arms, further complicate global maritime security, undermine law and order on the high seas, and intensify the overall security risk.

Various national, regional, and international bodies, including the Food and Agriculture Organization (FAO), the International Maritime Organization (IMO), and the National Oceanic and Atmospheric Administration (NOAA), provide definitions for IUU fishing.[3] These definitions subsume different kinds of unsanctioned fishing practices.

- **Illegal fishing** involves activities that break laws and regulations established by either national governments or international bodies. This includes fishing in a country's waters without permission or operating outside agreed conservation measures on the high seas.

- **Unreported fishing** includes non-disclosure and inaccurate reporting of fish catch to relevant national or regional authorities, such as regional fisheries management organizations (RFMOs). This lack of transparency can mask overfishing and jeopardize conservation efforts by disrupting effective monitoring of fish populations.

- **Unregulated fishing** occurs in areas or for fish stocks where no specific management measures exist, often involving vessels without nationality or from countries that are not part of an RFMO. Such fishing can disregard established conservation standards, threatening marine biodiversity, particularly in areas not covered by an RFMO's jurisdiction or oversight.

Scope of the Problem: Economic Costs and Regional Vulnerabilities

Independent studies estimate that global economic gains from IUU fishing range between $9 billion and $17 billion annually, while economic losses for legitimate trade are far more staggering, projected at $26 billion to $50 billion.[4] While losses vary between countries, developing nations particularly bear the brunt. A 2022 report by the Financial Transparency Coalition highlights losses nearing $11 billion in African countries, $4 billion in Indonesia, and $2 billion in Argentina.[5] These figures highlight the significant financial toll of IUU fishing in vulnerable regions.

Even from a sustainability standpoint, IUU fishing has done tremendous harm in some regions. It was estimated in 2013 that IUU fishing accounted for approximately 20 percent of the total global fish catch.[6] A 2012 analysis highlighted the alarming situation in regions like the Indian Ocean and along the West African coast, where over 50 percent of fisheries had already been overexploited.[7] Over a decade later, and with IUU activities on the rise, the condition is expected to be much worse. Reports from West Africa and the South American coast indicate that IUU fishing is a widespread issue impacting diverse parts of the globe.[8] For example, off Ecuador's coast near the Galapagos Islands—a marine world heritage site—approximately 99 percent of the fishing activity in 2020 was done by vessels engaged in IUU fishing.

The growth of IUU fishing activities has prompted international efforts to thoroughly study the issue, focusing on the regions impacted and the actors involved. One such initiative is the IUU Fishing Risk Index, which provides a comprehensive risk-based ranking of countries and regions vulnerable to IUU fishing. The 2023 index reveals heightened vulnerability across Asia and the Indian Ocean, underscoring a persistent and escalating threat in these regions.[9] Asia was ranked the most susceptible to IUU fishing in 2023, alongside the Western Indian Ocean.

More recent studies have noted growing Chinese involvement in IUU fishing-related activities. The scale of the Chinese distant water fishing fleet is well known, with many public accounts confirming it to be operating the world's largest distant water fishing fleet, with a substantial number of its approximately 17,000 trawlers reportedly engaged in IUU fishing activities.[10] Consistently ranked as the worst IUU fishing offender from 2019 to 2023, China's footprint in illegal fishing is substantial. The 2022 Financial Transparency Coalition study revealed that Chinese companies control eight of the top ten corporations involved in IUU fishing operations globally.[11]

Overfishing in the South China Sea has caused significant ecological damage. Experts estimate that up to 90 percent of large fish stocks in the region have been depleted since 2000, largely due to Chinese fishing operations.[12] As marine resources in these areas dwindle and global demand for seafood continues to grow, the risk of IUU fishing activities extending into the IOR becomes more pressing—an eventuality that India must prepare for.

India is not oblivious to the rising presence of Chinese research vessels in the IOR, with the Navy actively tracking their movements.[13] While these vessels are officially categorized as scientific research ships, their dual-use nature warrants closer scrutiny, as they may serve broader strategic interests.[14] In particular, the increasing number of fishing vessels operating near India's EEZ could be linked to IUU fishing activities in the region. With the depletion of marine resources in the South China Sea, the presence of Chinese vessels in the Indian Ocean region is likely to grow.

But how do illegal fishing operations translate into security challenges? What security risks do Chinese IUU fishing vessels pose in the IOR? The next section answers these questions.

China's IUU Fishing Operations: A Security Threat in the Indian Ocean

Chinese presence has grown markedly in the IOR, with annual deployments increasing from 300 vessels in previous years to nearly 450 in 2019.[15] While comparable annual figures for 2020 to 2024 are not available, news reports point to the presence of at least six Chinese war vessels in the IOR at any given time, in addition to the many fishing and research vessels.[16] There have also been reports of Chinese underwater surveillance networks, consisting of buoys, surface vessels, satellites, and underwater gliders, in the Indian Ocean.[17]

This increased vessel presence is alarming against the background of China's now widely accepted and well-documented practice of leveraging part of its fishing fleet as a maritime militia—civilian vessels that double as military auxiliaries trained by the People's Liberation Army (PLA) Navy.[18] These fishing boats potentially serve as China's frontline assets for grey-zone operations in the IOR, equipped with sophisticated surveillance equipment like subsea lasers and cameras, and some also carrying military grade equipment.[19] As confirmed in China's own media, these vessels operate under military command while ostensibly conducting commercial fishing and are tasked with intelligence gathering in international waters.[20] This militia routinely harasses and intimidates local fishers within their own EEZs, effectively extending China's maritime power projection.[21] Even when not acting as militias, China's seemingly non-strategic fishing fleet, heavily subsidized through government support for fuel, shipbuilding, and the construction of new vessels, often serves a dual purpose.[22]

Data collected by Chinese dual-purpose fishing vessels engaged in surveillance, reconnaissance, and ocean bed mapping can support the operations of underwater military assets, posing a significant strategic threat.[23] The presence of these vessels in the IOR, combined with China's access to key ports across the Indian Ocean, secured through economic agreements with littoral states, can strengthen its strategic hold over this vital maritime route.

A growing Chinese presence in the IOR could potentially also engender another challenge. South Asian countries have long grappled with recurring fishing disputes, primarily arising from disagreements over maritime boundaries and access to marine resources.[24] These disputes frequently escalate into political and diplomatic standoffs.[25] The involvement of coast guards and naval forces, along with the frequent and prolonged detention of fishermen, adds a security dimension to what are essentially resource management challenges.[26] Fishing disputes in South Asia are rooted in a mix of local livelihoods, national security concerns, and sensitive maritime boundary issues. Conflict resolution and negotiations in these cases are often influenced by domestic sentiments and the imperative to maintain sovereignty. The presence of Chinese fishing vessels, and by extension, Chinese strategic and economic interests, threatens to complicate bilateral processes of resolution. Chinese operations near disputed or sensitive fishing zones are increasingly seen as involvement in local dynamics,

further straining existing conflict resolution mechanisms.[27] This view also finds some resonance with experts from littoral states.[28]

More broadly, China's IUU fishing has also led to major socio-economic challenges that translate into security challenges for the IOR as a whole. The depletion of resources, for example, of shrimp stocks in Madagascar, has undermined livelihoods in coastal communities.[29] In Ghana, artisanal fishers experienced a 40 percent drop in annual income over the past fifteen years.[30] This resource erosion drives broader security issues, including smuggling, piracy, and forced migration, as desperate communities face declining opportunities. IUU fishing has also been linked with organized maritime crime. For instance, in Somalia, pirates claim to protect local waters from IUU fishing. Yet, studies reveal that these operations are frequently facilitated by Somali agents, sometimes with government involvement, through the sale of fishing licenses, falsified documents, and onboard security services.[31]

Patterns and Practices

Chinese vessels involved in IUU fishing often follow established patterns and practices observed in operations worldwide. Understanding these strategies can help identify trends in IUU fishing and offer valuable insights relevant to the Indian context.

Foremost, Chinese fishing vessels systematically evade detection. Despite requirements under Regulation 19-1 Chapter V of the International Convention for the Safety of Life at Sea (SOLAS), 1974, that mandate continuous identification systems operation for ships above 300 tons, these trawlers frequently and deliberately disable their identification transmitters or manipulate them to broadcast false identities and locations.[32] This dark fleet, comprising "phantom vessels," engages in egregious illegal practices, from shark finning to harming endangered marine species in the Northern Indian Ocean.[33] To further obscure their activities, they deploy low-power and sub-standard devices whose weak signals evade satellite detection.[34]

China also frequently reflags its vessels under the open shipping registries of other coastal states, particularly of those with weak governance and permissive legal systems.[35] These states often lack the resources or will to enforce international fisheries conservation and management standards effectively. Such reflagging typically takes place through joint ventures that allow foreign companies to gain access to local fishing resources. Under international guidelines, any country that suspects a vessel of engaging in IUU fishing must report the violation to the flag state for investigation.[36] However, many of these flag states are reluctant to probe suspicious vessels, given their economic reliance on the revenues these foreign-flagged fleets bring. This deliberate opacity creates disparities between tracked catch estimates and official reports, severely undermining efforts to combat IUU fishing operations.[37]

Despite growing alarm, China's IUU fishing activities continue to expand unchecked, exposing critical gaps in international regulatory frameworks. The next section, therefore, examines how recidivist vessels, many of which are from China, circumvent these frameworks and why they remain ineffective against this escalating threat. Rather than offering a comprehensive legal assessment, the focus is on specific breaches by Chinese IUU fishing activities, highlighting loopholes that IUU offenders exploit. Key instruments under review include the United Nations Convention on the Law of the Sea, the International Maritime Organization (IMO), Regional Fisheries Management Organizations (RFMOs), and the Agreement on Port State Measures (PSMA)—the only binding treaty targeting IUU fishing. By analyzing these overlapping jurisdictions, the next section aims to highlight weaknesses at multiple governance levels that enable such violations.

An Analysis of the International Legal Framework Relating to IUU Fishing

United Nations Convention on the Law of the Sea

The international legal framework for governing high seas fishing encompasses the 1982 United Nations Convention on the Law of the Sea (UNCLOS), which serves as the world's primary framework for ocean governance.[38] It sets ground rules for how nations should use and protect seas and oceans. At its core, UNCLOS balances the rights of coastal states with freedom of navigation in coastal waters and freedom of nations to use the high seas with their responsibility to protect marine resources.[39] Additionally, the UNCLOS, under Articles 55–62 of Part V, defines the rights and responsibilities of coastal states in managing resources within their EEZs, which extend up to 200 nautical miles from the baseline of their territorial sea.[40] Coastal states may permit other states to utilize resources within their EEZ through mutual agreements, while retaining the authority to enforce conservation measures and regulatory conditions. These include licensing fishermen, vessels, and equipment, requiring fees or compensation, such as financing, technology, or equipment for developing states, and determining species quotas, fishing seasons, and permitted gear or vessel sizes. Similarly, in the high seas, for example, while all nations have the right to fish, they must also work together to ensure fish populations remain sustainable.

However, UNCLOS lacks specific requirements and rules for managing fisheries or regulating fishing practices in the coastal waters and high seas. It delegates this task to member states and other global, regional, or subregional fisheries organizations. Pursuantly, the convention also outlines the scope of its relationship with other specialized organizations, like the IMO, and empowers others, like RFMOs, to develop and enforce specific regulations.[41] Thus, a system is created where broad principles laid out by the UNCLOS are transformed into practical standards and rules for maritime activities.

Consequently, a variety of "soft law" instruments have developed, primarily led by the FAO and supported by the IMO. Key instruments in this framework include the 1993 Compliance Agreement, the 1995 UN Fish Stocks Agreement, the International Plan of Action on IUU Fishing, and the FAO Agreement on Port State Measures.[42]

A closer analysis of the UNCLOS reveals its limitations in effectively countering IUU fishing. Foremost, as previously discussed, the fundamental challenge with UNCLOS is that acceding to the Convention does not translate into a firm commitment to implement its norms. Ratification merely signifies a state's formal acknowledgment of the treaty's principles.[43] It does not automatically translate into domestic legislation or enforcement mechanisms. Somalia ratified UNCLOS in 1989, but it does not have proper maritime regulations and enforcement mechanisms. A similar situation is true for Libya, which ratified the agreement in 1982, or Vanuatu in 1991, and many other coastal states. This gap between international commitment and national implementation creates a significant weakness in the UNCLOS's ability to effectively govern maritime behaviour. As noted by experts, "enforcement is a weak point of all international law… marked by an absence of an international equivalent of a police force and the jurisdiction of international courts and tribunals being ultimately always founded on consent."[44] Enforcement is also a significant challenge given the vast expanse of the seas. Moreover, unsustainable exploitation often goes unnoticed until after it has occurred, rather than being detected while or before it happens.

Secondly, IUU fishing sometimes occurs in locations vulnerable to exploitation when the site in question is claimed by more than one state's sovereign control or is beyond the control of a single sovereign state. While UNCLOS provides a comprehensive and compulsory dispute settlement mechanism under Part XV, its effectiveness is limited by significant exceptions. Article 297 (2) and (3) of Part XV of the UNCLOS explicitly exempt certain matters related to marine scientific research and fisheries within EEZs from mandatory dispute resolution. The exemption of EEZ fisheries from the full dispute settlement mechanisms under UNCLOS stems from the competing interests among coastal States, distant water fishing nations, and landlocked or geographically disadvantaged States concerning access to and use of ocean resources. This can be understood as a balancing act between recognizing the qualified sovereign rights and discretionary authority of coastal States in managing resources within their EEZ and upholding the principle of equitable utilization of marine resources by other States, as embedded in the Convention's broader legal framework. However, this creates a complex legal landscape allowing States to strategically exclude specific disputes from the settlement mechanism, potentially undermining UNCLOS's ability to effectively resolve fishing-related conflicts.

Thirdly, China's approach to the UNCLOS dispute resolution mechanism raises concerns regarding IUU fishing enforcement. Having employed "salami-slicing" tactics in the South China Sea, China could extend this strategy to fragment fishing-related disputes across different legal forums, thereby diluting the impact of any single resolution.[45] More fundamentally, its stance towards the UNCLOS dispute resolution mechanism presents a significant obstacle—invoking Article 298 of the UNCLOS, it has declared non-acceptance of the Convention's dispute settlement provisions.[46] This systematic rejection effectively creates a

legal blind spot in addressing Chinese IUU fishing activities, especially when combined with its strategic approach to maritime disputes. To add to this, Chinese strategic engagement with littoral states of the IOR and their dependence on investments by China dissuades them from pursuing any legal contests.[47]

International Maritime Organization (IMO)

The IMO serves as the global standard-setting body for international shipping. It facilitates intergovernmental cooperation on technical maritime matters by providing the machinery for governments to cooperate on regulation and technical practices related to international shipping. It aims to encourage and facilitate the adoption of the highest practicable standards in matters concerning maritime safety, efficiency of navigation, and prevention and control of marine pollution from ships. The IMO also oversees crucial international treaties like the SOLAS 1974 and the International Convention for the Prevention of Pollution from Ships (MARPOL 1973/78). IUU fishing falls under its subcommittee on IMO instruments implementation. This subcommittee, reporting to both the Maritime Safety Committee and Marine Environment Protection Committee, creates a platform where flag, port, and coastal states converge to address implementation issues. These committees continuously update safety and environmental protection standards, as well as instruments like SOLAS 1974 and MARPOL 1973/78, to maintain comprehensive oversight of maritime activities. This exercise crucially depends on the availability of shipping data, which states are responsible for sharing.

The IMO's role in combating IUU fishing suffers from significant structural weaknesses. Firstly, a fundamental flaw lies in its focus on vessel quality metrics and equipment standards for the identification of vessels engaged in IUU fishing. It is assumed that IUU fishing vessels are inherently substandard, but in reality, many IUU ships are equipped with modern technology and thus stay outside the purview of IMO instruments.[48] A 2019 incident at Ratnagiri, Maharashtra, offers evidence of these vessels' capabilities. When ten Chinese fishing vessels sought shelter from Cyclone Vayu, Indian Coast Guard inspections unveiled industrial-scale operations: 80,000-tonne storage capacity, 500,000-watt LED lights, and illegal fishing equipment, including squid jigging gear and purse seine nets.[49]

Secondly, the IMO relies on information gathered by the port state through the flag state, which includes data related to technical aspects like vessel standards and maintenance conditions.[50] This presents a weakness because port state control works best when it supports the oversight of the flag state, not when it tries to replace it. If the flag states do not properly do their job and port states are left to fill the gap, the system becomes less effective. The current framework places the burden of vessel monitoring and verification on the port state in the absence of reliable flag state cooperation.[51] As noted earlier, port states with weak political systems and governance and strained financial conditions are often unable to resist the influence of IUU fishing lobbies, making them susceptible to becoming compliant and passive partners to these activities. This creates an imbalanced and often ineffective surveillance system.

This system's vulnerability is illustrated further by recent developments. India's Directorate General of Shipping's 2023 report shows inspections of eleven vessels from China, twenty-nine from Hong Kong, eighty-eight from Liberia, eighty-nine from the Marshall Islands, and 143 from Panama.[52]

Liberia, which holds the world's largest vessel registry with approximately 25 percent comprising Chinese vessels, recently renewed a maritime cooperation agreement with China, allowing more Chinese vessels to operate under the Liberian flag.[53] In 2020, Liberia conducted its annual safety inspections of vessels, including examining documents and equipment via video communication, raising serious concerns about inspection integrity and standards.[54]

These developments reveal how, in the absence of robust flag state accountability, countries can exploit regulatory gaps to bypass international efforts aimed at reducing IUU fishing. China's growing maritime agreements with financially vulnerable coastal states, particularly in the IOR, further undermine the IMO's ability to enforce effective measures against IUU fishing, highlighting a significant weakness in the global regulatory framework.

Regional Fisheries Management Organizations

Regional Fisheries Management Organizations (RFMOs) are international bodies established through treaties, comprising countries that have shared interests in managing and conserving fish stocks within specific regions. The UNLCLOS contains references to regional bodies for the management of oceanic resources.[55] There are around seventeen RFMOs in the world, five of which are responsible for managing approximately 91 percent of the world's oceans.[56] While different in individual structure and mandate, all RFMOs primarily aim to promote cooperation between member states on fisheries issues. Studies have attempted to classify the types of RFMOs based on their specific functions.[57] One such classification categorizes RFMOs into General, Tuna, and Specialized RFMOs. General RFMOs address the conservation of all marine species in a region, while Tuna and Specialized RFMOs focus on specific species with unique traits, such as migration patterns or breeding seasons, requiring special management approaches.

Though these organizations aim to regulate fishing activities through measures like vessel tracking and setting catch limits, challenges still remain in their effectiveness.

Foremost, RFMOs monitor compliance only for vessels registered under member countries of the specific RFMO. Consequently, vessels flagged by non-member states are not obligated to follow RFMO policies. For instance, Chinese vessels flying the Liberian flag are not subject to the Indian Ocean Tuna Commission (IOTC), a key RFMO in the region, because Liberia is not a party to this RFMO.

Another major shortcoming lies in their decision-making process, which is heavily influenced by political considerations rather than scientific recommendations. Research by organizations working on fisheries management also points to many RFMOs approving catch limits above sustainable levels despite scientific guidance against it.[58]

Fisheries management bodies that rely on onboard observers for data collection have failed to monitor catch levels effectively due to the lack of observers on all vessels.[59] Many oppose greater observer coverage of vessels, citing the high costs associated with maintaining observer crews on seafaring vessels for extended periods.[60] Some RFMOs also resort to restricting fishing days instead of implementing strict catch limits, a practice that is seen among certain coastal states to allow their specific fish stocks to replenish.[61] For example, Bangladesh bans hilsa fishing for a few days in a year to allow spawning in the breeding season.[62] However, this approach proves particularly vulnerable to exploitation by IUU vessels that can circumvent these restrictions through practices like ghost fishing or "going dark"—essentially disappearing from tracking systems to fish beyond their allocated time limits.[63]

As a member of four out of the five tuna RFMOs, China has a prominent presence in RFMOs globally.[64] Since most RFMOs operate on a consensus-based decision-making process, this approach can undermine compliance, as it enables states to obstruct or hinder critical decisions. For example, in 2023, China single-handedly blocked the South Pacific RFMO's attempt to blacklist two Chinese vessels engaged in suspicious activities.[65] This exemplifies how individual member states can exploit the consensus-based process to shield their vessels from accountability.

The Agreement on Port State Measures

The Food and Agriculture Organization's Agreement on Port State Measures (PSMA) is the first binding international accord aimed specifically at countering IUU fishing. Its primary objective is to prevent vessels involved in IUU fishing from accessing ports, thereby blocking these vessels from landing illegal catches and reducing the incentive to engage in such activities.[66] By restricting IUU-derived fish from entering ports, the PSMA seeks to prevent these products from reaching both national and international markets.

While the PSMA has several desirable provisions, it has notable limitations as well. Firstly, given that presently only seventy-nine countries have signed the PSMA, IUU fish catches may still enter global value chains through ports outside the PSMA. Secondly, it only applies when vessels attempt to access ports outside their flag state. This limitation can be exploited by IUU fishing operations by vessels operating under foreign flags. In the case of China, vessels flagged under foreign states, such as certain African nations, may avoid PSMA restrictions by entering ports within the flag state itself. Furthermore, IUU fishing often intersects with other organized maritime crimes, like smuggling, which complicates efforts to monitor and intercept illegal catches. Fish products sourced through IUU fishing may still find their way into markets through illicit trade channels, limiting the effectiveness of the PSMA.

India's Deep Sea Fishing Opportunity

Indian fisheries represent a powerful economic engine with vast growth potential. The world's twelfth-largest EEZ, with an expanse of 2,372,298 square kilometers, is abundant in groups of finfishes, crustaceans, and molluscs, which are already being harvested in coastal areas.[67] The Arabian Sea is known as having a high concentration of purple-back flying squid. Despite extensive surveys by national institutes and fisheries bodies to assess the prospects of commercial fishing in the deep sea, the exploitation of marine resources has been limited to traditional coastal waters, leaving vast economic opportunities untapped.[68] In the recent past, the Government of India has taken steps to enhance deep-sea fishing capabilities among traditional fishermen. Under the 2016 Blue Revolution scheme, the government introduced the "Assistance for Deep Sea Fishing" sub-component in March 2017, providing financial support of up to Rs 80 lakh (approximately $93,000) per deep-sea fishing vessel.[69] A total of 918 such vessels were sanctioned under this initiative. Further, the Pradhan Mantri Matsya Sampada Yojana (PMMSY) announced in the budget of 2023–24, inter alia, offers financial assistance to traditional fishers for acquiring and upgrading deep-sea fishing vessels.[70] However, deep-sea catch still remains a small fraction of India's total fish catch, with over 90 percent coming from areas within 50 metres of depth.[71]

While India has yet to fully exploit its deep-sea fishing resources, IUU fishing in the IOR has already depleted stocks in parts of the western Indian Ocean and is steadily increasing across the region. Moreover, unsustainable fishing practices in the Western IOR can have far-reaching impacts on the Indian EEZ due to the interconnected nature of marine ecosystems. Marine life often migrates across vast distances, moving between different territorial waters and EEZs in search of food, breeding grounds, or favourable environmental conditions. When overfishing or IUU fishing occurs in one area, it depletes the population of marine species that might otherwise migrate to or rely on resources in nearby regions. India must recognize this threat and seriously consider its profound implications.

India's Preparedness Against IUU Fishing in the IOR

Monitoring and Surveillance Systems

India has been restructuring its maritime monitoring and surveillance system progressively, especially after the 26/11 Mumbai attacks, following which it mandated the installation of automatic identification systems (AIS) on all vessels above 20 meters.[72] For smaller vessels below 20 meters, which form a significant portion of the coastal fishing fleet, the

government introduced initiatives to equip them with AIS-based transponders and distress alert transmitters (DAT) to ensure their inclusion in the maritime surveillance grid. The fleet sizes of both the Indian Navy and Coast Guard have also been substantially increased, complemented by an expanded Dornier surveillance aircraft fleet.[73] Further, under the Pradhan Mantri Matsya Sampada Yojana (PMMSY), a central government scheme implemented by the Department of Fisheries, 350,000 transponders manufactured by the India Space Research Organisation were set to be distributed to fishermen. Some state governments have started the installation of these transponders.[74] These devices allow constant tracking of fishing boats at sea and enable direct communication with monitoring agencies. This addresses the issue of fishermen using low-quality Chinese transponders that transmit false identities, often creating problems for surveillance operations.[75] By distinguishing legal fishing activities from illegal ones, these efforts will optimize resources and reduce unnecessary diversions.

However, with around 250,000 fishing boats in India, enforcement could pose a challenge.[76] Launched in 2020 for a period of five years, with the aim of installing 100,000 transponders in vessels across thirteen union territories and states, the PMMSY has so far only been able to install over 4,000 transponders in vessels across seven states.[77] Ensuring these transponders remain operational and active is an additional challenge faced by the State governments. Further, the Coastal Security Scheme, launched in 2005, was expanded post-2008.[78] This centrally sponsored scheme, which covers thirteen coastal states and union territories, aims to strengthen infrastructure for marine policing by establishing coastal police stations, outposts, and jetties. The scheme also provided funds for the procurement of patrol boats and surveillance equipment.

Several statutory provisions have also been implemented in the last few years. The enforcement of the Maritime Zones of India (Regulation of Fishing by Foreign Vessels) Act, 1981, has been strengthened post-2008 to regulate foreign fishing vessels within India's EEZ and ensure compliance with maritime security protocols.[79] The Indian Coast Guard (ICG) Act was amended in 2019, authorizing the ICG to board and inspect vessels and detain offenders suspected of engaging in illegal activities, including smuggling, piracy, or unauthorized fishing.[80] The Indian Anti-Maritime Piracy Bill was passed by the Parliament in 2022 to address the challenge of piracy on the high seas.[81] The Act empowers personnel aboard Indian Navy warships, Coast Guard officials, and authorized officers from central or state governments to arrest individuals or seize vessels suspected of piracy. The statute bolsters India's legal response to threats in its maritime domain.

Building on advancements in satellite technology, the Indian Navy has effectively employed ISRO's capabilities to strengthen communication across the Indian Ocean. The Rukmini satellite, a seventh-generation geosynchronous satellite, provides coverage over 2,000 nautical miles, enabling real-time communication between warships, aircraft, submarines, and land-based systems.[82] Additionally, under the Quad's Indo-Pacific Partnership for Maritime Domain Awareness (IPMDA), the Navy is finalizing a deal with U.S.-based satellite operator Hawkeye 360, which uses a constellation of twenty-one satellites to provide global coverage.[83]

This partnership will enable precise location tracking of data emissions, aiding in curbing illegal activities at sea.

Similarly, for enhanced maritime domain awareness, the Information Management and Analysis Centre (IMAC) was established in 2014 as the Navy's nodal information monitoring agency.[84] IMAC currently tracks vessels on the high seas using data from coastal radars, AIS transponders on merchant ships, air traffic management systems, white shipping agreements, and global shipping databases. Further, in 2018, the Information Fusion Centre – Indian Ocean Region (IFC-IOR) was established within the IMAC to coordinate with regional countries and serve as a repository of maritime data.[85] With partnerships spanning twenty-one countries and twenty-two multinational agencies, the IFC-IOR plays a pivotal role in fostering regional cooperation and improving maritime security. There are also plans to evolve the IMAC into a national maritime domain awareness centre that will enable seamless information exchange among fifteen agencies under seven ministries.[86]

To further improve coordination between multiple maritime security agencies, the Government of India appointed the first national maritime security coordinator (NMSC) under the national security advisor in 2022.[87] The NMSC is responsible for ensuring coordination and seamless functioning among various agencies and stakeholders to protect India's extensive coastline and secure interests within its EEZ.

Regional Cooperation

Tackling IUU fishing requires a collaborative regional approach. At the regional level, the Indian Ocean Rim Association (IORA), established as an intergovernmental organization in 1997, has been focusing on IUU fishing as a growing challenge.[88] India also hosts the Indian Ocean Naval Symposium (IONS), a voluntary platform set up in 2008, for regional navies to discuss shared security challenges and develop coordinated responses.[89] Through seminars held in 2022 and 2024, the twenty-five member states assessed the scale of IUU fishing and emphasized the need for decisive actions to close legal loopholes.[90] These discussions have highlighted priorities such as capacity building and improving inspection mechanisms to strengthen regional efforts. Additionally, through bilateral agreements, like the White Shipping Agreements with most nations in the region, India works closely to collectively promote information sharing with respect to vessel movement, including those that may be involved in IUU fishing.

The Indian Ocean Tuna Commission (IOTC) of the FAO, of which India has been a member since 1996, has been overseeing the management of tuna fisheries in the region. However, effective management requires a deeper understanding of tuna migration patterns. Satellite-based tracking systems, electronic tagging, and vessel monitoring systems (VMS) are being deployed to track tuna movements and migration patterns. Cooperation between countries in the Indian Ocean will be essential to manage these highly mobile species effectively.

Way Forward and Suggestions

To further strengthen India's preparedness against IUU fishing in the IOR, a multi-pronged approach is outlined below for Indian policymakers to consider.

1. Establishing Presence in Deep-Sea Fishing

The first line of defense against foreign IUU fishing offenders are India's own fishermen. By establishing a strong and consistent presence in the Indian EEZ and IOR, India can harness its economic potential while also playing a critical role in monitoring and surveillance efforts. In this context, government initiatives promoting deep-sea fishing by domestic fishermen could be a step in the right direction. The National Marine Fisheries Policy 2020, building on the 2017 policy, prioritizes deep-sea fishing in offshore waters and areas beyond national jurisdiction (ABNJ).[91] Similarly, the draft Marine Fisheries Bill 2021 emphasizes responsible fishing in the high seas.[92] It proposes measures such as mandatory licensing for Indian vessels fishing beyond territorial waters and a ban on foreign fishing vessels in Indian waters, among other steps. However, the bill has not been passed thus far due to significant opposition from various stakeholders. The government needs to complete the consultation process and finalize the regime to ensure better regulation of deep-sea fishing within the Indian EEZ.

Separately, the government aims to help traditional fishermen transition to deep-sea fishing and also plans to provide deep-sea fishing vessels under the Sagarmala project's coastal community development plan.[93] However, a balance must be struck between addressing fishermen's concerns and maximizing the opportunities within the EEZ.[94]

2. Greater Use of LEO-based Satellites for Monitoring and Surveillance

Given the vast and dynamic nature of the ocean and advancements in space technologies, it is now possible to plug gaps in monitoring vessel movements, including those involved in IUU fishing. Traditional surveillance methods primarily rely on geostationary (GEO) satellites, which maintain a fixed position relative to the Earth's surface, providing imagery up to 10 meters. GEO satellites can be used to monitor specific areas, but their limited range necessitates the deployment of multiple satellites for comprehensive coverage. This approach is not only cost-prohibitive but also allows fishing vessels to evade detection by moving out of the satellite's coverage zones.

To address these limitations, low Earth orbit (LEO) satellites present a transformative solution. Orbiting at altitudes below 2,000 kilometers, LEO satellites offer global coverage with shorter revisit times at sub-metre resolutions, enabling near real-time tracking of vessel movements.[95] Their ability to monitor large swaths of the ocean, combined with advancements in synthetic aperture radar (SAR) and electro-optical imaging, ensures that even

small, unregistered fishing vessels can be detected, irrespective of weather conditions or the time of day. This could also be effective against vessels that disable their AIS transponders using real-time image processing and artificial intelligence-based analytics.

Moreover, integrating LEO satellite data with AIS and other vessel tracking technologies enhances situational awareness. The European Space Agency's Copernicus Programme and the SeaVision tool are already demonstrating the potential of combining satellite imagery with AI-driven analytics to detect and deter IUU fishing activities.[96] By adopting a multi-satellite constellation approach that incorporates both GEO and LEO systems, India should work toward establishing an effective maritime monitoring framework. This will ensure robust surveillance of its EEZ and adjoining areas, which have a direct influence on its marine environment. Phase 3 of India's Space-Based Surveillance (SBS-III) program plans to put fifty-two LEO satellites in orbit and could be leveraged for this purpose.[97] This LEO satellite system, built by IN-SPACe with private sector participation, will greatly enhance India's ability to regularly monitor its EEZ. Coastal states can leverage these satellites to protect the interests of legitimate fishers and prevent illegal fishing attempts. Notably, state governments of Tamil Nadu, Gujarat, and Kerala have already come out with space policies and are making efforts for engaging space-based assets for developmental purposes. Preventing illegal fishing can be a big part of the same.

Brazil's Blue Amazon Management System uses a combination of satellites, radar, drones, naval vessels, and submarines to provide surveillance for more than 4,600 miles along the continent's coastline.[98] Given India's vibrant drone industry ecosystem, drones could be strategically deployed to track and monitor vessels suspected of illegal activities, leveraging their ability to provide real-time pursuit following initial satellite detection.

To further bolster the IFC-IOR's capabilities, India could look to replicate the IFC Real-Time Information-Sharing System (IRIS), an advanced maritime surveillance system designed to enhance maritime domain awareness, already in use at the Changi Command and Control Centre, an IFC hosted by the Singaporean Navy.[99] By integrating multiple data sources such as AIS, long-range identification and tracking (LRIT), satellites, coastal radar, and drones, IRIS will provide real-time vessel tracking and monitoring. Utilizing sophisticated AI and machine learning algorithms, the system will analyse vessel movements, detecting anomalies and identifying unauthorized activities like illegal fishing and smuggling through pattern recognition and behavioural analysis.

3. Building International Partnerships and Strengthening Regional Cooperation

Given the global scale of the IUU fishing challenge, it is crucial for India to collaborate with like-minded partners committed to preserving the openness of the world's oceans and promoting security in the Indo-Pacific region. In recent years, the United States has demonstrated a strong commitment to combating IUU fishing globally. Its 2022 Indo-Pacific

Strategy outlined a vision for a "free, open, connected, prosperous, secure, and resilient" region, emphasizing partnerships to advance this goal.[100] The U.S. Coast Guard had earlier recognized IUU fishing as a major maritime security threat, releasing a joint strategy to counter it.[101] This effort culminated in the National Security Memorandum on Combating IUU Fishing and Associated Labor Abuses, signed by then U.S. president Joe Biden, which led to the National 5-Year Strategy on Combatting IUU Fishing.[102] The strategy fosters inter-agency cooperation to prevent illegally caught seafood from entering commercial markets and encourages partnerships with priority regions, including the Caribbean, Africa, Southeast Asia, and the Pacific Islands. The strategy fosters inter-agency cooperation to prevent illegally caught seafood from entering commercial markets and encourages partnerships with priority regions, including the Caribbean, Africa, Southeast Asia, and the Pacific Islands.

The United States has also worked with countries like Ecuador, Panama, Senegal, Taiwan, and Vietnam to provide operational intelligence on over 100 fishing vessels to support enforcement efforts.[103] It has also focused on strengthening governance through RFMOs and promoting fishing risk assessments.

While the new U.S. administration under Donald Trump has continued its strategic focus on the Indo-Pacific, forging deeper cooperation with it on countering IUU fishing may prove challenging.[104] Recent developments underscore this complexity. First, although China's maritime dominance remains a central concern, the U.S. appears more inclined towards projecting strength independently rather than through institutional cooperation.[105] This preference for unilateral strategic posturing over multilateral approaches could be particularly challenging for combating IUU fishing, given its global nature.

Second, recent policy decisions affecting U.S. ocean governance raise doubts about the administration's commitment to addressing IUU fishing as a security priority.[106] Budget and personnel cuts at the NOAA, coupled with reduced U.S. participation in global ocean sustainability forums, suggest a de-prioritization of environmental and conservation diplomacy, which is crucial to tackling IUU fishing comprehensively.[107]

Against this backdrop, India will need to take a more proactive role in advocating for enhanced focus on IUU fishing by leveraging shared security interests within the Indo-Pacific, even as efforts to improve maritime domain awareness continue.

This also highlights the need for India to strengthen cooperation with regional partners. Efforts to sign white shipping agreements should be expanded to cover nations that have yet to conclude these agreements. Besides, efforts to enter grey shipping agreements should be initiated with friendly coastal states of the region.

For high seas within the IOR, India may continue to take greater responsibility by assuming a leadership role and fostering close cooperation with littoral and partner nations to strengthen monitoring, information sharing, and joint efforts to prevent IUU fishing. Since

many coastal states in the region do not have the domestic capability to monitor vessels in the region, India could consider expanding its satellite capabilities to help them monitor their EEZs in other parts of the IOR once its own LEO capabilities are expanded. The IMAC can share data on IUU activities with friendly littoral states, ensuring coordinated action when such violations occur in their waters.

4. International Agreements

There are three main binding agreements under UNCLOS: the PSMA, which was adopted by the FAO in 2009 for regulating port access to fishing vessels involved in IUU; the UN Fish Stock Agreement (UNFSA) which promotes cooperation among States to manage fish which migrate across EEZs and into the high seas; and, most recently in 2023, the Agreement on Marine Biological Diversity of Areas Beyond National Jurisdiction (BBNJ).[108] Having endorsed the BBNJ, India aligns itself with global efforts to protect marine biodiversity on the high seas, ensuring the fair and equitable sharing of benefits arising from marine genetic resources and contributing to the sustainable governance of the world's oceans.[109] India should now review its position on the PSMA and UNFSA and become a more active international player in the fight against IUU fishing.

Secondly, while the IOTC focuses on the sustainable exploitation of tuna, there is a need for greater attention to squid stocks as well. Squid are a major part of the diet of yellowfin tuna and swordfish, which are economically important species for fisheries. Overexploitation of squid can disrupt this food chain and affect the health of the tuna population and other commercial fish stocks. Considered a delicacy in many parts of the world, squid is also an essential bait in longline tuna fishing. The squid industry provides economic benefits to Indian coastal communities, with millions of people depending on the catch for livelihoods. In the Western Indian Ocean, squid populations have been impacted by overfishing.[110] Despite being a highly prized species, squid fisheries are managed by only two RFMOs globally, both in the Pacific.[111] The alarming rise in large-scale IUU fishing for squid off the coast of Oman underscores the urgent need for regional action.[112] India must lead efforts to establish RFMO-managed squid fisheries to prevent overexploitation and ecological damage, and lead an agenda for greater focus on squid fishing in the region within the IOTC.

Furthermore, global partnerships like the Quad, which already share a common goal of securing the Indo-Pacific, must put up a joint front against IUU fishing. In this regard, the announcement by the Quad countries of inaugurating a joint patrol by coastguards of all members to combat IUU fishing is a welcome step.[113] The Indo-Pacific Partnership for Maritime Domain Awareness, a Quad initiative launched in 2022, should also look to collaborate against IUU fishing. An information-sharing system on identified IUU vessels by member states would be beneficial for all. Combined with interoperability through joint naval exercises, this collaboration would enable quick action against identified vessels and create a stronger unified force against IUU fishing.

Conclusion

IUU fishing poses a growing threat to oceans globally, with several incidents in Southeast Asia and Africa highlighting the ease with which IUU vessels infiltrate EEZs, creating significant security risks. For India, the stakes are even higher, given its strategic location in the Indian Ocean and the escalating economic and ecological damage caused by Chinese fishing vessels along its coastlines.

To safeguard its marine resources, India must adopt a comprehensive strategy that enhances domestic capabilities to fully utilize its EEZ, strengthens coastal surveillance and monitoring systems, and leverages international agreements and partnerships to rally regional and global support. The urgency to act is clear—India must decisively secure both its EEZ and the broader IOR from the mounting threat of IUU fishing.

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