AUSTRALIA-INDIA INDO-PACIFIC OCEANS INITIATIVE

REGIONAL COLLABORATIVE ARRANGEMENTS IN MARINE ECOLOGY IN THE INDO-PACIFIC BASELINE STUDY

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CONTENTS

Introduction

This Report collects together a series of baseline studies on Regional Collaborative Arrangements in Marine Ecology in the Indo Pacific. The findings from these studies are the basis of a set of recommendations for the Australian Government to promote greater Indo-Pacific cooperation in marine ecology.

Baseline Reports on regional arrangements in the Pacific include:

- Baseline Report 1 - Marine Plastics in the Pacific: Report on Regional Arrangements among Pacific Island Countries (page 15)
- Baseline Report 2 - IUU and the Blue Pacific: Report on Cooperative Arrangements among Pacific Island Countries (page 35)
- Baseline Report 3 - Ocean Science in the Blue Pacific: Report on Regional Arrangements among Pacific Island Countries (page 67)

The reports relating to regional arrangements in the Pacific were researched and written by Dr Anthony Bergin. Officials and stakeholders consulted in connection with this research are listed in Annex 2. Dr Bergin's biographical details are included in Annex 3.

Baseline Reports on regional arrangements in Southeast Asia include:

- Baseline Report 4 - Marine Plastic Pollution in Southeast Asia: Cooperation, Challenges and Opportunities (page 87)
- Baseline Report 5 - Emergency Response and the Maritime Space in Southeast Asia: Regional Cooperative Arrangements (page 117)
- Baseline Report 6 - Regional Cooperation on Marine and Coastal Protection and Conservation: Learning from the CTI-CFF Experience (page 131)

The reports relating to regional arrangements in Southeast Asia were prepared by a research team from the S. Rajaratnam School of International Studies (RSIS), Nanyang Technological University, Singapore. The team was headed by Dr Julius Cesar Trajano and included Dr Lina Gong and Margareth Sembiring. Officials and stakeholders consulted in connection with this research are listed in Annex 2. Biographical details of RSIS researchers are included in Annex 4.

Baseline Reports on regional arrangements in the Bay of Bengal region include:

- Baseline Report 7 - Marine Litter in the Bay of Bengal Region: Regional Cooperative Arrangements (page 143)
- Baseline Report 8 - Illegal, Unreported and Unregulated (IUU) Fishing in the Bay of Bengal: Regional Arrangements (page 157)
- Baseline Report 9 - Regional Collaboration in Marine Disaster Management: A study of the Bay of Bengal (page 187)

The reports relating to regional arrangements in the Bay of Bengal region were prepared by a research team from the Observer Research Foundation, Kolkata, India. The team was headed by Dr Anasua Basu Ray Chaudhury, and included Dr Anamitra Anurag Danda, Sayanangshu Modak and Sohini Bose. Officials and stakeholders consulted in connection with this research are listed in Annex 2. Biographical details of ORF researchers are included

in Annex 5. A note on the geographical definition of the Bay of Bengal for the purposes of these case studies is included in Annex 6.

The Baseline Reports are followed by a section that sets out our recommendations for the Australian Government to promote greater Indo-Pacific cooperation in marine ecology as part of its commitment to the Indo-Pacific Oceans Initiative (page 221).

David Brewster and Anthony Bergin
Project Leaders
Canberra
May 2022

RECOMMENDATIONS FOR THE AUSTRALIAN GOVERNMENT

Executive Summary of Report Recommendations for Australia

This part of the Report includes the following recommendations on ways in which the Australian Government should promote enhanced Indo-Pacific cooperation in marine ecology as part of its commitment to the Indo-Pacific Oceans Initiative. These recommendations are discussed in greater detail from page 217.

1. ***Indo-Pacific Declaration on Marine Plastics:*** Australia should work with India and other selected partners to co-sponsor an Indo-Pacific Declaration and Action Plan on Marine Plastics. This would be open to all littoral states of the Pacific and Indian Oceans.

2. ***Enhance interactions between Indo-Pacific regional groupings:*** Australia should work with India and other selected partners to facilitate regular meetings/workshops among representatives from IORA, ASEAN and PIF to share experience and consider cooperative mechanisms in selected areas of marine ecology.

3. ***Study on IUU Fishing in Bay of Bengal:*** Australia should consider sponsoring a quantitative study on IUU fishing in the Bay of Bengal area, potentially through BIMSTEC or BOBLME-P.

4. ***Observer status with BIMSTEC***: Australia should seek observer status in BIMSTEC, with a focus on engagement on marine ecology issues.

5. ***Observer status with IOC***: Australia should seek observer status with IOC, with a focus on engagement on marine ecology issues.

6. ***Pairing of Australian and Indian cities in marine ecology***: The Australian and Indian governments should promote pairing of Australian and Indian coastal cities to share experiences in combating marine plastics and other marine ecology challenges.

7. ***Bringing Pacific and Indian Ocean island states together***: Australia should facilitate sharing of experiences of Pacific and Indian Ocean island states on marine ecology issues through hosting events, workshops and training exercises in fisheries management, monitoring control and surveillance, the challenge of marine plastics and in ocean science.

8. ***Enhance support for G16 on IUU fishing***: Australia should increase its financial and diplomatic support to the Group of 16 IOTC Coastal States, with the objective of strengthening regional fisheries management by IOTC in identified areas, especially in monitoring, control and surveillance strategies.

9. ***Establish a Pacific Ocean Expedition***: Australia should work together with Pacific Island countries, key Pacific partners and international bodies to establish a Pacific Ocean Expedition modelled on the Second International Indian Ocean Expedition.

10. ***Establish an Indian Ocean Centre for Environmental Security***: The Australian Government should sponsor an Indian Ocean environmental security centre as a regional hub for professional development and research in environmental security.

SUMMARY OF KEY FINDINGS OF BASELINE REPORTS

Key Findings of Baseline Report 1 - Marine Plastics in the Pacific: Report on Regional Arrangements among Pacific Island Countries

The Indian Ocean could learn from the Pacific islands experience in mitigating marine plastics in the following ways (see page 16):

- ***Development of unified positions***: Pacific islands have developed unified positions on plastics. This experience should be shared between regional bodies such as PIF and IORA.

- ***Regional cooperation frameworks:*** Pacific island countries have a regional framework for national legislation to restrict the import and trade of some of the most problematic plastics into the region that should be shared with Indian Ocean states.

- ***Information sharing on 'cultural issues'***: There should be inter-regional information sharing on the "cultural issue" of plastic use: how to change the behaviour of plastic users and consumers. SPREP and IORA should consider holding a joint meeting on sharing lessons on issues of consumer awareness, support and motivation for reducing the use of single-use plastics.

- ***Working together in global forums***: Much is happening at the international level on marine plastics. The Pacific and Indian Ocean regions can work together in global forums such as the IMO on shipping and plastics or FAO, on fishing and plastics, as well as at the UN Environment Assembly. There should be much greater information exchange between the PIF, SPREP and IORA in pursuit of a legally binding instrument on plastics pollution.

- ***Working with NGOs***. There are opportunities for NGOs working on the plastics issue to share information with Indian Ocean states about their Pacific work. This includes the ANZPAC Plastics Pact launched in Australia, New Zealand and the Pacific Islands region which unites businesses, NGOs and governments through ambitious 2025 targets to eliminate plastic waste.

Key Findings of Baseline Report 2 - IUU and the Blue Pacific: Report on Cooperative Arrangements among Pacific Island Countries

Set out below are the key report findings on opportunities for collaboration between the Pacific and Indian Ocean regions on IUU fishing (see page 35):

- ***Monitoring, control and surveillance of IUU***: The Pacific demonstrates how a region can successfully implement monitoring, control and surveillance against IUU fishing through regional cooperation amongst coastal states.

- ***Information exchange on VMS and data standards***: There is a significant opportunity for Pacific information exchange with organisations in the Indian Ocean region on vessel monitoring systems and data information sharing standards.

- ***Observer training:*** The Pacific provides lessons about the value of standardised training of independent fisheries observers at a national level.

- ***G16 to take up IUU fishing***: The so-called Group of 16 like-minded coastal states of the Indian Ocean Tuna Commission could take up the IUU issue as a challenge and build capacity and trust among its members through engagement with Pacific fishing bodies. A first step would be to undertake a region-wide independent quantification study of IUU fishing.

- ***Central management of reporting data:*** In the Indian Ocean, there is a lot of overlap in limited fisheries reporting. There are opportunities to collaborate with the Pacific, including establishing central management of reporting data.

- ***Minimum terms and conditions for access to EEZs:*** The Indian Ocean could benefit from greater interaction with the Pacific fisheries bodies on the development of harmonised MTCs for access to coastal states EEZs to prevent one island country being played off against another.

- ***Managing transhipment:*** Managing transhipment is a big problem in the Indian Ocean. Information exchange with the Pacific on transhipment observer programs would be useful.

- ***Use of port state controls:*** Although much more of the fishing takes place in the high seas in the Indian Ocean compared with the Pacific, Indian Ocean coastal states can use port state controls to influence fishing beyond national EEZs. The role of port state control is an area for useful cross-ocean information exchange.

- ***Fisheries science:*** The Indian Ocean does not have a single independent provider of fisheries science. There are opportunities in the Indian Ocean to look at the Pacific model of independent science input.

- ***Enhanced role of NGOs:*** There is an important role for non-government organisations in the Indian Ocean, such as *Global Fishing Watch, Fish-I Africa* and the *Stop Illegal Fishing* group. These NGOs would benefit from interacting with Pacific regional fisheries bodies on the IUU.

- ***Coordination in global bodies***: The Indian Ocean and the Pacific would benefit from closer cooperation in relation to global discussions on IUU in fora such as the FAO's Committee on Fisheries.

Key Findings of Baseline Report 3 - Ocean Science in the Blue Pacific: Report on Regional Arrangements among Pacific Island Countries

Below are the key findings for inter-regional cooperation between the Pacific and Indian Oceans in ocean science (see page 66):

- ***Ocean science as a regional responsibility***: The Pacific islands provide important lessons for other regions in taking responsibility to advance ocean science through regional bodies. There are no bodies in the Indian Ocean undertaking work like the Pacific Community (in fisheries) or the South Pacific Regional Environmental Program (SPREP) (on biodiversity).

- ***Independent fish stock assessment***: The Indian Ocean region should look closely at Pacific models for ocean science cooperation. In particular IOTC fish stock assessment modelling is currently provided by members of the IOTC and not by an independent agency. There's a need in the Indian Ocean for a scoping study on the best model for fisheries science advice as a key driver for improved fisheries governance.

- ***Indian Ocean Expedition***: The Pacific can learn from the Indian Ocean experience in ocean science. In the Pacific there's never been a coherent scientific examination of the ocean as is occurring in the Indian Ocean through the Second International Indian Ocean Expedition. IIOE-2 provides a strong basis for improved scientific knowledge transfer to regional governments in the Indian Ocean and enables capacity development opportunities in support of regional and early career scientists.

- ***Pacific Ocean Expedition***: The Pacific Community and the University of the South Pacific should work with the International Oceanographic Commission to develop a similar program. A Pacific Ocean Expedition would make for a powerful "branding exercise" for the Pacific framed under the UN Decade of Ocean Science. It would be a once in a generation ocean science initiative to have a lasting legacy aimed at improving livelihoods and sustaining the region's ocean environment.

Key Findings of Baseline Report 4 - Marine Plastic Pollution in Southeast Asia: Cooperation, Challenges And Opportunities

Below are the key findings for inter-regional cooperation in marine plastic pollution from Southeast Asia (see page 85):

- ***ASEAN Framework/Action Plan***: The establishment of an ASEAN regional framework and regional action plan in combatting marine plastic pollution in Southeast Asia provides lessons for exploring a much wider action plan and strategy for the Pacific, Indian Ocean and Southeast Asia.

- ***Collaboration with extra-regional states***: Collaboration initiated by ASEAN member states with South Korea, Norway and Japan provides regional pathways towards a capacity-building collaboration framework for the wider Indo-Pacific.

- ***Indo-Pacific consortium of marine scientists***: Scientists from Southeast Asia and the Indian Ocean region may form an Indo-Pacific consortium of marine scientists, based on the MICROSEAP Consortium of Southeast Asian universities.

- ***Regional knowledge centres***: Existing regional knowledge centres such as the Regional Knowledge Centre for Marine Plastic Debris (RKC-MPD) by the Economic Research Institute for ASEAN and East Asia (ERIA) and the Regional Capacity Center for Clean Seas (RC3S) provide a good model that can be expanded to the wider Indo-Pacific.

- ***Business initiatives***: There is an opportunity for states to collaborate with regional partners through bodies like business-initiated recycling alliances/associations to accelerate the shift towards plastics circularity in the broader Indo-Pacific. Growing alliances of business conglomerates and multinational corporations in Southeast Asia may also seek a regional platform where they can share information and good practices on how their respective recycling alliances can contribute to the circular economy approach at the national and regional levels.

- ***Cross-sectoral groups***: The complementary roles of governments, regional organisations such as ASEAN, universities and their scientists, regional knowledge centres, donor countries, the private sector and civil society organisations strengthen regional arrangements in Southeast Asia, which may be replicated in the broader Indo-Pacific.

Key Findings of Baseline Report 5 - Emergency Response and the Maritime Space in Southeast Asia: Regional Cooperative Arrangements

Below are the key findings for inter-regional cooperation in emerging response and the maritime space from Southeast Asia (see page 114):

- ***Growing vulnerability to natural disasters:*** Southeast Asia is becoming more vulnerable to natural hazards due to climate change. In particular, the socio-economic impacts of droughts should receive greater attention as the region is predicted to experience more frequent extreme heat waves in the decades to come.

- ***Key focus for ASEAN***: Emergency response, has been and will continue to be a key channel for ASEAN to build regional cohesion in Southeast Asia and to engage extra-regional partners.

- ***Institutionalisation of ASEAN arrangements***: Regional emergency response in Southeast Asia has been well institutionalised within the ASEAN framework. However, a fine balance between institutionalisation and flexibility is necessary, as flexible arrangements facilitate swift and timely responses in many cases.

- ***Ongoing engagement among stakeholders***: Regular engagement in the forms of workshops, meetings and joint exercises helps maintain active working relations between the relevant counterparts, which is conducive for communication and coordination during disasters.

- ***Need for improved information sharing***: A platform for information-sharing is useful for emergency response, which provides timely information related to the emergency, such as damage assessment, deployment of manpower and assets, the points of contact and other information related to the country and community affected.

- ***Role of private sector***: Funding remains a challenge facing emergency response, and efforts should be made to tap into non-public sources, such as the private sector.

- ***COVID-19***: The COVID-19 pandemic has exposed the need to enhance integration between regional mechanisms to deal with different types of disasters, as the concurrence of multiple disasters is increasingly likely. In the double disasters of volcanic eruption and tsunami in Tonga during the pandemic, a lack of communication and coordination between different stakeholders involved hampers the responses.

- ***Enhancing localised responses***: A new modality of emergency response should be explored, such as remote programming, since the pandemic has shown that deployment of international personnel can be difficult in certain circumstances. Localisation therefore should be promoted.

Key Findings of Baseline Report 6 - Regional Cooperation on Marine and Coastal Protection and Conservation: Learning from the CTI-CFF Experience

Below are the key findings for inter-regional cooperation in marine and coastal protection from the Coral Triangle Initiative (see page 128):

- ***An inter-regional initiative***: The Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security (CTI-CFF) demonstrates that countries from different regions can work together to protect and conserve the marine and coastal environment in a designated sea area.

- ***Transboundary nature of challenges***: Regional states need to acknowledge the transboundary nature of marine and coastal problems and endorse dedicated regional cooperation to solve them. This will also require commitments of necessary support, including funding.

- ***Guidelines and action plans***: Technical working groups have been effective in formulating guidelines and action plans to address identified issue. These documents assist member states to implement measures at the national and local levels.

- ***Navigating differences***: Navigating differences is critical to keep member states focused on shared objectives. Different cultural practices can be manifested in the governance of coastal communities where member countries have specific systems, technologies, logistics, protocols, communication styles, and cultural practices. These differences need to be understood and respected to enable the formulation of inclusive regional approaches.

- ***Building communication***: The key to bridging cultural gap among member states is by forming at an early stage mechanisms that will allow good communication and mutual understanding. These include giving all member states an equal voice in discussions and establishing a rotational mechanism for all member states to chair working groups. Continuous dialogues are critical to get member states on the same page and strengthen understanding among them.

- ***Dealing with transboundary disputes***: Transboundary issues that already existed between two or more countries prior to the founding of the CTI-CFF are acknowledged and considered, but are not engaged. This enables member states to continue working on their shared objectives without pre-existing transboundary problems hampering their cooperation.

- ***Flexibility on regional standards***: Some flexibility on regional standards and definitions needs to be on the table to accommodate the various national and local contexts.

Key Findings of Baseline Report 7- Marine Litter in the Bay of Bengal Region: Regional Cooperative Arrangements

Below are the key findings for inter-regional cooperation in marine litter in the Bay of Bengal region (see page 140):

- ***Lack of data on marine litter***: The origin and flows of marine litter are diverse and are not well understood in the Bay of Bengal (BoB) region. There are no uniform methods to study and compare management of marine litter challenges, including removal and disposal.

- ***Separate regional mechanisms for South and Southeast Asia***: The BoB partially encompasses the South Asian Seas (SAS) and the East Asian Seas (EAS) regions. Those regions have separate regional intergovernmental mechanisms for the protection of the marine environment and coastal areas. There is little or no interaction between the two mechanisms and Myanmar does not figure in either arrangement. This creates significant problems for data and developing consensus within the BoB.

- ***Need for consensus on single-use plastics***: Countries in the BoB region are at different stages of banning single-use plastic, but there is insufficient data to assess the effectiveness of current measures. There is a need to create a regional consensus against single-use plastic to prevent plastic pollution and marine litter, as well as to create a market for biodegradable and recyclable products.

- ***Need for systemic solutions, including waste management***: The challenge of marine plastic pollution requires systemic solutions covering policy, technology, management, financing, research, awareness raising and behaviour change. Of particular importance is the establishment of adequate waste management systems on land.

- ***Need for binding regional agreement***: A new legally binding agreement that clearly stipulates the goal of zero discharge of plastic into the ocean is needed.

Key Findings of Baseline Report 8 - Illegal, Unreported and Unregulated (IUU) Fishing in the Bay Of Bengal: Regional Arrangements

Below are the key findings for inter-regional cooperation in combatting IUU fishing in the Bay of Bengal (see page 154):

- ***Prevalence of EEZs requires co-management of marine resources***: Around 80% of the Bay of Bengal Large Marine Ecosystem is comprised of EEZs of littoral states. This may require co-management of marine resources as littoral states pursue future opportunities in the Blue Economy.

- ***Existence of large anoxic zone***: The BoB region contains a large Oxygen Minimum Zone (OMZ), where depleted oxygen concentration in the ocean contributes to the creation of biological deserts. This needs to be better factored into regional planning.

- ***Use of technology for MCS***: Indonesia and Thailand have experience in integrating technology for undertaking monitoring, control and surveillance (MCS) and can share that experience with other littorals. Policy-makers will need to take into account challenges from the number of landing sites.

- ***Need for data on IUU***: There is a need for consistent and robust data on IUU catch, which also differentiates between domestic and foreign vessels. The current IUU catch estimates does not provide a reliable basis for effective policy formulation.

- ***Regional collaboration on stock estimation***: There is a need for regional collaboration for stock estimation, particularly for species that straddle two or more EEZs. Such collaboration is a necessary condition for initiating an Ecosystems Approach to Fisheries Management (EAFM) along with the estimation of Total Allowable Catch (TAC).

- ***Role of NGOs/local communities***: Non-state actors can play an enabling role given the resources required to monitor and regulate fisheries across such large spaces. The active devolution of powers to civil society organizations and co-management frameworks would help curb IUU fishing and empower local communities.

- ***Need for regional data-sharing platform***: A regional data-sharing platform with digital and cellular communication should be established to facilitate monitoring of suspicious vessels and sharing of intelligence to intercept dark vessels at sea or regional ports.

- ***Market-state and port-state measures***: Market-state measures have been effective in the past and port-state measures also hold promise in mitigating IUU fishing. All BOBLME countries are parties to the Port State Measures Agreement, except India and Malaysia which have concerns regarding the costs of implementation.

Key Findings of Baseline Report 9 - Regional Collaboration in Marine Disaster Management: A study of the Bay of Bengal

Below are the key findings for inter-regional cooperation in marine disaster management in the Bay of Bengal (see page 184):

- ***Incidence of natural disasters in BoB:*** The BoB is one of the most turbulent maritime spaces of the world, where natural hazards such as cyclones and tsunamis regularly wreak havoc on the littoral states.

- ***Bilateral cooperation is dominant paradigm:*** Bilateral cooperation is the dominant paradigm in the region for disaster response despite lack of formal agreements between littorals.

- ***Need for confidence building to overcome sovereignty concerns***: Littorals have a strong 'sensitivity to sovereignty' in accepting disaster aid, indicating the need for more confidence building for multilateral approaches to be effective.

- ***Multistakeholder engagement:*** Participation in disaster management at the regional level is largely limited to the governments and armed forces. Multistakeholder involvement including the private sector is necessary for a more holistic approach. Community participation in disaster management is an effective way of strengthening national capacity.

- ***Strengthening BIMSTEC***: BIMSTEC's efforts at disaster management are nascent. There is a need to strengthen the institutional structure and funding of BIMSTEC for the organisation to make concrete progress. BIMSTEC needs to follow up the recent adoption of a charter with standard operating procedures in areas such as disaster management.

- ***Potential for BIMSTEC Plus approach:*** The ambit of BIMSTEC may be broadened to form "BIMSTEC Plus" by including Malaysia, Singapore and Indonesia as a way of sharing expertise and resources of these countries.

- ***Broaden role of BIMSTEC Climate Centre***: Based on lessons from the ASEAN AHA Centre, the BIMSTEC Centre of Weather and Climate can undertake a periodic review of vulnerabilities of littoral states.

- ***Regional pool of experts and resources***: BIMSTEC should create a regional pool of expertise and resources, including Expert Groups on disaster management. A flexible arrangement where countries can choose to engage in issue-based cooperation will improve functionality and practicality of a regional approach.

- ***Information sharing platform***: There is need for more digital support within BIMSTEC to help in early warning alerts and coordination in preparedness and response as regards disaster management.

Baseline Report 1

Marine Plastics In The Pacific: Regional Arrangements Among Pacific Island Countries

Dr Anthony Bergin
Senior Fellow, Australian Strategic Policy Institute

Executive Summary

The Indian Ocean could learn from the Pacific islands experience in mitigating marine plastics in the following ways:

- ***Development of unified positions***: Pacific islands have developed unified positions on plastics. This experience should be shared between regional bodies such as PIF and IORA.

- ***Regional cooperation frameworks:*** Pacific island countries have a regional framework for national legislation to restrict the import and trade of some of the most problematic plastics into the region that should be shared with Indian Ocean states.

- ***Information sharing on 'cultural issues'***: There should be inter-regional information sharing on the "cultural issue" of plastic use: how to change the behaviour of plastic users and consumers. SPREP and IORA should consider holding a joint meeting on sharing lessons on issues of consumer awareness, support and motivation for reducing the use of single-use plastics.

- ***Working together in global forums***: Much is happening at the international level on marine plastics. The Pacific and Indian Ocean regions can work together in global forums such as the IMO on shipping and plastics or FAO, on fishing and plastics, as well as at the UN Environment Assembly. There should be much greater information exchange between the PIF, SPREP and IORA in pursuit of a legally binding instrument on plastics pollution.

- ***Working with NGOs***. There are opportunities for NGOs working on the plastics issue to share information with Indian Ocean states about their Pacific work. This includes the ANZPAC Plastics Pact launched in Australia, New Zealand and the Pacific Islands region which unites businesses, NGOs and governments through ambitious 2025 targets to eliminate plastic waste.

The global problem of marine plastics is getting worse. There's an accelerating rate of plastics consumption and production.[1] Fifty percent of all plastics produced are intended for the manufacture of single-use products. The 368 million tonnes of virgin plastics produced annually is set to double by 2040. Only 9% of all plastics ever produced have been recycled.

[1] B Hardesty et al "Socioeconomics effects on global hotspots of common debris items on land and the seafloor" *Global Environmental Change* 2021https://doi.org/10.1016/j.gloenvcha.2021.102360

Just 12% have been incinerated. Around 80% of all plastics produced have accumulated in landfills or the land or marine environment.[2]

The Pacific islands contribute less than 1.3 percent of the mismanaged plastics in the world's oceans. Populations living within 50 kilometres of the coastlines of Pacific island countries generate an estimated 311,090 tonnes of waste plastic each year, of which 227,880 tonnes may potentially become marine debris.[3] But Pacific islands are one of the main recipients of marine plastics.[4] The *Second World Ocean Assessment* found that the highest recorded quantity of floating plastics are in the South Pacific subtropical gyre.[5]

The increase of lightweight, but not durable, plastic items are visible across much of the region's coastlines. Plastic debris, such as food and beverage containers, household goods, and synthetic clothing, litter the shores. The build-up of debris along beaches and in lagoons, and nearshore marine areas can negatively impact livelihoods, tourism and recreation, by reducing opportunities for safe swimming and navigation and diminishing fisheries harvests.[6]

While a number of islands ban the importation and sale of major sources of single use plastics such as cutlery, straws, and cling film, the transboundary nature of plastic pollution, including discarded fishing gear, makes plastic pollution exceedingly difficult to combat. Recycling, reusing, and repurposing are options. But these can be expensive and market dependent. The COVID pandemic has increased the use of disposable plastics worldwide, exacerbating the issue.[7]

This Baseline Report #1 has the following sections:

1. What's the problem?
2. Regional framework for addressing marine plastics
3. What's working well?
4. Fixing the gaps
5. Bringing the oceans together

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[2] N Simon et. al A binding global agreement to address the life cycle of plastics *Science* July 2021 https://www.science.org/doi/abs/10.1126/science.abi9010

[3] "Pacific Ocean Litter Project", Department of Agriculture, Water and Energy, https://www.environment.gov.au/marine/international-activities/pacific-ocean-litter-project

[4] https://reports.eia-international.org/wp-content/uploads/sites/6/2020/09/Plastic-Prevention-Gap-Analysis-2020.pdf; Office of the Pacific Ocean Commissioner, *Blue Pacific Ocean Report 2021* https://opocbluepacific.net/publications/#blue-pacific-ocean-report

[5] *https://www.un.org/regularprocess/woa2launch*

[6] W Filho et al, "Plastic debris on Pacific islands: Ecological and health implications" *Science of the Total Environment* June 2019

[7] Personal protective equipment is needed. But thought needs to be put into what happens at the end of life of the PPE. Hughes, Kristin, May 2020, "Protector or polluter? The impact of COVID-19 on the movement to end plastic waste" *Eco-business* 8 May 2020 https://www.eco-business.com/opinion/protector-or-polluter-the-impact-of-covid-19-on-the-movement-to-end-plastic-waste/

1. What's the problem?

Pacific island countries rely heavily on imported goods and there is a growing dependence on pre-packaged foods many of which contain or are packaged in plastic. Like elsewhere, plastics, including bags, straws, bottles and takeaway containers are in use every day in the Pacific islands. Anecdotal evidence on the impact of Covid-19 on the plastics issue in the region is that there's been a reduction in marine litter in the terrestrial environment. That's mainly been due to less visitor numbers, less gatherings due to restrictions on numbers of people allowed to gather and less public activities. No studies have been undertaken on the impacts of Covid-19 on ocean sourced marine litter in the region.

Plastic waste has an effect on the food chain. The plastic ingested by fish in the Pacific has been measured at 30 per cent higher than elsewhere.[8] Plastic is polluting Pacific island coral reefs with plastic items entangled in the corals.[9]

Most Pacific island nations have inadequate or under resourced waste management infrastructure.[10] They've got small populations, meaning that recycling isn't always economic. They often don't have much technical support to develop measures to reduce the use of plastics in the first place.

Recycling is also practically constrained in island states by intra and inter-island logistical and transport challenges, lack of collection and sorting facilities, limited port capacity and difficulty in securing and retaining markets for post-consumer materials. Many islands have limited landfill space and high shipping costs. Waste is often stored for shipping until sufficient material is available to make shipping it overseas economic. Many islands have stockpiles of recyclable materials awaiting export. Where domestic recycling or recycling exports are limited or non-existent, plastics are either dumped or burnt.[11] Large amounts of plastic waste ends up in the ocean.[12]

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[8] A Markic et al, "Double trouble in the South Pacific subtropical gyre: Increased plastic ingestion by fish in the oceanic accumulation zone" *Marine Pollution Bulletin* November 2018

[9] UNEP "Marine plastic: A new and growing threat to coral reefs" 5 March 2018 https://www.unep.org/news-and-stories/story/marine-plastic-new-and-growing-threat-coral-reefs

[10] *Environmentally responsible trade in waste plastics in the Asia Pacific region* UTS Institute for Sustainable Futures, 2020 http://www.environment.gov.au/protection/waste/publications/environmentally-responsible-trade-waste-plastics-asia-pacific

[11] Environmental Investigation Agency, *Plastic pollution prevention in Pacific island countries: Gap analysis of current legislation, policy and plans* August 2020 https://reports.eia-international.org/wp-content/uploads/sites/6/2020/09/Plastic-Prevention-Gap-Analysis-2020.pdf

[12] Pacific Region Infrastructure Facility, *Pacific region solid waste management and recycling, Pacific country and territory profiles*

Reliable waste collection services are primarily available to communities living only in the capital cities, not outer islands. Plastic waste in many Pacific island countries is being disposed of in non-sanitary landfills. Plastic is the second largest stream after organic waste in municipal solid waste in the region. Landfills and dumpsites are also often located in flat coastal areas most exposed to weather events and rising sea levels.[13]

The islands often lack resources to implement education and compliance activities. For the most part, there's no nationally coordinated system for collecting, sorting and cleaning up municipal recyclable material. Most islands' governments don't fund extraction of plastics from waste.

A report by the Environmental Investigation Agency, an independent London and Washington based research organisation, found that many island countries have ratified, signed or acceded to regional and global instruments related to plastics pollution. But the implementation of these obligations is rarely reflected in national level policy frameworks.[14] Where the transposition of an international convention into national law is made, these are usually aimed at waste management, not preventative measures. This study found that plastic pollution is often subsumed within the broad category of "waste management" in island laws. A range of terms in island legislation associated with plastics lacks standardised definitions and best practice. Microplastics is almost never noted in island national documents. Few linkages are made between human health, climate change and plastic pollution.[15]

2. Regional framework for addressing marine plastics

Key regional institutions

The Secretariat of the *South Pacific Regional Environment Program* (SPREP) has around 80-100 staff is the principal regional body for environment conservation and biodiversity, and waste management. Members of environment agencies make up its governing body.[16] Its members are: American Samoa, Australia, Commonwealth of the Northern Mariana Islands, Cook Islands, Federated States of Micronesia, Fiji, France, French Polynesia, Guam, Kiribati,

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https://www.theprif.org/document/regional/solid-waste-management-and-recycling/pacific-region-solid-waste-management-and

[13] Environmental Investigation Agency, *Plastic pollution prevention in Pacific island countries: Gap analysis of current legislation, policy and plans* August 2020 https://reports.eia-international.org/wp-content/uploads/sites/6/2020/09/Plastic-Prevention-Gap-Analysis-2020.pdf

[14] Environmental Investigation Agency, *Plastic pollution prevention in Pacific island countries: Gap analysis of current legislation, policy and plans* August 2020

[15] EIA report, as above. The deep ocean is a sink for microplastics. The number of microplastic fragments on the seafloor is generally higher in areas where there's more floating rubbish. "14 million tons of plastic on sea floor" *News release* CSIRO 6 October 2020

[16] As noted in the section on ocean science this contrasts with SPC that covers many areas.

Marshall Islands, Nauru, New Caledonia, New Zealand, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, United Kingdom, United States, Vanuatu and Wallis and Futuna.

SPREP is based in Samoa. It achieved autonomy as an independent inter-governmental organisation with the signing of the Agreement Establishing SPREP in Apia on 16 June 1993. SPREP is one of several inter-governmental agencies comprising the Council of Regional Organisations in the Pacific (CROP).The purposes of SPREP are to promote cooperation in the South Pacific region and to provide assistance in order to protect and improve the environment and to ensure sustainable development for present and future generations. SPREP's vision is: "The Pacific environment - sustaining our livelihoods and natural heritage in harmony with our cultures". SPREP also functions as the Secretariat of 3 regional conventions: the Noumea Convention, the Waigani Convention and the Apia Convention.

As noted in the Report on Regional Arrangements in the Pacific on Marine Science, the *Pacific Community (SPC)* is the main scientific and technical organisation for the region supporting ocean science and it also undertakes work on the environment. It has 26 members, around 650 staff and a budget of around 80 million euros. It provides scientific and technical services across the ocean sector. This has principally been built on the Oceans and Maritime Program based in Suva and the Division of Fisheries, Aquaculture and Marine Ecosystems Division in Noumea.

Regional plans and programs

Despite marine plastic pollution originating largely from land-based activities, these sources are largely unregulated by regional frameworks. These frameworks are focused largely on sea-based sources of plastic and do little to or nothing to prevent plastic entering the region on tidal flows, tourism or through trade.

Cleaner Pacific 2025

The Pacific has developed and implemented a regional action plan on marine litter. The *Pacific Regional Waste and Pollution Management Strategy 2016-2025* (known as '*Cleaner Pacific 2025')* is a comprehensive regional framework for sustainable waste management and pollution prevention in the Pacific islands region.[17] It was developed and endorsed by the Secretariat of the Pacific Regional Environment Programme members in 2016. It addresses all forms of waste and pollution in the region, including both land-based and sea-sourced marine plastic pollution.

Cleaner Pacific 2025 provides a strategic management framework to address waste, chemicals, and pollutants that will reduce associated threats to sustainable development of the region. Priority areas for management include municipal solid waste, asbestos, electrical and electronic waste, healthcare waste, chemicals, ozone depleting substances, mercury,

[17] https://www.sprep.org/attachments/Publications/WMPC/cleaner-pacific-strategy-2025.pdf

used oil and lubricants, marine litter, ship-sourced pollution, disaster waste, and liquid waste such as sewage and trade waste.

These goals are being implemented through operationalising 15 strategic actions aimed at strengthening institutional capacity, promoting public-private partnerships, promoting sustainable best practices in waste, chemicals and pollution management, developing human capacity, improving dissemination of outcomes and promoting regional and national cooperation. While *Cleaner Pacific 2025* strives to prevent the generation of wastes, its strategic goals are disproportionately focused on waste management rather than prevention.[18]

Pacific Marine Litter Action Plan

The *Pacific Marine Litter Action Plan 2018-2025 (PMLAP)* is the primary means through which members of SPREP are collaborating through the SPREP Secretariat to address sea-based sources of plastic pollution (not land-based sources). It sets out the key actions to minimise marine pollution across islands.[19]. It's a subset of *Cleaner Pacific 2025* as well as the *Pacific Oceans Prevention Pollution Program 2015-2020* (see below).[20]

The PMLAP covers 11 pillars that includes legislative instruments, prevention of shipping and terrestrial pollution, management of transboundary waste, behaviour change and disaster waste management. The PMLAP primarily aims to address marine debris but also includes some terrestrial-based marine litter point sources as described in the *Cleaner Pacific 2025 Strategy*. The PMLAP covers all kinds of marine litter, not just on reducing the sources of single-use plastics (straws, PET bottles, polystyrene takeaway containers, and plastic bags) in the marine environment.

Pacific Oceans Prevention Pollution Program 2015-2020 (PACPOL)

This program is supported by the SPREP Secretariat and provides overall leadership and technical assistance to improve the prevention and response to ship sourced and related marine pollution in the Pacific Islands region. PACPOL sets out 15 work plans to reduce the impacts of ship-based waste in the Pacific region. Key priorities of PACPOL include promoting public awareness among seafarers on marine pollution sources, reinforcing international best practices, polluter-pays principles, including enforcement provisions, and capacity-building. It also includes guidelines for monitoring and reporting. However, marine litter was not identified as a priority issue for any of the island states included under PACPOL.

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[18] Environmental Investigation Agency, *Plastic pollution prevention in Pacific island countries: Gap analysis of current legislation, policy and plans* August 2020
[19] https://www.sprep.org/sites/default/files/documents/publications/MAP-Digital-small.pdf
[20] https://www.sprep.org/attachments/Publications/WMPC/PACPOL-strategy-2015-2020.pdf

Pacific Regional Reception Facilities Plan 2016

The PMLAP is supported by the *Pacific Regional Reception Facilities Plan 2016.* The plan recognizes five Pacific hubs: Apia, Samoa; Suva, Fiji; Port Moresby, Papua New Guinea; Noumea, New Caledonia; and Papeete, Tahiti. The plan involves establishing reception facilities at each of these hubs, enabling the safe off-loading of garbage, sewage and used oil. SPREP developed the plan together with the Australian Maritime Safety Authority and the International Maritime Organization, for reception facilities in Pacific ports to ensure the safe off-loading of waste from ships.

Pacific Ocean Litter Project

SPREP's *Pacific Ocean Litter Project* (POLP) is a six-year regional program (2019-2025) funded by Australia.[21] POLP is focused on prevention and aims to reduce single-use plastics from land-based sources. It emphasises strengthening policy and legislative frameworks, including the implementation of bans and levies. POLP is a "work in progress" (see below).

3. What's working well?

In Pacific regional meetings such as those convened by the Pacific Islands Forum and SPREP, some island leaders have put plastic pollution on an equal footing with climate change. They're calling for an urgent and coordinated global response.

In some ways most of the "low hanging fruit" of product bans has already been picked in the region. That's been greatly helped by the *Marine Litter Action Plan* that's set the broad regional direction. But there are still challenges in the implementation of many of the measures, such as container deposit schemes.

In 2019, the Pacific Islands Forum leaders' meeting was plastic-free at the initiative of the host country, Tuvalu. Since then, nine countries have banned some single-use plastics in an effort to address marine plastic pollution and microplastics. In several countries and territories (Commonwealth of Northern Mariana Islands, FSM Yap State, Palau, Republic of the Marshall Islands, Samoa, Vanuatu, New Caledonia and French Polynesia) bans have been introduced on the importation of non-biodegradable plastic shopping bags.[22] And additional six countries (Cook Islands, Fiji, Kiribati, Solomon Islands and Tonga) have announced their intention to ban plastics.

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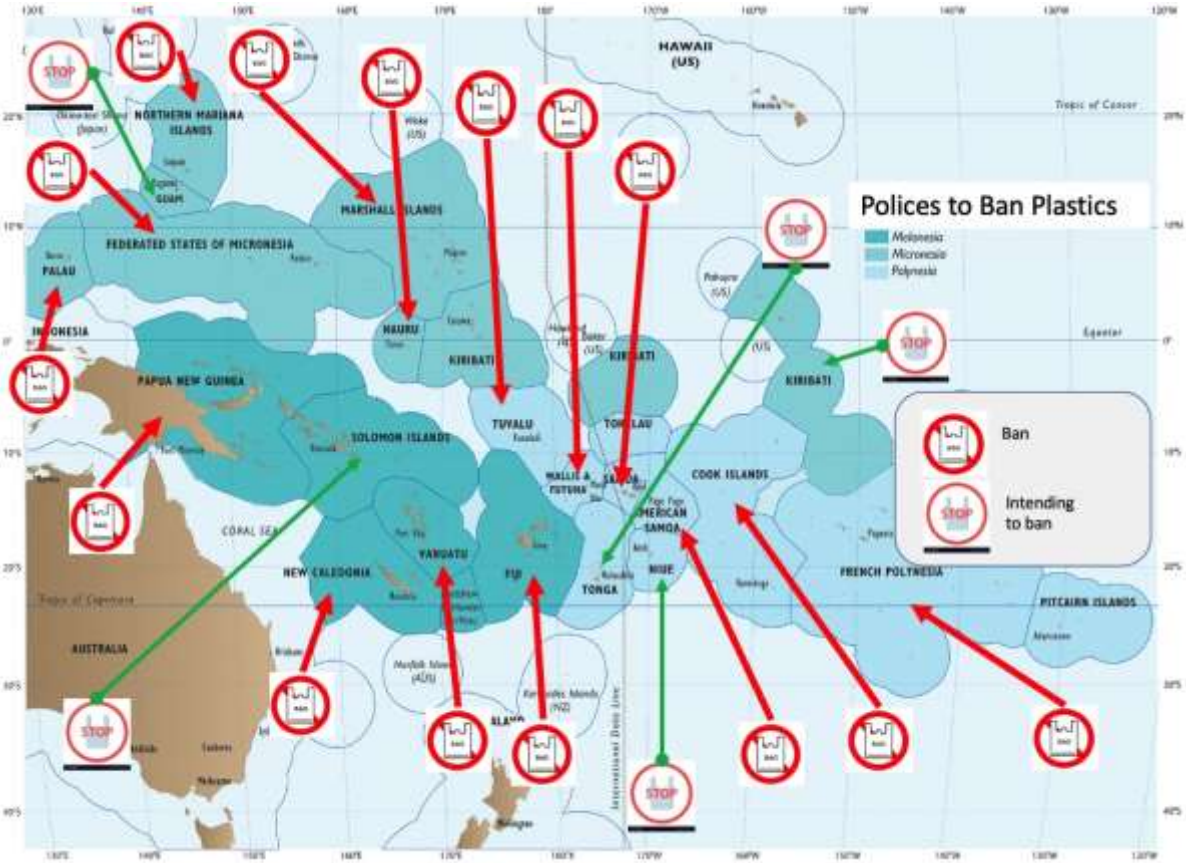
[21] https://www.environment.gov.au/marine/international-activities/pacific-ocean-litter-project

[22] Ban on single-use plastic shopping bags, Commonwealth of Northern Mariana Islands, FSM Yap State and Palau; ban on single-use plastics shopping bags, polystyrene, plastic cutleries, Republic of the Marshall Islands; ban on single-use plastic bags and straws, Samoa and Vanuatu; ban on single-use plastics, New Caledonia, French Polynesia; ban on importation and use of single-use plastics, Tuvalu



Regional policies on banning plastics Source: SPREP Secretariat

SPREP, and other national bodies, have done very useful work in recent years to tackle the problem of marine plastic pollution at a regional level. The POLP project, for example, is showing promise in helping countries to adopt legislation or voluntary bans on single-use plastic bags, levies and other instruments. It's in the process of undertaking work on consumer awareness, support and motivation for reducing the use of single-use plastics.[23]

POLP is taking steps to identify sustainable alternative products and processes to aid a reduction in single-use plastics. SPREP is delivering the project, with skills training for Pacific island countries through specialist technical support. The POLP is focused on *reduce* and *reuse* approaches to waste management, rather than r*ecycle* or *return* approaches. It aims to drive decreased marine litter in the region by reducing the availability of single-use plastics (PET,[24] plastic bags, polystyrene and straws).

There are now several successful projects in the Pacific islands supporting recycling and returning of existing plastic waste. Several island states are introducing container deposit schemes (CDSs) to fund environmental clean-ups. Palau has put in place a CDS and works

[23] On littering of plastic water bottles a good Australian case study is K Willis et. al "The Success of Water Refill Stations Reducing Single-Use Plastic Bottle Litter" *Sustainability* 2019
[24] PET is a clear, strong, and lightweight plastic that is widely used for packaging foods and beverages.

with the private sector to ensure they can export material that's collected.[25] Samoa is considering a comprehensive waste levy system that will allow for the collection of beverage containers. Tuvalu has placed a waste levy on imported goods, including plastics.[26] In 2018–19 Vanuatu implemented a successful single-use plastic ban that resulted in a reduction of single-use plastics in both landfill and litter.[27]

In 2019 Samoa, with the assistance of SPREP, initiated the *Greening of the Games* campaign (in conjunction with hosting the Pacific Games). This was a key activity in the implementation of the PMLAP to raise awareness and actions to reduce the use of single-use plastics at sporting events, as well as carbon footprint offsets.[28]

A ban on polystyrene products in Fiji went into effect on 1 January 2021. Fiji has a plastic bag levy, which was introduced in August 2017. The levy was increased from 20 cents to 50 cents on 1 January 2020.

Measures to stimulate the *reduce, reuse, recycle, recover* and *return* philosophy are in use across several island states, such as Samoa, Solomon Islands, Palau and Vanuatu.

Overall, Pacific island countries have adopted a progressive stance on plastic pollution. It's impressive that 73% of Pacific island states have policies banning single-use plastic and polystyrene and more island countries are declaring a commitment to do so. The total commitment from the region will soon be 91% of all states and territories in the Pacific Islands region. When a ban has been implemented it reduced the quantity of single-use plastics found in the waste (Vanuatu).[29]

We've seen several island states work to decrease plastic debris by strengthening local collection and disposal infrastructure and introducing recycling programs. In many island countries, market restrictions on plastics have come with preferred alternatives in the form of "biodegradable" plastics (although this can just mean that the plastics degrade into smaller bits of plastic and isn't any better for the environment.)

There's been real efforts to co-operate with regional countries to share resources and knowledge to tackle the problem. Since 2016, for example, there's the biennial *Clean Pacific Roundtable.* It's the largest waste conference to be held in the region and organised by

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[25] https://www.sprep.org/attachments/j-prism/events/2013/Nov/1._Manual_for_Beverage_Container_Deposit_Fee_Program.pdf
[26] https://www.loc.gov/item/global-legal-monitor/2019-08-19/tuvalu-ban-on-single-use-plastics-commences/
[27] D Kalfatak "Meet the innovator battling plastic waste in Vanuatu" *World Bank News* 4 June 2019 https://www.worldbank.org/en/news/feature/2019/06/04/meet-the-innovators-battling-plastic-waste-in-vanuatu-donna-kalfatak
[28]SPREP, Greening of the Games, fact sheet https://www.sprep.org/greening-of-the-games/fact-sheet
[29] https://apwc.com.au/wp/reports/ see the *Waste data report for Vanuatu* p 67

SPREP. It discusses coordinated actions to combat plastics debris and share good practices.[30]

There's a lot happening in coordinating approaches to plastic pollution at the regional level. One example of a useful initiative is the *Moana Taka Partnership*.[31] It's a partnership with Swire Shipping Company, providing free freight for non-commercial waste from Pacific islands to any destination within its Asia-Pacific shipping network. The MOU for this partnership was signed between SPREP and Swire Shipping Agencies in March 2018. It helps to alleviate the burden of waste on islands in the Pacific by enabling Swire Shipping vessels to utilise empty shipping containers to transport non-commercial recyclable waste from Pacific islands. In 2019 more than 50 shipments of recyclable waste from Pacific island countries and territories were moved to destinations within the Asian market for disposal and recycling.

SPREP is also doing some useful work through *PacWastePlus* (Pacific hazardous waste) a five-year project funded by the European Union. This program addresses sustainable waste management at both national and regional levels. It provides a platform where Pacific countries can share their experiences and best practices to find common solutions and replicate successful initiatives. Through *PacWastePlus*, island countries are supported in developing solutions in waste management, through mechanisms such as container deposit schemes, advance disposal fees, and environmental taxes and levies.[32] Under *PacWastePlus*, SPREP has recently completed detailed national waste audits and country assessments on what's working well and where the gaps are.[33]

Good work is also being undertaken by Forum Fisheries Agency and the Western Central Pacific Fisheries Commission (WPFC) to step up efforts to stop the dumping of plastic waste at sea by fishing vessels in the region. The main source of plastic waste for longliners is the liners in the bait boxes. For purse-seiners, it's salt bags (salt is used to make a brine that is used in freezing the fish.) Since 1 January 2019, WCPFC has prohibited the dumping of plastic waste through a conservation and management measure (CMM).[34] It's an excellent step in the right direction, although at this point, there isn't any information on reviews of the CMM by WCPFC that are in the public domain. The WCPFC measure was taken in the context of the International Maritime Organisation (IMO) and the MARPOL Convention, where there's an IMO *Action Plan to Address Marine Plastic* (see footnote 36).

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[30] The third roundtable was held in November 2021. https://www.sprep.org/news/third-clean-pacific-roundtable-closes-with-renewed-commitment-to-cleaner-pacific

[31] SPREP, "Moana Taka Partnership unfolds exciting recycling possibilities for the Pacific islands" https://www.sprep.org/news/moana-taka-partnership-unfolds-exciting-recycling-possibilities-pacific-islands

[32] https://pacwasteplus.org/

[33] *The Connection* SPREP Newsletter, issue 6, 2021 https://library.sprep.org/sites/default/files/2021-07/connection-newsletter-issue-6.pdf

[34] https://www.wcpfc.int/doc/cmm-2017-04/conservation-and-management-measure-marine-pollution

The region has also done a good job in developing factsheets for policy makers on marine plastics. UNEP funded a project that has produced five factsheets launched at the Third Clean Pacific Roundtable in November 2021. The factsheets cover the circular economy for plastics in the Pacific, policy gaps on plastics, marine litter and climate change, impacts on human health and the impacts on human rights on human rights in the Pacific. The factsheets will be very useful for the Pacific as awareness materials, although more work will be needed to translate the information into policy briefs to assist countries when they go into negotiations on international arrangements.[35]

At the global level, Pacific island countries are leading the global discussion on plastic waste from ships within the United Nations system. The islands are, for example, pushing the issue within IMO.[36] In 2018 two submissions were made to the IMO on behalf of Pacific island countries to enhance existing regulations to tackle marine plastic litter from ships through the IMO. One was co-sponsored by Vanuatu, the Marshall Islands and Palau and another was co-sponsored by SPREP, Vanuatu, Fiji, Kiribati, Tuvalu, the Cook Islands, Palau, Solomon Islands and the Marshall Islands. These proposals triggered the development of the IMO *Marine Litter Action Plan*, with 17 of its 30 actions derived directly from these submissions.[37]

4. Fixing the gaps

The Chair of the United Nations Environment Assembly's Ad Hoc Open Ended Expert Group on Marine Litter categorises measures to deal with the marine litter issue in four broad areas: legal and policy, technological, economic and educational/informational (see box).

Ad hoc open-ended expert group on marine litter and microplastics

The ad hoc open-ended expert group (AHEG) is established through the United Nations Environment Assembly. Its mandate is to review the present situation and analyse effectiveness of existing and potential response options related to marine plastic litter and microplastics.

The AHEG has met four times (three in-person and one on-line meeting). At its fourth meeting in November 2020 the AHEG considered various barriers to combating marine plastic litter and microplastics, including challenges related to resources, capacity development and technology transfer in developing countries within four main areas:

[35] The factsheets can be accessed here: https://www.unep.org/resources/factsheet/marine-litter-plastic-pollution-and-human-rights

[36] "IMO Action Plan to address marine plastic litter from ships" https://www.gpmarinelitter.org/resources/information-documents/imo-action-plan-address-marine-plastic-litter-ships

[37] Whilst discharging plastics into the sea is already prohibited under MARPOL, the Plan aims to enhance existing regulations and introduce new measures to reduce marine plastic litter from shipping. IMO Member States agreed that actions that relate to all ships, including fishing vessels, should be completed by 2025. https://wwwcdn.imo.org/localresources/en/MediaCentre/HotTopics/Documents/IMO%20marine%20litter%20action%20plan%20MEPC%2073-19-Add-1.pdf

- *Legal barriers* were established by, founded upon or generated by law or its absence or a lack of implementation and/or enforcement, namely the lack of definition and the existence of gaps in legislation; unclear definitions of targets in legislation; the definition of hard numerical limits in regulations; lagging or incomplete implementation or enforcement of legislation; inconsistent national implementation of international legislation; and national legislations which may conflict.
- *Financial barriers* were characterised by high-costs that make a certain activity difficult to afford or implement. Some of those financial barriers also constitute economic barriers. These include lack of internalisation of cost, harmful subsidies, failure to implement polluter-pays-principles, inappropriate global funding schemes, lack of funds, lack of implementation of market-based instruments and tax incentives, missing markets.
- *Technological barriers* are the ones that are related to the production, manufacturing and design of products, consumption systems and all aspects of waste collection, management and recovery. They include lack of standards and coordination across the plastics value chain and for environmental controls and quality specifications of plastics, differing approaches to recovery, sorting and reprocessing technologies and systems.
- *Information barriers* included access to data, research, transparency, and education and awareness. Information barriers are also highly relevant to inclusivity and environmental justice.[38]

In the Pacific there are ongoing challenges in responding to all four barriers identified by the AHEG, particularly issues with single use plastics, consumer behaviour, poor treatment facilities, the ability to recycle, viable alternatives and an absence of legislation. There's no problem with political will. As noted above, there's now a range of measures in the islands from introducing voluntary single-use plastic to bans or levies.

Most of these financial mechanisms and policy instruments are relatively new, so more time will be needed (with data) to determine their real impact. There's been little to no real time nor retrospective reporting to date. In addition, since bans are more straightforward and less costly to implement, the island states are opting for those over levies, such as plastic bag bans.

Levies on consumer items that are refunded when the item is returned for recycling are being introduced in some island states (Advance Recovery and Fee Deposits (ARFD)). Palau and Kiribati have had these for more than a decade. Tuvalu has implemented an extensive version of this. Work is underway by Asia Pacific Waste Consultants to look at the feasibility for such scheme in another five island countries. These are not designed to reduce consumption but to implement sustainable financing models for recycling and recovery of materials including SUPs like containers. When a levy is applied that provides a refund for return of recyclable items, almost 60-90% of the items are returned.

[38] https://www.unep.org/environmentassembly/chairs-summary-aheg-4

The overarching regional frameworks are in place and the islands come to this issue with a unified voice, just as they've done on the climate change issue.

One of the key challenges in the development of a Pacific recycling sector and a subsequent reduction in marine plastic pollution is improvements to basic solid waste management services like collection and disposal systems. As one comprehensive study found: "A very small number of countries have well-resourced collection and treatment systems in place, however for the overwhelming majority the existing in-country solid waste management systems are limited. Appropriate infrastructure, fit-for-purpose technologies and government policies able to sustain the segregation and recovery of recyclable waste materials like plastics from the general waste stream will provide a strong basis for increasing value-added technologies over time."[39]

While the POLP is doing some work, there's more needed to develop consumer awareness on the plastics problem and support for reducing the use of single-use plastics as well as plastic reduction measures targeted to specific sectors.

Research by the Environment Investigation Agency found that stimulation of local and regional markets for recycled plastic products could be undertaken by making a plastic material display label common to the Pacific region and taking measures to prohibit the import, sale, or use of products other than those with the regional logo. This would clearly indicate the origin of plastic material to ensure regional level end of life options.[40] It would be linked to better consumer education.

Developing legislation to promote procurement of eco-friendly goods by governments in the Pacific would be useful. Depending on access to feedstock, subsidies might be introduced for recyclers to build facilities for processing plastics. There's a need to develop appropriate infrastructure and policies to sustain the segregation and recovery of recyclable waste materials, like plastics. There's more work to be done in the region to examine a levy/tax on all single-use plastics to incentivise a shift to refillables/reusables.

National plastic pollution reduction targets for the most problematic plastics could be set by Pacific states.

Examining alternatives for plastic packaging, especially for food items, is an area for the region to do more, along with separating plastics and addressing the more problematic plastics, not just the single-use plastics. In doing this care does need to be taken to consider the potential for perverse outcomes here e.g. impacts on food safety/shelf-life and the potential for contributing to food waste and any impacts on sources for alternative products such as forestry impacts.

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[39] *Environmentally responsible trade in waste plastics in the Asia Pacific region*
UTS Institute for Sustainable Futures, 2020, see especially report
threehttp://www.environment.gov.au/protection/waste/publications/environmentally-responsible-trade-waste-plastics-asia-pacific

[40] Environmental Investigation Agency, *Plastic pollution prevention in Pacific island countries: Gap analysis of current legislation, policy and plans* August 2020

The region should be putting more work into *prevention strategies*, whether that be prohibiting imports of non-recyclable plastics, establishing efficient collection systems, introducing national mandatory container deposit schemes or applying taxes or levies on certain imported products. These measures are, however, generally more expensive to implement than upstream activities such as product design standards.[41]

It should also be noted here that the Paris Agreement of the UN Framework Convention on Climate Change specifically links plastic pollution to climate change impacts. It requires that the plastic lifecycle must be managed to achieve net carbon neutrality by 2050.[42]

More needs to be done to discourage fishing vessels dumping plastic overboard while at sea, particularly providing incentives that will help fishers comply with the rules. Keeping waste on board and offloading it at Pacific island ports isn't simple: the waste facilities of many small island nations may be insufficient to handle this waste stream. The measure passed by WCPFC in 2017 to prohibit fishing vessels operating in the WCPFC convention area from discharging any plastic, but not including fishing gear, is good. But most of the other clauses merely encourage signatories to prohibit their vessels from dumping waste at sea. There's no enforcement mechanism.[43]

A recent study for Forum Fisheries Agency has provided advice to the region on how to more effectively promote and monitor compliance with the conservation and management measure on dumping plastic waste and improving mitigation of fishing vessel plastic waste dumping.[44] The report's many recommendations focus on using the principles of waste management and economic incentives to tackle this difficult problem. Further work will be needed to support national and regional efforts to better mitigate plastic waste dumping from fishing vessels operating in the region.

A key challenge will be building the Secretariat of the Pacific Regional Environment Programme's capacity on the plastics issue to channel effective programs of support and build capacity and coordinate donor support on the plastics issue in the region.

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[41] *Possible elements of a new global agreement to prevent plastic pollution* Nordic Council 2020 https://www.nordicreport2020.com/

[42] Centre for International Environmental Law, *Plastic and climate: The hidden costs of a plastic planet,* May 2019 https://www.ciel.org/wp-content/uploads/2019/05/Plastic-and-Climate-FINAL-2019.pdf

[43] V Fernandes, "Marine pollution from fishing vessels in the Pacific Ocean: what is the Western and Central Pacific Fisheries Commission doing about it?" *Ocean Law Bulletin* 5 November 2018 http://www.sas.com.fj/ocean-law-bulletins/marine-pollution-from-fishing-vessels-in-the-pacific-ocean-what-is-the-western-and-central-pacific-fisheries-commission-doing-about-it

[44] A Leney, F Blaha and R Lee, *An assessment of fishing vessels plastic waste generation in the WCPO region and potential measures to improve waste management in the fleet* March 2021 https://www.ffa.int/system/files/Plastics%20from%20Fishing%20Vessels%20Study%20Final.pdf

A range of policy responses are needed on the plastics issue all the way along the value chain. But it's sensible to consider upstream measures. As with climate change, tackling plastic pollution requires a coordinated global response.[45] The United Nations Environment Program's review of 18 international instruments and 36 regional instruments relevant to plastic pollution concluded that current governance strategies and approaches provided a fragmented approach that didn't adequately address marine plastic litter and microplastics.[46] In response, researchers and Pacific countries have called for an international plastic pollution convention from production through to recycling.[47]

SPREP Environment Ministers, gathered at SPREP on 10 September 2021 for a High-Level "Talanoa". They affirmed that while they're implementing the *Pacific Marine Litter Action Plan*, they recognised "the interconnectivity of the world's oceans means that marine pollution as a transboundary problem requires the coordinated, collective, and effective involvement of all countries".[48] The ministers urged Pacific rim countries and flag states to expeditiously implement relevant measures to prevent and effectively manage marine pollution and marine litter in accordance with international law. They called in their ministerial statement for a new global agreement on marine plastic pollution and endorsed a *Pacific Regional Declaration on the Prevention of Marine Litter and Plastic Pollution and its Impacts*.[49] They urged all states at the fifth session of the United Nations Environment Assembly in February/March 2022 to support the establishment of an intergovernmental negotiating committee to negotiate a new binding global agreement covering the whole life cycle of plastics (see below).

Pacific island markets are small and domestic legislation is unlikely to significantly impact the production and design of plastics, which essentially happens at a global level. The Pacific

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[45] N Simon et al "A binding global agreement to address the life cycle of plastics" *Science* July 2021 43-47 https://www.science.org/doi/abs/10.1126/science.abi9010

[46] UNEP *Legal limits on single-use plastics and microplastics 2018* https://www.unep.org/resources/report/legal-limits-single-use-plastics-and-microplastics

[47]Environmental investigation Agency, *Islands of opportunity: Toward a global agreement on plastic pollution for Pacific island countries and territories,* April 2020 https://eia-international.org/report/islands-of-opportunity-toward-a-global-agreement-on-plastic-pollution-for-pacific-island-countries-and-territories/

[48] https://www.sprep.org/news/pacific-ministers-reaffirm-commitment-to-tackling-environmental-issues-impacting-the-pacific-region

[49] https://www.sprep.org/news/pacific-leaders-call-for-urgent-action-on-marine-litter-and-plastic-pollution see also "Australia takes action on plastics to the world stage" *Media release* 13 September 2021 Minister for Environment, Sussan Ley https://minister.awe.gov.au/ley/media-releases/australia-takes-action-plastics-world-stage In September 2021 the governments of Ecuador, Germany, Ghana and Vietnam in September 2021 issued a ministerial statement to be forwarded to the UN Environment Assembly in February 2022, calling for commencement of talks towards a new global agreement on plastic pollution. https://sdg.iisd.org/news/ministerial-calls-for-global-agreement-on-marine-litter-plastic-pollution/

islands have consistently demonstrated leadership in international fora on ocean health and climate change. Addressing plastic pollution also requires an urgent global response that reflects the needs of the countries and regions most directly affected.

A global agreement could provide scientific, financial and technical assistance to develop national action plans to prevent plastic pollution. Current international discussions are around an international agreement that covers the whole life cycle of plastics – this will allow countries to consider actions that suit their specific circumstances. A possible treaty that aims to take into account the full lifecycle of plastics would be plastic pollution's version of the Paris climate agreement.

In early March 2022 at the UN Environment Assembly some 175 countries agreed to develop the first binding treaty on plastic pollution. Its terms will cover the lifecycle of plastic from production to disposal. The treaty will address all forms of plastic pollution, including microplastic particles. An intergovernmental negotiating committee will be convened to develop an international, legally binding instrument on plastic pollution, including in the marine environment. The committee will start work this year, with the ambition of completing its work by 2025.The resolution gives it a broad mandate to develop both binding and voluntary measures, set global targets and produce mechanisms for tracking progress and ensuring accountability. The measures could include limits on the production of virgin plastic, the phasing out of single-use products, and requirements to recycle. The resolution calls for financial assistance to help poorer countries to take action.[50]

The Pacific islands will be active in the discussions developing a global treaty. The island countries are expected to play a strong role in ensuring any agreement's design is responsive to the needs of the region and its measures effectively implemented. In the Pacific Island Leaders *Ocean Statement* in 2021 they called on governments to "ensure that appropriate global mechanisms are in place to enable the transformation of the global plastics economy".[51]

A global agreement on marine litter and plastic pollution would provide a level of global coordination and accountability that is currently missing. The patchwork of existing international legal instruments isn't sufficient to prevent the acceleration of the impacts of plastics on the marine environment. An option for implementing a new global agreement on marine litter and plastic pollution is through national action plans. Countries would meet the objectives of the agreement through a plan that outlines national specific policies and

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[50] https://www.unep.org/news-and-stories/story/what-you-need-know-about-plastic-pollution-resolution For background see K Raubenheimer and N Urho, "Rethinking global governance of plastics - The role of industry" *Marine Policy* March 2020, Ellen MacArthur Foundation, *Towards a UN treaty on plastic pollution*, https://ellenmacarthurfoundation.org/towards-a-un-treaty-on-plastic-pollution UNEP, *Combating marine plastic litter and microplastics: An assessment of the effectiveness of relevant international, regional and subregional governance strategies and approaches*, October 2017

[51] https://www.forumsec.org/wp-content/uploads/2021/02/2021-Special-Leaders-Retreat-Decisions.pdf

measures to be taken to reduce plastic pollution. One useful model here would be Australia's National Plastics Plan (see box).

Australia's National Plastics Plan

In March 2021 Australia launched a National Plastics Plan, with industry to deliver four national packaging targets by 2025. These are: 100% of packaging is reusable, recyclable, or compostable by 2025, 70% of plastic packaging goes to be recycled or composted, 50% average recycled content included across all packaging (20% for plastic packaging), and a phase-out of problematic and unnecessary single-use plastic packaging.

The plastic problem is being addressed in the plan through legislation, investment, industry targets, research and development and community education. Among the actions identified are:

- a plastic free beaches initiative
- new labelling guidelines to help consumers
- an end to expanded polystyrene consumer packaging fill and polystyrene food and beverage containers
- greater consistency for kerbside bin collections, including food and organic waste options
- establishment of a task force to address the plastics in littered cigarette butts
- phase-in microplastic filters in washing machines
- ensuring 100% of all packaging is reusable, recyclable or compostable

The export of unsorted mixed plastics was banned from July 2021.

Additional measures include a phase-out of non-compostable plastic packaging containing additive fragmentable technology that doesn't meet relevant compostable standards by July 2022, and of polyvinyl chloride packaging labels and expanded polystyrene in consumer food and beverage containers by December 2022.

The Australian government will fast-track the rollout to the Australasian Recycling Label so that at least 80% of supermarket products will display the ARL (including recycled content) by December 2023. The end goal is to establish a circular economy: all plastics fully recycled and products designed to allow their components to be remanufactured at the "end of life". [52]

Additional financial, technical and capacity-building support will be needed from donors to support the development of national plans for Pacific island nations. SPREP could be a useful source of support for island states to develop plans. At the same time as there's action to get a global agreement on plastics, the Pacific islands aim to establish a regionally binding agreement that would have financial mechanisms, compliance and enforcement provisions, standards and codes of practice.

[52] https://www.environment.gov.au/system/files/resources/a327406c-79f5-47f1-b71b-7388407c35a0/files/national-plastics-plan-2021.pdf

5. Bringing the oceans together

Like the Pacific, the trajectory of marine plastics pollution in the Indian Ocean region (IOR) is in the wrong direction: the problem is going to get worse before it gets better. And solutions will be slow to put in place. Awareness of the problems of plastic debris is relatively new in the Indian Ocean.[53]

The Indian Ocean region needs greater information exchange on marine plastics pollution data and to develop a greater focus on regional plastic control. Legal mechanisms are one potential tool that should be used as part of a wider toolkit. But, as set out above for the Pacific, there are a range of policy levers around economic controls, new plastic legislation and levies.[54] Each has its strengths and weaknesses. Indian Ocean states will need to identify what levers work well for which problem.

There are five areas where the Indian Ocean could learn from and work with the Pacific islands in this context:

Regional cooperation frameworks: In the Pacific the foundations and regional frameworks to address the problem are in place (see above) with ambitious legislation to restrict the import and trade of some of the most problematic plastics into the region.

While there are still gaps in Pacific island country-level frameworks, those foundations should be shared with IOR region through information exchange between Pacific regional bodies such as SPREP and key bodies in the Indian Ocean such as Indian Ocean Rim Association that has a focus on the blue economy.

Development of unified positions: The way in which the Pacific has come together and developed unified positions on the plastics issue through SPREP and the Pacific islands Forum (that have had multiple meetings on the issue), holds out key lessons for the Indian Ocean region as it develops a regional approach to the problem. There's been a real coherence by the Pacific islands as a region when it comes to the plastics issue. Leadership of Pacific regional bodies and the way they've gone about addressing the plastics problem should be shared with IORA and other key IOR bodies.

Information sharing on 'cultural issues': While the causes and contributors to plastic pollution will vary from country to country in both oceans (whether, for example, it be related to lack of access to safe fresh water driving use of bottled water or problems in

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[53] M van der Mheen, et al, "Beaching patterns of plastic debris along the Indian Ocean rim" *Ocean Science* 2020 16, 1317–1336

[54] K. Willis et al "State and local pressures to drive plastic pollution compliance strategies" *Journal of Environmental Management*, 2021 One study that focused on Australia found that illegal dumping, litter prevention, re-cycling, education and "Clean Up Australia" programs all significantly reduced waste along a local government council's coastline. See K. Willis et. al "How successful are waste abatement campaigns and government policies at reducing plastic waste into the marine environment?" *Marine Policy* November 2017.

transporting waste out of the region), one area that warrants information sharing between the two oceans are the "cultural issues" relating to plastic use: how to change the behaviour of plastic users and consumers. SPREP and IORA might consider holding a joint meeting on sharing lessons specifically on issues of consumer awareness, support and motivation for reducing the use of single-use plastics and stakeholder projects to monitor the use of plastics.

Working together in global forums: A lot is happening at the international level on marine plastics and it's happening quite fast: the two regions can work closer together in global forums such as the IMO on shipping and plastics or FAO, on fishing and plastics. More urgently the two regions should work together at the UN Environment Assembly. There should be much greater information exchange between the PIF, SPREP and IORA on a legally binding instrument on plastics pollution.

Working with NGOs. There are also opportunities for NGOs working on the plastics issue to share information with Indian Ocean states about their Pacific work. WWF are helping to bring attention to civil societies in the islands to address the issues of plastics. They are helping to mobilise countries to adopt policies and have a common voice in international fora. The International Union for the Conservation of Nature (IUCN) is doing work on plastic management in the region and helping to move the private sector to establish sustainable financing systems such as container deposit legislation. The Centre for International Environment Law[55] and the Environmental Investigation Agency are helping Pacific countries, and others, to have a common voice in international fora such as the UN Environment Assembly.

ANZPAC Plastics Pact: Finally, there's the ANZPAC Plastics Pact launched in Australia, New Zealand and Pacific Islands region in May 2021. It's sponsored by the Ellen MacArthur Foundation's Global Plastics Pact network with Pacts in Africa, Europe, Latin America and North America. It unites businesses, NGOs and governments behind a series of ambitious 2025 targets to eliminate plastic waste.[56] The ANZPAC Plastics Pact represents the complete plastics supply chain: leading brands, packaging manufacturers and retailers to resource recovery leaders, government institutions, and NGOs.[57]

Because the issues related to managing plastics are fundamentally transnational in nature there should be a consistent approach between ocean areas. The Pacific Islands and Indian Ocean countries should lift their levels of cooperation to meet the international challenges for managing plastic waste.

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[55] https://www.ciel.org/plasticandclimate/

[56] ANZPAC members are working towards four targets by 2025: eliminate unnecessary and problematic plastic packaging through redesign, innovation and alternative (reuse) delivery models; 100% of plastic packaging to be reusable, recyclable or compostable packaging by 2025; Increase plastic packaging collected; and effectively recycled by 25% for each geography within the ANZPAC region.

[57] https://anzpacplasticspact.org.au

Baseline Report 2

IUU And The Blue Pacific: Cooperative Arrangements Among Pacific Island Countries

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Executive Summary

Set out below are report findings on opportunities for collaboration between the Pacific and Indian Ocean regions on IUU fishing:

- ***Monitoring, control and surveillance of IUU***: The Pacific demonstrates how a region can successfully implement monitoring control and surveillance against IUU fishing through regional cooperation amongst coastal states.

- ***Information exchange on VMS and data standards***: There is a significant opportunity for Pacific information exchange with organisations in the Indian Ocean region on vessel monitoring systems and data information sharing standards.

- ***Observer training:*** The Pacific provides lessons about the value of standardised observer training of independent observers at a national level.

- ***G16 to take up IUU fishing***: The so-called Group of 16 like-minded coastal states of the Indian Ocean Tuna Commission could take up the IUU issue as a challenge and build capacity and trust among its members through engagement with Pacific fishing bodies. A first step would be to undertake a region-wide independent quantification study of IUU fishing.

- ***Central management of reporting data:*** In the Indian Ocean, there is a lot of overlap in limited fisheries reporting. There are opportunities to collaborate with the Pacific, including establishing central management of reporting data.

- ***Minimum terms and conditions for access to EEZs:*** The Indian Ocean could benefit from greater interaction with the Pacific fisheries bodies on the development of harmonised MTCs for access to coastal states EEZs to prevent one island country being played off against another.

- ***Managing transhipment:*** Managing transhipment is a big problem in the Indian Ocean. Information exchange with the Pacific on transhipment observer programs would be useful.

- ***Use of port state controls:*** Although much more of the fishery takes place in the high seas in the Indian Ocean compared with the Pacific, Indian Ocean coastal states can use port state controls to influence fishing beyond national EEZs.

- ***Fisheries science:*** Indian Ocean does not have a single independent provider of fisheries science. There are opportunities in the Indian Ocean to look at the Pacific model of independent science input.

- ***Enhanced role of NGOs:*** There is an important role for non-government organisations in the Indian Ocean, such as *Global Fishing Watch, Fish-I Africa* and the *Stop Illegal Fishing* group. These NGOs would benefit from interacting with Pacific regional fisheries bodies on the IUU.

- ***Coordination in global bodies***: The Indian Ocean and the Pacific would benefit from closer cooperation in relation to global discussions on IUU in fora such as the FAO's Committee on Fisheries.

The Pacific island countries are engaged in increasingly complex and demanding regional and international processes supporting efforts to secure sustainable ocean development in a rapidly evolving policy environment. Regional leaders, at the national level and through regional agencies, are promoting sustainable development for the island countries through initiatives that seek to secure the conservation and sustainable use of the ocean and its resources.

For Pacific island countries the ocean sector is the most significant natural asset available to support sustainable development. Ironically, many industrialised nations see the Pacific as the last frontier, with resources to be exploited. This Report addresses regional cooperative arrangements in the Pacific relating to IUU fishing.

This report has the following sections and annexes:

1. The nature of IUU fishing
2. What's working well
3. Outstanding problems
4. Fixing the gaps
5. Bringing the oceans together

Annex 1: Description of Regional Fisheries Management Organisations and arrangements

1. The nature of IUU fishing

The EEZs of 17 Pacific Islands Forum Fisheries Agency (FFA) members' EEZs cover 30,569,000 km² of ocean: equivalent to 28% of the world's EEZs. In 2019 the total tuna catch was 2.96m mt in the western central Pacific Ocean, 55% of global tuna production. The EEZs of the 8 Parties to the Nauru Agreement (PNA) nations EEZ in the equatorial belt deliver about 70% of the Western Central Pacific Fisheries Commission (WCPFC) catch, mainly by purse seiner. The roles of these three Regional Fisheries Management Organisations (and several other relevant organisations) are described in detail in Annex 1 to this Baseline Report.

Tuna caught in FFA members waters is valued at US $2.5 billion,[58] with the purse seine fishery in PNA waters amounting to about 90% of this. The industry provides employment

[58] https://www.ffa.int/node/2109

for more than 22,000 people mainly onshore, although there are crews and observers on vessels. The Pacific island fleet is growing and about a third of the 255 purse seiners vessels active in the region fly Pacific island country flags.

The purse seine fishery is the largest tuna fishery in the Western and Central Pacific Ocean. This method of fishing is used to catch skipjack tuna and small yellowfin tuna. Most of these fish are canned. Purse seine vessels operate in the open ocean, using a huge net to catch many thousands of tuna in a single operation in the surface layer of the ocean (up to 200 m deep). Most purse seine vessels have freezers on board so that the catch can be frozen immediately. Purse seine fishing can be more successful when fishers use floating objects known as fish-aggregating devices (FADs), because tuna like to congregate around objects floating on or near the surface of the ocean

In contrast, the offshore tuna fishery in the longline fishing sector is dominated by fishing vessels flagged to distant-water fishing nations primarily China, Japan, Taiwan, South Korea, Philippines and the US. Longline fisheries target adult bigeye, albacore and yellowfin tuna. This fishery accounts for 10–13% of the tuna caught in the Western and Central Pacific Ocean. But the tuna caught this way are more valuable; they are larger and can be landed in better condition. It's the main fishing method used for producing high quality sashimi. Longline fishing feeds out long lines with hooks into the open ocean. The crew of a longliner bait single hooks (manually or by machine) and feed out lines that may be more than 60 km long. Vessels that are at sea for short periods usually have ice for cooling, whereas those that are at sea for many months at a time contain freezers capable of snap-freezing the tuna and keeping it at less than –40°C.

When talking about illegal unregulated and unreported (IUU) fishing in the region too often it's understood as a singular entity as the term is composed of three distinct components each of which is different from the other. When the term "IUU" is used many equate the term as used to describe a fishing vessel "sneaking" into an ocean region where it might not be authorised or licensed, catching fish and selling it on the black market. But IUU fishing can involve many different things. For the Pacific islands, as in other oceans, IUU fishing comes in many shapes and forms and can have huge costs. One recent study on IUU fishing in the area of competence of the Asia-Pacific Fishery Commission, for example, found that IUU fishing was estimated to be worth up to US$23 billion annually.[59]

Illegal fishing

The "I" in IUU is 'illegal fishing', which refers to activities conducted in a country's EEZ in contravention of its laws and regulations. It can also refer to fishing in international waters in violation of that country's flag state law and regulations related to its obligations under the international treaties and regional fisheries management organisations (RFMO) convention arrangements to which it is party.

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[59] Wilcox, C, et al, *A review of illegal, unreported and unregulated fishing issues and progress in the Asia-Pacific Fishery Commission region.* Bangkok, FAO and Hobart, CSIRO. 2021 The APFIC region is very different to Western Central Pacific, particularly in relation to tuna distribution and Pacific island countries.

In the past, illegal fishing has had dire consequences for the Pacific islands. It's a threat that the island countries and regional fisheries management organisations have invested very significantly to respond to and as a result the threat has largely been mitigated. With better communications technology and data today pretty much every boat is known, including the IMO vessel numbers, technical specifications, fishing gear, owner, master and flag. Most are typically Vessel Monitoring System (VMS) tracked.

So, it's now unlikely a vessel will deliberately fish in the Pacific region without a licence, and if it did it would soon be caught. The exception is small Southeast Asian vessels encroaching in the west of the region. There are very few if any stateless vessels, (vessels not registered with a state), operating in the Pacific region, which is a region dominated by EEZ and managed waters.

Today, illegal fishing is not the most serious aspect of IUU. That said, it's important to staying vigilant to the threat of unlicenced illegal vessels and maintain the capability to detect and deter unlicenced illegal fishing. Nevertheless, the Pacific island countries and Pacific RFMOs have now judged that they can't afford to only focus their monitoring, control and surveillance (MCS) tools only on the "I" of IUU fishing.

Unreported fishing

The first "U" in IUU refers to fishing activities that haven't been reported, or have been misreported, to the relevant national authority or RFMO, in contravention of the laws, regulations and reporting procedures of that country or organisation. This can occur both within EEZs and on the high seas. Species can be underdeclared or catch underdeclared or just undervalued. This may be deliberate or poor record keeping.

Unregulated fishing

The second "U" is unregulated fishing. This refers to fishing activities in areas or of fish stocks where there are no national, regional or international conservation or management measures applicable to a particular fishery or fishing vessel. Unregulated fishing can occur in an unmanaged fishery within an EEZ or on the high seas by vessels without a flag, or by vessels flying the flag of a country that isn't a party to international conventions or a relevant RFMO.

Crossover between the three elements of IUU fishing

Each of these three components of IUU aren't necessarily mutually exclusive. A vessel fishing illegally, for example, is unlikely to record its activities in a logbook or even provide its logbook to a national or regional body: its fishing activity will be unreported. There is, however, a tendency for each breach to be compounded and the scale of the issue inflated in dollar terms. Vessels operating illegally may be stateless. But far more frequently they are operating under flag states that have some lax regulatory environment, noting it is a flag state responsibility to manage vessels when authorised to operate outside a home party's

waters. It's also likely they're in the category of unregulated fishing. In short, there's a crossover between each of the three components of IUU fishing.

While it's difficult to talk about the components of IUU fishing in complete isolation, for the Pacific islands it's unreported fishing that's the largest component of the IUU risk. The main regulatory focus now is on fishing vessels in the region that aren't complying with license conditions.[60] The largest component of that by volume is misreporting.

Apart from the difficulties of correctly estimating catch weight and species composition at sea, there's often short-term commercial incentives for misreporting, non-reporting, or underreporting of fishing activities and catch.[61] Misreported fishing activities can compromise the data that the region relies on for strong fisheries management and science.

The importance of getting fisheries data is critical: it feeds into stock assessments and regulating the region's fisheries. Small inaccuracies in reporting, when aggregated across the entire offshore Pacific tuna fisheries sector, can be significant. This undermines the economic, scientific and potentially the social benefits that the Pacific island countries should be gaining from the fisheries resources they own when managed this way.

Quantification study

The "gold standard" quantification study on IUU in the Pacific was done by MRAG consultants in 2016 in the area covered by the members of the FFA.[62] The 2016 quantification study allowed the Pacific islands to better target their MCS efforts. The study resulted in FFA gaining a clearer profile of IUU fishing in the region. It helped FFA track whether its previous monitoring control and surveillance (MCS) investments had worked.

The study found that best estimate of total volume of product either harvested or transhipped involving IUU activity in Pacific tuna fisheries was 306,440 tonnes, with 90% confidence that the actual figure was within a range of 276,546 to 338,475 tonnes. Based on the expected species composition and markets, the ex-vessel value of the best estimate

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[60] This discussion of IUU does not deal with coastal fisheries in the Pacific.

[61] For purse seine fishery, they catch very large volumes, with many tonnes taken in each set – it can be difficult to estimate catch weights and species composition accurately. But for longline fishery, they're catching fish individually – and most at very low rates – a few fish per thousand hooks. There should be no excuse to not report catch numbers accurately (although weights will still be estimates). As discussed later, in the purse seine fishery vessels are effort limited – managed under the Vessel Day Scheme. There's no real incentive for under-reporting. But in the longline fishery there are catch limits for some species such as bigeye. So, there are incentives to under-report or misreport, for example by reporting bigeye tuna and yellowfin tuna to stay under catch limits.

[62] MRAG Asia Pacific, *Towards the quantification of illegal, unreported and unregulated (IUU) fishing in the Pacific Islands region*, Brisbane 2016.

figure for IUU fishing was $616.11m.[63] The study found that the main IUU problem in the Pacific was licensed boats not complying with license conditions: the problem was mainly misreporting catch and non-reporting.

That still remains the biggest IUU problem for the region. The unregulated component of Pacific isn't a huge problem. That's largely because island governments have worked well together to make sure they've created a strong regulatory environment.

In December 2021 FFA released an MRAG report that updated its 2016 findings.[64] It found that the annual estimated volume of Pacific IUU tuna fishing has reduced by one-third in the past decade: the best estimate of the total annual volume of tuna product harvested or transhipped involving IUU activity in Pacific tuna fisheries during 2017-19 was 192,186 tonnes, worth an ex-vessel value of $333.49 million. This compared with the total annual volume estimated for 2010-2015 of 306,440 tonnes, worth an estimated ex-vessel value of $616.11 million.

The updated study had some better data available to support some IUU estimates, such as the volume of longline fishing misreporting, due to a more than 10-fold increase in monitoring of longline vessels unloading in FFA member ports and new information for estimating illegal transhipment.

The study again found that Pacific IUU is dominated by harvest of tuna by licensed fleets. That contributed 89% of the estimated IUU by volume from 2017-19. Most of this misreporting was in the purse-seine fishing sector, where there is 100% observer coverage. Only 5% of the overall estimated IUU volume was thought to be due to various forms of unlicenced fishing: few unlicensed fishing vessels were detected or prosecuted during the study period, except for incursions by illegal boats on the western fringe of the FFA area. Non-compliance with licence conditions and post-harvest regulations were each estimated to account for another 3% of IUU.

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[63] The study analysed detailed information at a local scale in an effort to build a more accurate picture of IUU fishing activity. Estimates obtained in this way were added together to develop an overall estimate of IUU catch and value. The "IUU problem" was analysed into quantifiable units – volume, species composition and value – before aggregating them up to produce a regional scale estimate. The study identified the IUU risks for each of its main fishing sectors, including unlicensed fishing, misreporting, underreporting and illegal transhipping. The study generated a "best estimate" level of IUU activity, as well as minimum and maximum ranges.

[64] MRAG Asia Pacific (2021). The Quantification of Illegal, Unreported and Unregulated (IUU) Fishing in the Pacific Islands Region – a 2020 Update https://static1.squarespace.com/static/52a9273ae4b07fa2610392dd/t/61b7e62aa1cb747d1e6824c0/1639441975812/ZN2869+-+FFA+IUU+2020+Update+-+final.pdf ; see also "Regional cooperation reduces illegal, unreported & unregulated tuna fishing in Pacific", FFA Media release 14 December 2021

The study found MCS arrangements for longline fisheries of the Pacific are much weaker than for the purse seine fishery: with only 5% observer coverage meaning less independent data compared to purse-seining (100%). The study noted there was uncertainty around at sea transhipment of longline catch and better systems were needed to validate the volume and species of tuna transhipped by these fisheries.

As noted earlier and confirmed by the MRAG study, so called "pirate" vessels fishing illegally aren't a significant problem in the region as they had been in the past: the risk is very small for offshore fishing vessels operating in the region that RFMOS don't know about. Of the dozen regional surveillance operations over the last three years that have been run by FFA on monitoring, control and surveillance, across a huge area of ocean, it hasn't found a single confirmed unlicensed vessel.[65] For reasons explained below, there's been significant investment in MCS that is very effective in creating a strong deterrence effect where unscrupulous actors know they can't get away with unlicenced illegal fishing.

2. What's working well

The tools to address the problem in the Pacific Islands region are discussed below. But the key point to note here is that these MCS tools are *comprehensive.* Regional countries are proud of their record in responding to IUU fishing. That's because combatting IUU in the Pacific has been an amazing success story, making it a world leading region when it comes to combatting IUU fishing. Too often broad-brush statements around the problem in the region cloud the success, drawing unfairly on problems in Southeast Asia, so diminishing the good work that the island states and RFMOs have done. It's been a learning experience and forty years of cooperation and effort for the region in developing and implementing MCS tools: the region now has a world class regional MCS framework in place (see Annex for a description of current RFMOs and fisheries arrangements).

Whilst PNA has been united on fishery management, the broader and more diverse interests of FFA have found it much easier to cooperate on IUU than fisheries management. The result is that the level of IUU fishing in the region is quite low. The key reason for that outcome is that it's been about cooperative arrangements in the region: the MCS tools in the Pacific have been built on cooperation among the island countries.

Pacific Islands Forum Fisheries Agency role

The Forum Fisheries Agency (FFA) has been at the centre for a range of these tools. The integration of the MCS tools by FFA has been fully supported by FFA member states. FFA works on behalf of the FFA member states and not on its own. All of the integration of MCS tools is due to FFA member consensus of directing FFA to conduct the work and implement it. FFA does not do work unless approved by and with consensus of FFA members. It's the implementing mechanism.

[65] There have been a few high seas long liners in EEZs and not reporting on VMS, so there is some indirect evidence of something suspicious. But nothing has been confirmed.

FFA has a strong capacity building role in MCS and works as a block when it comes to IUU. The island states have developed good management practices: fishing companies understand what their obligations are when they operate in the region.

All this has helped the island states address IUU issues from a position of relative strength. In the Western and Central Pacific Fisheries Commission (WCPFC) the islands go into negotiations with fishing countries in way where they as a bloc "stand up" to the distant water fishing states. They've shown regional solidarity when it comes to IUU. And they've got the MCS tools to back it up.

The key question for the region after UNCLOS was concluded was how to control a vast fishery over huge ocean areas. The reality in 1982 was that they couldn't do it individually. The Pacific islands region worked out at the outset that MCS was absolutely critical for fisheries management.

FFA (and PNA) have played a vital role in advising island members, when they go into negotiations, and in understanding where the IUU risks are. FFA has been operating in the region a long time, so when the WCPFC deals with IUU issues it's really building off regional arrangements like the minimum terms and conditions (MTCs, see below). FFA has detailed and sophisticated compliance schemes that focus on particular points of risk that the island states agree are important to the region. That produces strong compliance outcomes, agreement on how compliance measures should be implemented and what's acceptable in terms of regional fisheries oversight from a flag state or island coastal state.

Treaty based arrangements

Compared to other regions, the Pacific is way ahead in tackling IUU fishing, management and science. A key factor is that it has a web of treaty-based arrangements through FFA, WCPFC, the Nauru Agreement, the Niue Treaty on Cooperation in Fisheries Surveillance and Law Enforcement (see below) and the US Tuna Treaty. All of this has been about supporting a sustainable fishery, not just "catching bad guys".

A common goal and strong MCS networks

The islands have made it very clear to distant water fishing nations: "If you fish here you fish under our rules". The island countries have found that combatting IUU is a common goal. The islands have had a very high degree of trust in working on the IUU issue with strong informal relationships across MCS networks in the region. Pacific MCS officers have been supported in the region by undertaking a certificate IV in fisheries enforcement and compliance delivered by the Pacific TAFE program of the University of the South Pacific.

Three "Cs": Communication, cooperation and common understandings

Communication and cooperation have been a great deterrent to IUU fishing in the region. The region's done well because it chose to take active steps to implement its fishery resource rights under UNCLOS. Indeed, the FFA was set up more than forty years ago for that specific purpose: the islands have long viewed FFA as *their* organisation. As noted

above, there's been strong trust built over many years between the islands on IUU issues and legal instruments on information sharing.

The Niue Treaty on Cooperation in Fisheries Surveillance and Law Enforcement in the South Pacific and the Niue Treaty Subsidiary Agreement (the implementing agreement for the Niue Treaty) with concepts like cross-vesting of enforcement powers and sharing of enforcement assets are good examples here.[66] There's common understandings by the islands on how information related to fishing vessels will be held by RFMOs. Sharing data here has been absolutely critical. That's been essential for making the regional MCS system work.

PNA's role

The PNA purse seine skipjack fishery, with some 255 vessels working in the region, has strong controls and management. Over 70% of purse seine skipjack catch of WCPFC is caught in the waters of PNA members, with 20% in other island EEZs and 10% on the high seas. Through the work of the PNA, an organisation that's totally self-funded and "home grown" by the member countries, there's a strong "handle" on the fishery: it's got observer coverage at 100% of purse seine vessels, (in 2020 the average was only 40% because of covid suspensions but PNA is in the process of getting it back to 100%), 100% of purse seine transhipments are mandatory to be done in port, mandatory log sheets and registry, and the 24-hour use of VMS. PNA uses VMS for the purposes of the vessel day scheme and compliance, through FIMS Inc, a PNA company. It covers purse seine, longline, tankers and carriers.

Every boat is tracked via VMS from port to port at one hour (or 30 minute periods during fish aggregating device closure). There's tracking of ancillary boats as well, including proximity alerts. The PNA get live data so it can check figures. Because the PNA run a vessel day scheme, electronically day usage in multiple zones is more accurate and faster. Coupled with live catch data from eLOGS and in port transhipment being monitored there's no need for weighing catch. This means it's highly unlikely in this fishery that you'd have a vessel fishing without a license. Unlicensed fishing is very small with no real economic impact as licences are charged per day and aren't dependent upon catch declared or price.[67]

As noted above, PNA has remarkable 100% observer coverage of the purse seine fleet (although 100% coverage has been suspended since March 2020 for Covid.) That provides an enormous deterrent for "bad" behaviour. All transhipments are done in port.[68] In short,

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[66] The treaty establishes a framework to allow the island states to share surveillance capacity and undertake joint and reciprocal surveillance operations.

[67] Because the VDS limits effort, not catch, there is less emphasis on validation of catch reporting (like there would be under a quota system). It's highly unlikely there is unlicensed fishing because there's only around 250 vessels. They're very large capital investments and they're all very well known. Industry has very good intelligence on new vessels being built. It would be hard to just "blunder in" with an unlicensed purse seine vessel.

[68] The requirement to tranship in designated ports has been suspended (about April 2020) with the PNA requirement extended to include designated areas within territorial seas.

there's very tight control over the purse seine fishery. A company under the PNA vessel day scheme has already paid for a fishing day so there's no incentive to misreport catch of tuna species.[69]

The Pacific islands have been very good at making the rules fairly for the fishing industry and explaining what those rules are. The region relies heavily on VMS monitoring and observer programs. Unlike the IOTC in the Indian Ocean, VMS is managed by the PNA and for monitoring control and surveillance by the FFA. It is centralised and not run by flag states on behalf of regional authorities (see below). Through FIMS Inc., select data is available to industry to assist in catch documentation and IUU documentation for market access as well as a tool for increased self-compliance and lodgements online.

FFA, VMS, and the Regional Fisheries Surveillance Centre

FFA runs and maintains the regional VMS with the service provided by an Icelandic company. FFA has its own VMS team to manage the FFA VMS data. FFA is also a designated VMS service provider for WCPFC (essentially managing a significant portion of WCPFC VMS data – via the FFA VMS). VMS is a requirement for all foreign fishing vessels wanting to fish in FFA member waters. The FFA feed is for whole region including high seas, but FFA members only get data in-zone (i.e. inside their EEZs) and border areas thus impeding IUU enforcement against unlicenced vessels. PNA have access to both FFA and the PNA's FIMS Inc. vessel monitoring system.[70]

In FFA members' waters all fishing vessels are required to have vessel monitoring systems reporting to FFA as well as to PNA for vessels in PNA waters. That FFA data goes to the Regional Fisheries Surveillance Centre (RFSC) in Honiara at FFA. It's then sent back to the islands with information sharing between the island countries (where permitted by countries in accordance with agreed procedures.) The RFSC integrates VMS data, AIS, observer data, port data and catch and effort data. The islands have taken the view that when it comes to satellite and observer information in-zone it's their information, but that there's no point in collecting the data unless it can be shared.[71] The RFSC is a very important MCS tool; it helps intelligence-led regional operations.

The region's vessel registration system and requirement for "good standing" has worked well through PNA, FFA and WCPFC. Vessels who transgress the rules and aren't in "good standing" can be removed from the register and so can't fish in members waters or may be included on the IUU listing with the RFMO. Importantly, the vessel register isn't an agreement with the flag state but with the owners of the vessel. If the vessel has done the wrong thing in any one

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As Covid comes under control in port transhipping will most likely be reinstated.

[69] There is an incentive to misreport retained shark catch if operators are harvesting fins for financial benefit (typically fins are for crew benefit) in an area where retaining shark is prohibited.

[70] The PNA VMS is port to port globally.

[71] They have also taken this view with aerial surveillance provided by Australian Defence Force through FFA – what's collected in "their area" is theirs.

EEZ and is not in "good standing" then it can't fish in any of the other EEZs. This is a very effective "long arm" MCS tool and provides a huge disincentive if a vessel is caught.

Observers

Observers have played a vital role in tackling the IUU issue. As noted above, there is 100% observer coverage on the purse seine fleet, reporting not just on the vessel operations but also other sightings of other vessels. The WCPFC target for longline fleet coverage of observers is just 5%. However, most fleets haven't met this target. Historically it's been around 1%,[72] and for those reporting the paper logs reporting can be delayed for years if supplied at all. This is driving investigations into electronic reporting and video analysis (see below).

Harmonised minimum terms and conditions

FFA members agree regionally harmonised minimum terms and conditions (MTCs) for all fishing vessels licensed in their zones. Under the MTCs, all foreign vessels fishing in FFA member EEZs need to meet the same standards. This means that vessel owners can't play one country off against another and management of regionally shared fish stocks is not threatened by any "weak links". But each FFA member must implement the MTCs into their own national rules and regulations. The MTCs mean that fishing effort isn't displaced depending on how lax a country is in terms of enforcement.

The MTCs are given national effect through vessel licencing conditions or by incorporation into national law as appropriate. They're designed to enforce arrangements on fishing vessels operating in the region to make sure they're doing the right thing. The MTCs developed by FFA and PNA members to apply within their waters have been a crucial mechanism for cooperation to develop management regimes and arrangements that govern the fishery.

Through the MTCs, Pacific island countries have been able to use their control of the fishery to leverage stronger management arrangements in the WCPFC, hence lifting the standard for fisheries management in this fishery more effectively than multilateral negotiations alone would likely have achieved.

Stock assessments

The Pacific Community (SPC, formerly the South Pacific Commission) provides fish stock assessments for Pacific island countries.[73] The centralisation of logbook data and its delivery to the SPC for analysis has served the region well in terms of stock assessments. SPC run standard log-book sheets for each type of fishery and under MTCs.

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[72] There is much less space on long liners than purse seine vessels. Observers live in in very cramped conditions and maybe under some duress. All too often observers on long liners are placed on vessels of limited or of "no concern."

[73] See generally, Report on Regional Cooperative Arrangements in the Pacific for Marine Science.

All FFA members require standard reporting. Any FFA member can get accurate assessment of what was caught in their zones and statistics such as catch per unit effort. This feeds into stock assessments and management. Together with high level assessment expertise within SPC, that's one of the reasons why stock assessments in the Pacific are world class.

PNA through FIMS Inc. runs eLogs on purse seiners to get near real time catch data, a massive improvement over paper log sheets which can take years to enter data bases. That's why stock assessments in the Pacific are so much better than elsewhere. The trust in data sharing in the Pacific islands region, along with VMS and observer data, really supports strong MCS efforts.

MCS framework

Importantly FFA has a robust regional MCS framework and strategy that island countries have agreed to put out as joint document.[74] FFA countries are aligned and like-minded when it comes to responding to IUU fishing. It's very powerful when you get a group of countries working together on the IUU problem. All these regional fisheries compliance measures have created a common understanding among all parties to the fishery, including fishing states expectations.

FFA has raised the bar for the island states by giving them regional and sub-regional capacity. There's strong implementation of MCS measures across the board in the region. FFA cooperates with other regional bodies like the Pacific Transnational Crime Coordination Centre in Samoa and will look to doing the same with the new Pacific Fusion Centre in Vanuatu.[75]

The island states have been very pro-active in keeping a constant watch on their IUU risks and how those risks manifest in terms of impacting their own island country situations. That's greatly assisted the island nations to tailor their and RFMO's MCS arrangements to what they judge to be the most important components of the IUU threat.

Independent science

The strength of regional arrangements has been supported by independent fisheries science from SPC provided to PNA, FFA and WCPFC (this is provided to all WCPFC members, not just the island countries). This has supported the region's capacity building around the science.[76]

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[74] *Regional monitoring, control and surveillance strategy 2018 – 2023*, FFA

[75] A Pacific Fusion Centre will inform strategic assessments on regional security issues, including IUU fishing. see David Brewster, *The Pacific Fusion Centre: the challenge of sharing information and intelligence in the Pacific* ASPI Special Report, September 2021. https://s3-ap-southeast-2.amazonaws.com/ad-aspi/2021-09/SR%20173%20Pacific%20fusion%20centre.pdf?VersionId=I4yKb_Y4qIiHixkIhDWyjRvMI61pCos7 The Niue Treaty Subsidiary Agreement allows for information sharing for broader law enforcement purposes.

[76] See Report on Regional Cooperative Arrangement in the Pacific in Marine Science.

Physical assets

It would be wrong to underestimate the power of physical assets to bring the region together and willingness to cooperate when it comes to MCS. The Pacific has been very strong in leveraging external parties to address their IUU risks in cooperative way. The islands have had lots of capability backing their MCS efforts. FFA has partnerships with countries like Australia (a supporting member of FFA) and Canada around satellite information and detecting radio signals

For over 30 years, FFA members have had the benefit of patrol boats supplied by Australia under its Pacific Patrol Boat Program (now called the Pacific Maritime Security Program or PMSP) that they use in coordinated regional operations. The original patrol boats are now in the process of being replaced by larger and more capable Guardian-class boats. The Guardian-class patrol boats donated to 12 island countries are the central element of the PSMP (A$2.1 billion over 30 years).

The PMSP also includes the aerial surveillance support with fully equipped two King aircraft supporting FFA fisheries operations full time. Samoa and Vanuatu are identified as the operating base for the aircraft (although Vanuatu is yet to finalise arrangements) providing 1440 hours a year. Because of Covid they're spending more blocks of time in one country. A New Zealand P-3K2 Orion aircraft also covers more than 735,000 square nautical miles on Pacific patrols each year.

The United States Coast Guard has shiprider agreements with eleven Pacific states and is planning to expand those.[77] This allows enforcement officers from Pacific states to deploy on USCG vessels to enforce national laws through boardings in the WCPFC convention area. The USCG is expanding its footprint in the region, recently stationing three fast cutters in Guam. These will give the USCG the ability to reach further out in the region. A USCG C-130 Hercules contributes to an annual cooperative MCS operation in the region. The Pacific Quadrilateral Defence Coordination Group (Australia, France, New Zealand and the United States), provides coordination in relation to maritime surface and aerial surveillance and maritime information exchange.

FFA has been building on its high-tech response to illegal and unreported fishing, trialling two new technologies, Starboard and satellite radio frequency detection. Starboard is a maritime domain awareness tool which identifies suspect fishing activities and encounters. Recent regional fisheries surveillance exercises have allowed FFA able to confirm the locations of suspected vessel interactions and correlate this with reported transhipments and analyse other fishing activity. Satellite radio frequency detection is providing a wider coverage area

[77] The agreements allow a country's authorities to board USCG vessels while they're on patrol with national authorities being able to authorise the USCG to take action on their behalf.

than traditional satellite monitoring technologies and is demonstrating potential for FFA to support more effective identification and tracking of non-reporting vessels.[78]

Regional surveillance operations and evaluations

There's strong regional cooperation in surveillance operations. Every year there's four major operations coordinated by FFA. These massive exercises generally each cover slightly different areas depending on which FFA members are participating. In recent years the surveillance operations have mainly focused around policing the operations of licensed vessels who haven't followed the rules and regulations governing their activities.

The FFA Regional Fisheries Surveillance Centre has been supported in these operations by fisheries compliance officers from several island states, the Australian Defence Force and the Australian Fisheries Management Authority. New Zealand also seconds an officer in the RFSC. The RFSC provides intelligence gathering and analysis, supplementing targeted information before and during the operation to support surveillance activities by FFA members. Regional collaboration and strengthening local expertise has been important in FFA's surveillance operations. FFA's capacity building has developed a real depth of expertise in Pacific islands MCS personnel.

Finally, Pacific RFMOs have compliance evaluation processes in place. These reviews analyse compliance by members with agreed conservation and management measures. Together with performance reviews of the Pacific RFMOs, they provide an indicator of effectiveness and where the RFMOs should look to enhance MCS arrangements. The WCPFC audits all regional observer programs and runs the regional observer program.

3. Outstanding problems

Longline fishery

Despite the success of the region there's still IUU challenges, primarily in the longline fishery. The longline fishery, with around 3000 vessels pre-Covid doesn't need to access EEZs. But around 50% of the effort has been in-zone in FFA member waters: as opportunities arise they roam to follow the fish, but they aren't dependent on in-zone access. With distant water vessels and transhipping in the high seas there's typically just 1-2% observer coverage despite the requirement for observers on transhipping under the WCPFC conservation and management measures. Some distant water fleets are getting higher coverage than this, some 5-7% in recent years.

The longline fleet isn't nearly as well monitored at the purse seine fleet.[79] With the longliner operations on the high seas and high seas transhipment is commonplace – hence vessels

[78] "Pacific trials new high tech tools in response to illegal fishing" FFA news release, 17 March 2022.

[79] This is not the case for FFA member based longliners. There are high seas longliners (mainly distant water fishing nations) who rarely come to FFA ports. Then there are

may be at sea for more than six months, meaning there's no opportunities to monitor them, unlike while in port. When the fishing is "in-zone", the islands can make the rules as a term of licence. But it's much harder for the high seas, so the risks are higher.[80] The island countries still don't have as much control over the longline fleet.[81] By comparison with the purse seine fleet, longlining is less well managed, with transhipment issues as well as labour standards concerns and misreporting (see below).[82]

High seas

It's the WCPFC that has responsibility for the high seas. But its governance ability is frustrated by the distant water fishing members who "drag the chain" or block measures when it comes to strong MCS measures. As seen in other RFMOs, it's the governance in high seas by distant water fishing nations who defer anything which impacts their economic interests in the area of the commons that has led to the demise of many stocks. Measures applied in the high seas should see an equal burden carried by all states. The Pacific is unique in that most fishing is in-zone and the island nations thus take the disproportionate burden of conservation in-zone for the broader RFMO.

Covid and observers

Observers play very important role in MCS in the region. Observers are under national programs, trained to Pacific Islands Regional Fisheries Organisation standards by SPC.[83] They operate under national programs with endorsement to operate PNA wide or work under PNA observer agency for FSM Arrangement boats,[84] or US tuna treaty or the WCPFC regional observer program.

Covid has had an impact on MCS efforts including placing observers on boats or freely move around the region as before. Whilst some coverage has been maintained throughout there's been a real lack of data which has IUU implications and limits the data for science, although levels are still above that seen in other RFMOs. Since April 2020 observers were mostly suspended on purse seine vessels and carrier fleets. Prior to this there was, as noted above,

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domestic and domestically based foreign longliners who are based in FFA member ports. For an outline of the different fleets and catches see https://www.wcpfc.int/ace-by-fleet

[80] There are locally based domestic longline fleets that some island countries are developing. Truly domestic fleets help grow the economic benefits and employment opportunities from the longline sector. However, Covid has seriously impacted these fleets through loss of air freight and access to overseas premium markets.

[81] There is a WCPFC requirement for compatibility of measures between in-zone and adjacent high seas and FFA is seeking better implementation of this obligation.

[82] New Zealand and Indonesia are leading a working group in WCPFC on conservation and management measures for minimum labour standards on fishing vessels.

[83] https://www.pirfo.org

[84] The FSM Arrangement is a mechanism for domestic vessels of the PNA to access the fishing resources of other parties. It was signed on the 30 Nov 1994 and came into force on the 23 Sep 1995.

100% observer coverage on the purse seine fleet. PNA parties are starting to resume observer placements subject to vaccinations, Covid tests and single port operations.

A challenge now is providing refresher training and upgraders and getting observers back to sea. It's expected this will take time for various reasons include observers leaving the profession, Covid restrictions and lack of inter-island air services, so PNA are working on a phased approach as services are reinstated.

Transhipment and labour standards

Transhipment is a problem for the longline sector, but not the purse seiners. This is a practice in which harvested fish are transferred directly from the catching vessel to another refrigerated carrier vessel to be delivered to processors.[85] Transhipment poses concerns for monitoring and controlling of fishing vessels. It can allow fishers to obscure the origin of catches sent on to port or market states although most processing states require evidence of IUU compliance.[86] Carrier boats and tankers are also on the PNA registry, have VMS and are licenced at national level. Whilst purse seiners tend to be zone-based and tranship in designated ports, longliners tend to tranship at sea, typically in high seas pockets and other high seas areas as permitted by the WCPFC.

Transhipment at sea by longliners has also been implicated as a factor contributing to labour abuses on board catching vessels. As the region wants more islanders working on boats, labour standards are a concern in the longline sector. Islanders want to know that it's a safe environment on board. The safety of crew and observers will need more focus. As IUU vessels engage in risky behaviour, it's more likely they'll be involved in labour abuse. The FAO is currently examining this issue and FFA is working towards some binding measures around crew safety and welfare.

In the longline sector, even though WPFC requires data notification when a vessel tranships at sea, it is rarely complied with. For the purse seine fishery transhipping is only permitted to take place in port or designated areas adjacent to port[87] which facilitates access for inspections. This is a problem for the region: it's a way of getting IUU fish into the market.

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[85] MRAG, *WCPO Transhipment Business Ecosystem Study*, October 2019. see also "Initial analysis of transhipment data held by the WCPFC", *Technical and Compliance Committee Report WCPFC-TCC15-2019-13,* 17 September 2019, Pohnpei, Federated States of Micronesia. Well-regulated transhipment is an essential part of the supply chain. Prior to Covid there was 100% observer coverage on carriers. But there were problems getting observer data to the WCPFC. With Covid there is very limited observer coverage, so the risks are even higher.

[86] Transhipment is authorised in port with appropriate monitoring but is heavily restricted/prohibited at sea. Authorised transhipment from purse seine vessels occurs in ports. The purse seine sector's current viability relies on being able to efficiently transfer catch to larger carrier vessels that take the fish to canneries.

[87] Due to the risks of Covid transmission, the requirement for in port transhipment was suspended by the WCPFC in 2020 and 2021, though Pacific island countries are transitioning back to full port access as of late 2021.

There's actually a requirement for 100% observer coverage on all carrier transhipping at sea. But there aren't observers on boats and no data is being provided by them to the WCPFC, so there's no way to validate what the carrier and longliner are reporting.

Aerial surveillance

There are operational gaps in the lack of maritime patrolling by several island states, especially in remote island areas. Air surveillance of remote areas, EEZs and adjacent areas of the high seas is conducted only on a limited basis. The island countries themselves, don't have dedicated aerial surveillance capability (although PNG does). FFA now has a dedicated aircraft to support FFA members.[88]

4. Fixing the gaps

When it comes to responding to IUU, the Pacific has largely picked off all the "low hanging fruit" in terms of enforcement. But there are several measures that can be taken to close some of the gaps, including implementing electronic reporting and electronic monitoring especially for longliners. It should also be implemented for purse seine fishers to compliment physical observers, not replace them. Responsible NGOs can play a useful role in mounting campaigns around the IUU issue in the region. Moves by retailers for greater traceability of catch can be useful.

Electronic monitoring

Electronic monitoring has a big future role to play in the WCPFC, especially in the longline sector. This includes cameras on board fishing vessels in the region and this will happen over time. Electronic reporting would strengthen providing logbook data in real time. Currently this is only standard in the PNA purse seine fishery. Some of the longliners are at sea for eight months (some can stay at sea for two years because they are supported by carriers). E-reporting would see daily information coming in and so allow desk top auditing. This would really strengthen the regional reporting regime.

Countries such as Fiji, FSM, RMI, Solomon Islands and PNG have already begun to develop electronic monitoring capacity, but it's not been rolled at yet at the regional level. FIMS Inc is working on more affordable electronic monitoring systems with machine learning and AI to develop the capacity. The biggest issues here are cost and data collection from hard drives. Regional adoption is important as countries could be "picked off" if longliners move to other zones where it's not compulsory.

The issue of how to re-deploy observers safely is now a big issue in the Pacific. Regional bodies are trying to fast track electronic monitoring on fishing vessels where they can't get observers onboard. As noted, some islands are already experimenting with e-monitoring. But the fear is if the islands do it for domestic fleets it'll make them less competitive. There'll be a need to apply these technologies in the high seas.

[88] https://ffa.int/node/2169

FFA has developed a policy for e-monitoring systems across FFA waters that can detect when transhipment events occur.[89] This is independent of the PNA FIMS work where vessel to vessel or vessel to Fish Aggregating Device (FAD) proximity alerts operate. The scope of the policy includes the high seas. However, getting any approach applied in the high seas will require WCPFC agreement.

If such electronic monitoring, cameras and sensors on vessels were made mandatory across the region there'd be economies of scale and provide greater competition by service providers. Electronic monitoring systems can send data to a satellite that gets sent to a data centre in an island country but that has high costs. So there's work on packaging data and other transfer media such as WIFI and the potential to reduce additional costs. There's a working group of WCPFC, led by the US and Vanuatu, trying to get better data outcomes through electronic reporting and forming a central data base to improve transhipment reporting.

Catch Documentation

For carrier transhipment for longliners, there's a need for better coordination. Moves towards catch documentation schemes is one effective option. Such a scheme has worked well, for example, in the southern bluefin tuna managed by the Commission for the Conservation of Southern Bluefin Tuna (CCSBT). The CDS provides for tracking and validation of legitimate southern bluefin tuna product flow from catch to the point of first sale on domestic or export markets. The CDS requires fishers to attach uniquely numbered tags to southern bluefin tuna at the time of kill. Upon landing, the licensed fish receivers records the tag number and various information on CCSBT catch tagging and monitoring forms.

It's also worked in PNA nations with EU accreditation. FFA have been working on a catch documentation scheme for some years. There is also more that can be done on regional catch and traceability: markets are requiring transparency along the value chain, not just assurances about the legality of the catch. [90] PNG has developed a sophisticated Catch Documentation Scheme for EU markets. A development underway in Solomon Islands is also promising (see box).

Noro e-port

Plans are in place to have the port at Noro in Solomon Islands, which will be known as an e-port, conduct a pilot of digital catch documentation scheme. The port of Noro is the

[89] FFA *Regional longline electronic monitoring policy,* June 2020. Fiji has 50 vessels with electronic monitoring systems. Australia has sensors on its longline fleet.
[90] One company (*Pacifical*), a PNA joint venture enterprise, has run block chain and net-to-plate traceability in the PNA freeschool skipjack and yellow fin Marine Stewardship Council certification as a world first. https://www.pacifical.com/officially-recertified-pna-free-school-skipjack-yellowfin-fishery/

only one in the region with all three types of fleets: purse seine, pole-and-line, and longline. It exports regionally and internationally.

The Noro e-port will be able to test the integration of electronic tools available into a pilot in a port-based context. It's the starting point for a catch documentation scheme. The e-port will see the digital integration of all port monitoring, compliance and surveillance related activities. The data to be integrated will include the requirements of the WCPFC port state measures, unloading data, factory weigh-in, and processed volumes leaving Noro.

Longline fishery

There's a need for better transparency in the longline fishery to respond to problem of unreported fishing. And there's a need to leverage common standards and use those standards for the WCPFC to lift the standards from EEZs to the high seas. The aim here would be to transition the longline fleet to a zone-based approach where the coastal state manages resources, as opposed to flag state management where a flag state has a fisheries allocation. But that's a long-term challenge given the scale of the fishery and the interests of flag states. PNA, FFA and the WCPFC are looking at machine learning, AI and satellite imagery for stronger MCS when it comes to vessel movements and in analysing video. With the longline fleet, the challenge will be persuading fishing vessel owners to adopt these technologies as they go from zone to zone or the high seas.

National inter-agency cooperation and information security

Inter-agency cooperation at the national level on MCS and fisheries compliance can be improved. In some islands, it's Defence that's responsible for patrols but with a low budget priority and fisheries agencies for compliance. There's not always good information sharing at the national level. In some cases, island navies and police have fractured relations with fisheries agencies, although in some islands it's working very well. In some island states fisheries sponsor the patrols to get an effective response.

Some islands have been sensitive about information sharing with other states when it comes to implementing the Niue Treaty Subsidiary Agreement (NTSA), with some countries (Fiji, Kiribati and PNG) seemingly reluctant to participate [91] The FFA gets the full picture from NTSA and the islands are supposed share information on what's happening in their EEZs. But they don't always share, even though MCS data sharing between FFA members is extremely high.

[91] The NTSA is an agreement on cooperation between FFA members about MCS. It includes provisions on exchange of fisheries data and information and procedures for cooperation in monitoring, prosecuting and penalising operators of IUU fishing vessels. With 13 ratified countries, those data sets are flowing through the regional information management system.

Each island state must have good information security at home. It's absence sometimes limits sharing. As fisheries sometimes contribute up 70% of government revenue island governments will naturally be protective of information. Within the PNA, however, there's full data sharing and in 2021 a revised MOU brought in the remaining parties. The Information Security Management System has been developed and updated by the FFA to account for members concerns and ensure their data is secure and protected. Information security, even if good, is an area that requires dedicated and constant attention as information security risks are as dynamic as IUU fishing.

In the longer term, interagency operations centres within the islands will need to be developed. Some states, such as Fiji and FSM, have already established national surveillance centres to break down silos between fisheries, customs, immigration and police. Capacity will always be key challenge: some fisheries administrations only have a handful of people. If you've only got one inspection officer it's hard to measure fish quantity. The new Pacific Fusion Centre in Vanuatu should over time assist in building analytic capability at a strategic level. But it's not designed to assist directly with MCS operations.

Aerial surveillance

There's room for improvement in aerial surveillance. FFA operationally manages regional aerial surveillance assets for its members. It coordinates and allocates aerial capacity in response to requests from countries. Countries provide clearances. But the operations are often well known by industry in advance, thus limiting their effectiveness.

5. Bringing the oceans together

The key lesson from the Pacific for the Indian Ocean Region (IOR) on combatting IUU fishing is clear: you can multiply MCS effectiveness through regional cooperation of coastal states. The fact that most of the islands have surveillance asset(s) with patrol boats to contribute towards regional operations helps to see the real benefits of regional cooperation that lends itself to information sharing.

Stronger together

The Pacific islands have a much stronger sense of shared identity and shared fisheries interests than exists in the IOR currently, where distant water fishing nations dominate that space. But there's a huge opportunity for the IOR to learn from the Pacific on combatting IUU and how to develop consensus in the face of powerful distant water fishing interests. The Pacific can send the message to the Indian Ocean coastal states that when it comes to developing an integrated approach to IUU, sustainable management and economic participation "As a region, you're stronger together".

Vessel monitoring systems

It's very important to monitor vessels in the IOR. There's a significant opportunity for Pacific information exchange with organisations like IORA and IOTC on vessel monitoring systems

and data information sharing standards in which the FFA and PNA have expertise and tools. With EM observers also have a role in validating and calibrating the systems: neither observers or EM are found to be 100% accurate.

The Pacific is now moving forward on electronic monitoring systems used to complement and enhance observers and standards for electronic monitoring. This provides a unique area for information exchange.[92]

The importance of sharing commercially sensitive data in tackling IUU and social accountability is a strategic conversation that the Pacific region could have with Indian Ocean states. In the IOTC, for example, there's no automatic sharing of VMS: the IOTC VMS is a completely "decentralised" system, rather than port to port. It doesn't require, facilitate or even encourage any degree of routine data sharing amongst Commission members or with the IOTC Secretariat. There's a huge opportunity for the IOR to learn from the Pacific on this issue, [93] especially from the RFSC in Honiara.

Within the IOTC there is a VMS Working Group working to provide advice to the Compliance Committee and Commission on improved standards for VMS which may include a fisheries monitoring role for the IOTC Secretariat. PNA, FIMs Inc or FFA might even, for example, be a service provider for MCS training workshops or as a VMS service provider for some of the smaller island states in the IOR.[94] As noted, IOTC VMS data isn't aggregated: this could lead to exploring options for a fisheries monitoring centre in the Indian Ocean.

Observers

The IOR could learn much from FFA about capacity building around MCS and standardised observer training of independent observers at national level: it's much less developed in the IOR than the Pacific. Indeed, information exchange on MCS tools has many opportunities in the Indian Ocean. The IOR could learn from Pacific observer programs. In the IOR there's industry funded observers with some questions over credibility and their independence. In the Pacific, observers, while there's some industry cost recovery at a national level, are under national programs and work regionally or under PNA observer agency, FFA, or WCPFC and the regional observer program. All are trained and report to a single standard. The Indian Ocean could look to the Pacific Island Pacific Islands Regional Fisheries Observers program to train and qualify observers and possibly adopt their work books in the Indian Ocean.

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[92] H Murua, F Fiorellato, J Ruiz, E Chassot, V Restrepo, *Minimum standards for designing and implementing electronic monitoring systems in Indian Ocean tuna fisheries*, IOTC report, November 2020. For overview of IOTC see H, Sinan, et.al, "Disentangling politics in the Indian Ocean Tuna Commission" *Marine Policy* September 2021

[93] There is intersessional work being done in IOTC to consider ways to enhance VMS, including establishing a requirement for the automatic sharing of data. The same is true in SIOFA.

[94] The Indian Ocean Commission does have some cooperation on VMS. *Indian Ocean Commission's Regional Fisheries and Aquaculture Strategy 2025-2025*

MCS tools

Information on MCS tools would be useful in areas such as MARPOL compliance, safety standards, fishing gear compliance, phytosanitary standards, and other inspections, (the IOTC has a record of vessels provided by the flag state), VMS and logbooks. This is a much more manageable agenda than trying to settle the enormously difficult allocation issues of fisheries resources in the Indian Ocean that are critical from a fisheries management perspective.

Group of 16

The so-called Group of 16 Like-Minded Coastal States of the Indian Ocean Tuna Commission (G16) is the closest group in the Indian Ocean to an FFA type body.[95] The Group of 16 excludes extra-regional fishers such as the UK, Spain, and France. The G16 could take up the IUU issue as a major challenge and build capacity and trust among its members through engagement with FFA and PNA.

Data reporting

In the Indian Ocean, there's a lot of overlap in the limited reporting, for example with some species within IOTC and the Southern Indian Ocean Fisheries Agreement.[96] CCAMLR joins the SIOFA region. Reporting data can now go to three different entities. There are opportunities in the IOR to collaborate with the Pacific, potentially assisting on options to establish one central management of reporting data, although it would be really difficult to get agreement, considering the IOTC has 30 members. Indian Ocean RFMOs are much less developed than Pacific ones and there's far less data collected than in the Pacific.[97] Hosting arrangements for a more centralised VMS, if agreed by RFMOs, is another opportunity for collaboration. Better data security and cost efficiencies may also be achieved through the central management of data.

Information exchange between Pacific and IO

Some early steps have been taken to share information between MCS personnel in the two regions. There's a tuna RFMO MCS network where Pacific MCS officers interact with those at IOTC.[98] There's an IUU vessel list in IOTC with consequent cross-listing procedures with

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[95] https://io-g16.org see generally H, Sinan, et al "Disentangling politics in the Indian Ocean Tuna Commission" *Marine Policy* September 2021 H, Sinan, et al "Disentangling politics in the Indian Ocean Tuna Commission" *Marine Policy* September 2021. The authors note the G16 is a platform to develop proposals, create a shared understanding of the proposals, and discuss ideas on developing coastal states' positions. In 2019 63% of conservation and management measure proposals in IOTC came from G16 members.

[96] SIOFA addresses the unregulated fishing of shared and straddling stocks, such as orange roughy, in the high seas of the southern Indian Ocean.

[97] Anthony Bergin, "Australia's approach to Indian Ocean fisheries: towards a closer regional engagement" *Journal of the Indian Ocean Region* August 2017

[98] The International Monitoring, Control and Surveillance Network helps to facilitate this.

WCPFC. This gives a better understanding of different controls in the Indian Ocean and the Pacific. There's been some "south-south" exchanges between PNA/FFA and IOTC around IUU and development issues. Senior PNA and FFA staff have exchanged views with Africa coastal states on MCS issues. But the IOR could benefit from greater interaction with the FFA and PNA on the development harmonised minimum terms and conditions for fisheries access to coastal states EEZs that help to prevent one island country being played off against another by major fishing states.

Managing transhipment is a big issue in the Indian Ocean: information exchange with the Pacific on transhipment observer programs would be useful. The IOR can learn from the Pacific on IUU in terms of strategy development, MCS tools and putting in place arrangements and/or relevant treaties to enhance cooperation and capability.

IORA's role

More could be done to encourage information exchange between the Indian Ocean Rim Association (IORA), IOTC, the Indian Ocean Commission and Pacific RFMOs (PNA, FFA, WCPFC). Fisheries have been a priority of IORA since 2017. An IORA core group on fisheries management has recently been formed, under Indonesian leadership, to focus on fisheries and aquaculture data management in the IOR. The group will cooperate with IORA's Fisheries Support Unit in Oman. There's also IORA working groups on the blue economy and maritime security and safety that overlaps with fisheries management. IORA should interact more with Pacific RFMOs on information exchanges around the IUU issue.

Port state measures

The IOR doesn't have a PNA or an FFA, and much more of the fishery takes place in the high seas, not in EEZs: for that reason it's much harder for IOR states to take control of their fishery. But IOR coastal states have port state control, a complicated MCS tool[99] and could develop minimum terms and conditions to influence and unite their positions over what

[99] The FAO agreement on Port State Measures lays down a minimum set of standard measures for Parties to apply when foreign fishing vessels seek entry into their ports or while they are in their ports. 15 out of 23 IORA members are parties to the agreement. All IORA members except Comoros receive foreign fishing vessels to their ports.

happens beyond 200 miles, thus leverage influence regionally. The role of port state measures is another area for useful cross-ocean information exchange.[100]

Independent science

Unlike in the Pacific, IOTC doesn't have single independent provider of fisheries science.[101] The Pacific has been fortunate to have that independent science capability through the FAME at the SPC. SPC, PNA and FFA have helped the island states understand the science. Its members have trusted the independence of science from the SPC's FAME program. IOTC science input is, however, mainly provided at the national level or distant water fishing nations interests, such as the EU or industry initiatives, which are potentially biased. There are opportunities in the IOR to look at the Pacific model of independent science input,[102] as well as the potential to contract SPC science for analysis.

Quantification study

The IOR could benefit from a quantification study along the lines of MRAG's study for FFA to ensure the scope of the problem is clear. It would provide an incentive and data for IOR coastal states to work together on the IUU problem.

Role of NGOs

There's a useful role for NGOs in the IOR, such as Global Fishing Watch. Fish-I Africa is starting to form the basis of an FFA type body; it's not too formal and it's providing the template to build up regional capacity in the western Indian Ocean.[103] The Stop Illegal

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[100] The third meeting of parties to the port state measures agreement was in May and June 2021 http://www.fao.org/port-state-measures/meetings/meetings-parties/en/ The IOTC adopted resolution 16/11 on port state measures in 2016 and CMM 05/03 in 2005 on the establishment of an IOTC Program of Inspection in Port. IOTC has undertaken legal training and capacity building on port state control over recent years. It has also developed an e-PSM application to implement port state measures. https://www.iotc.org/compliance/port-state-measures In September 2021 IORA hosted a webinar on combatting IUU fishing, especially through the port state measures agreement, in the IORA region. https://www.iora.int/en/events-media-news/events/priorities-focus-areas/fisheries-management/2021/iora-afdcsiro-webinar-combatting-illegal-unreported-and-unregulated-fishing-and-especially-through-psma-application-in-the-iora-region

[101] Three groups of scientists have been involved in IOTC science meetings: member scientists, NGO scientists, and outside experts.

[102] One recent study of IOTC found that only half of the member respondents consulted with scientists prior to decision-making processes. The lack of engagement with scientists was found to be due to a lack of scientific capacity within the country. H Sinan, et. al, "Disentangling politics in the Indian Ocean Tuna Commission" *Marine Policy* September 2021

[103] *Fish-I Africa* is a partnership of eight east African countries: Comoros, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, Somalia and Tanzania. It brings together

Fishing group is working with African countries. These NGOs would benefit from interacting with Pacific RFMO's on the IUU issue.[104]

The IOR and the Pacific would benefit from closer cooperation in relation to global discussions on a multitude of topics including IUU in fora such as the FAO's Committee on Fisheries (COFI). But this all won't happen overnight. The best place to start in the IOR is building informal networks of trust amongst fisheries MCS officers across the region to build trust. It's probably easier for the IOR to cooperate on IUU than some of the thornier issues on fisheries management.

That's true even if at some much later point the region ends formalising its own coastal states group into a treaty arrangement like PNA or FFA. The G16 is currently informal but could potentially, or another separate group, be formed through formal treaty negotiations. Such a treaty of united coastal states would need be "home grown" and not influenced by donors, industry or industry funded NGO groups.

national enforcement authorities, regional organisations and international experts to combat illegal fishing in the western Indian Ocean.

[104] *Stop Illegal Fishing* is an independent, African based not for profit organisation.

Baseline Report 2 - Annex 1
Key bodies and arrangements for Pacific Island fisheries

Fisheries regulation in the Pacific is organised through a series of nested multilateral groupings that significantly enhance the leverage of coastal states vis a vis extra-regional states.

Parties to the Nauru Agreement (PNA)

The PNA is a grouping of 8 Pacific island countries (Federated States of Micronesia (FSM), Kiribati, Marshall Islands, Nauru, Palau, Papua New Guinea, Solomon Islands, Tuvalu and the territory of Tokelau) that together controls the world's largest tuna purse seine fishery, because it covers the waters under the national jurisdiction of the PNA members where most of the tuna is caught. PNA delivers 60-70% of WCPFC tuna. Up to 50% of global skipjack for canning dominate the purse serine fishery.

Territories of PNA members (indicated in yellow)

Decisions of the PNA are reached by consensus and implemented through "Implementing Arrangements" taken up in national laws. PNA is self-funded, not donor influenced.

The PNA has very successfully introduced a vessel-day scheme (VDS) that limits the number of fishing days within the entire PNA plus Tokelau region to a sustainable level creating scarcity.[105] Faced with Distant Water Fishing Nations (DWFNs) playing off states, PNA

[105] Vessels pay for a day to fish subject to length; vessels under 50m can fish 2 days for 1 VDS day; 50-80m can fish 1 for 1 and vessels over 80m must buy 1.5 to fish 1. This reflects the fishing capability of the vessel classes in the purse seine fishery.

introduced a minimum benchmark for a fishing day price and tender or auction off the days. This has increased the region's revenue from about $60m a year pre VDS to over $500 million a year (2019). Days are sold at national level, and there exist several pooling arrangements to get multiple zone access especially for the smaller EEZs. This has further enhanced returns. Domestic flagged vessels also enjoy regional multilateral access.

As a result of these measures, all the key tropical tuna stocks in PNA waters (and WCPFC) are healthy and are likely to remain healthy at current rates of exploitation.[106] PNA members now assert great control over their resources. They wield considerable influence as a bloc in wider regional forums, including closing certain high seas pockets for conservation as a term of in-zone access.

PNA nations each have a national observer program. The region maintains 100% observer coverage in purse seine either under the national programs or managed under the PNA observer agency regional program for the FSM Arrangement (domestic boats, US Treaty administered under FFA or the WCPFC Regional Observer Program).[107] Put together, the PNA nations have been able to successfully move allocation of their resources back from extra-regional flag states to the nine VDS island nations in the purse seine fishery (as noted above, Tokelau participates in the VDS).

The way the VDS scheme has now entrenched national rights for PNA parties over their own resources in the purse seine fishery has been recognised regionally and globally as a success and has significantly advanced the efforts of Pacific countries to strengthen the rights and interest of coastal states in the WCPFC. The PNA VDS system is a home-grown act of self-determination. It's not been donor funded or driven. The PNA is a shining example of cooperation.[108] Coupled with this success, the PNA's Fishery Information Management System (FIMS] has been a home-grown system and is "fit for purpose".[109]This platform is owned by PNA nations, but it is available for use by any management regime globally.[110]

Pacific Islands Forum Fisheries Agency (FFA)

The FFA is a regional grouping comprising 17 Pacific island states, including the PNA member states. The FFA includes PNA and non PNA states, with massive differences between

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[106] *The Western and Central Pacific Tuna Fishery: 2019 overview and status of stocks* December 2020, Tuna Fisheries Assessment Report No. 20, Pacific Community

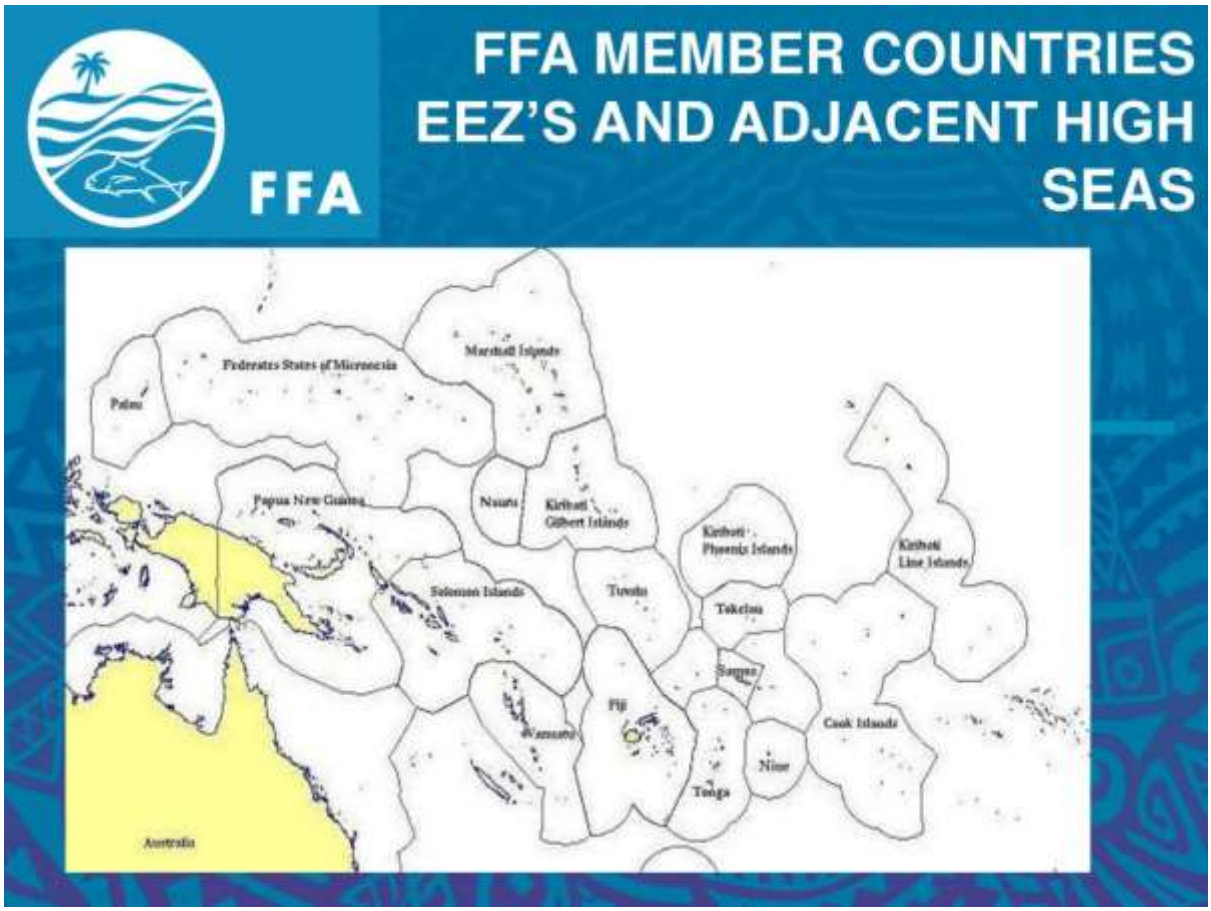
[107]https://www.pnatuna.com/sites/default/files/PNA%20FSMA%20Observer%20Programme%20-%202021%20Annual%20Booklet.pdf

[108] Transform Aqorau *Fishing for Success: Lessons in Pacific Regionalism*, ANU, 2020

[109] It allows many activities including online vessel register and licencing, asset management, e-logs, VMS, automated VDS, observer management and communications, Fad tracking and non-fishing day claims.

[110] Currently there are 3 clients for the PNA's platform in addition to the PNA: 1 in west Africa, PNA industry, PNG (domestic fisheries not covered by PNA) and individual PNA states for some modules such as customised licencing.

members in terms of relative economic reliance on fisheries. The FFA includes Australia and New Zealand. FFA role is about policy support. It is donor funded and there are around 100 staff.



The FFA secretariat ensures that members' interests are represented effectively in fisheries negotiations[111] and provides a range of technical services and advice at the national, regional and subregional levels.

Often purse seine fishing related agendas in PNA waters are escalated from the 8 PNA members to the FFA, who as a block then take it to WCPFC.

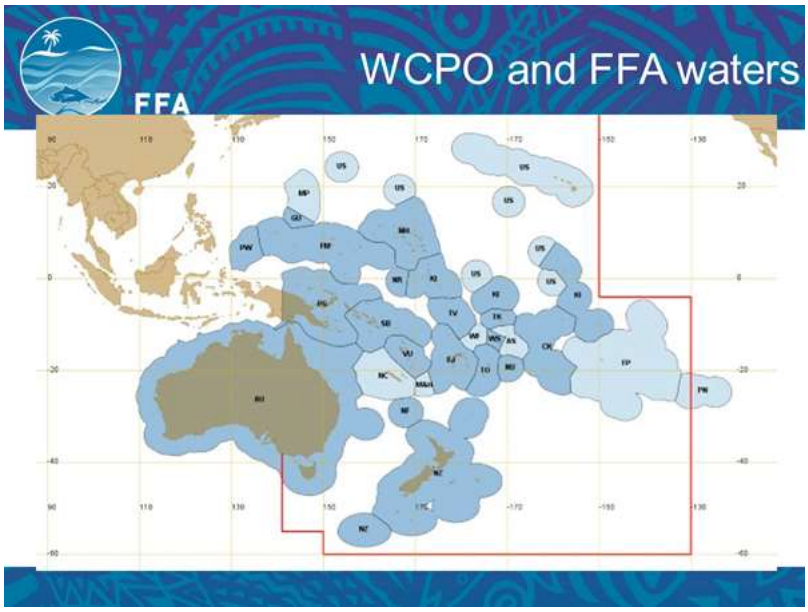
Western and Central Pacific Fisheries Commission (WCPFC)

The WCPFC is a regional fisheries management organisation (RFMO), whose members includes all key Distant Waters Fishing nations and Pacific Island coastal states (i.e. all members of the FFA, which includes all members of the PNA). Its decisions are binding on all members in all waters (including high seas) covered by the WCPFC.

The relative size of Pacific Island EEZs to high seas gives the Pacific Islands considerable leverage over activities that occur in the high seas. The WCPFC Convention area includes the EEZs of many of its members, including 15 Pacific island countries, New Zealand, part of

[111] FFA itself however does not sit at the table at WCPFC. FFA members do.

Australia and eight non-contiguous EEZs of the United States. The area's western and northern sides have no defined borders. A map showing FFA waters and boundaries of the WCPFC is below.



The WCPFC Secretariat offices are located in Pohnpei, FSM. All of the key Western and Central Pacific Ocean coastal and distant-water fishing states participate in this organisation. The Commission has a mandate to ensure the long-term conservation and sustainable use of the region's tropical tuna fisheries. WCPFC was an initiative of forum leaders to build upon the success of in zone management to have compatible management in adjacent high seas. It is a modern RFMO and it is the first to give recognition to Taiwan as a flag state through special status.[112]

The WCPFC has a remit over highly migratory stocks (including tuna, billfish and related species) throughout their range in both EEZs and high seas. The FFA and PNA continue to seek that the robust and effective management arrangements that have been established in their zones are reflected in the adoption of "compatible" measures in the WCPFC, including in strengthening management of the high seas.

WCPFC established a high seas inspection boarding scheme more than 10 years ago. It was the first one in an RFMO anywhere in the world. WCPFC currently has 26 members, seven participating territories and nine cooperating non-members. WCPFC has a range of MCS requirements and frameworks that are important in considering the Pacific's successes in combatting IUU fishing including a Regional Observer Program, a Commission VMS, IUU listing procedures and a High Seas Boarding and Inspection framework.

[112] K Amzi and Q Hanich, "Mapping interests in the tuna fisheries of the Western and Central Pacific Ocean" *Ocean and Coastal Management*, 212, 2021

Decisions at the WCPFC are typically taken by consensus. But there is provision for votes requiring both chambers (FFA and non-FFA) to support a decision by separate majority. This in effect gives FFA the power of veto should it be required.

Where measures are blocked at WCPFC level, then PNA and perhaps FFA have the power to implement measures unilaterally "in-zone" (i.e. within their EEZs) as most fishing effort is undertaken in-zone. The FFA/PNA can then demand compatibility in adjacent high seas and/or dictate high seas measures as a term of EEZ access (such as high seas pocket closures). In the purse seine fishery, at least, this leaves DWFNs purse fleets with a *fait accompli*: comply or don't fish.

South Pacific Regional Fisheries Management Organisation

The Convention on the Conservation and Management of High Seas Fishery Resources in the South Pacific Ocean (SPRFMO) entered into force on 24 August 2012. Its headquarters are in Wellington. The main commercial resources fished in the SPRFMO area are jack mackerel, scad and jumbo flying squid in the Southeast Pacific and, to a much lesser degree, deep-sea species often associated with seamounts in the southwest Pacific. Tuna aren't managed by SPRFMO. The original scope of the arrangement was relevant species in southern oceans but the convention area now extends to high seas 10 degrees north of the equator. The Convention has 15 members, including Australia (only two Pacific island countries, Vanuatu and Cook Islands) with three other nations cooperating non-contracting parties.

SPRFMO has a measure to strengthen actions taken against nationals involved in IUU fishing activities. It's established reporting and observer data collection requirements for transhipments of squid in the SPRFMO convention area. SPRFMO is considering a high seas boarding and inspection scheme. It currently relies on the UN Fish Stocks Agreement procedures and its considering SPRFMO specific procedures.

US Tuna Treaty

This agreement provides US tuna purse seine vessels access to fish in the waters of the Pacific island parties to the treaty. The Treaty is not a rule or standard-setting arrangement (like the WCPFC or the Nauru Agreement). However, the Treaty does include observer coverage and VMS requirements as a condition of access.

The Treaty has 17 parties and is administered by the FFA. In December 2016, the US and Pacific island parties signed a revised Treaty that includes the terms of fishing access for the US purse seine fleet to Pacific island waters through to 2022. The Treaty includes $21m US government support.[113]

[113] When the US Tuna Treaty operates in FFA waters it's managed under PNA VDS through FIMS.

Pacific Community (SPC)

SPC's Division of Fisheries Aquaculture and Marine Ecosystems (FAME) gives the island states and RFMO's the tools and information they need to make informed decisions on the management and development of their fisheries resources and the implementation of those decisions. The division runs oceanic and coastal fisheries programs provides world-class science on the health of fish stocks. SPC run the Pacific Islands Regional Fisheries Observer Program (PIRFO) and trains and certifies the fishery observers for vessels fishing under WCPFC.

Baseline Report 3

Ocean Science In The Blue Pacific: Regional Arrangements Among Pacific Island Countries

Dr Anthony Bergin
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Executive Summary

Below are the key findings for inter-regional cooperation between the Pacific and Indian Oceans in ocean science:

- ***Ocean science as a regional responsibility***: The Pacific islands provide important lessons for other regions in taking responsibility to advance ocean science through regional bodies. There are no bodies in the Indian Ocean undertaking work like the Pacific Community (in fisheries) or the South Pacific Regional Environmental Program (SPREP) (on biodiversity).

- ***Independent fish stock assessment***: The Indian Ocean region should look closely at Pacific models for ocean science cooperation. In particular IOTC fish stock assessment modelling is currently provided by members of the IOTC and not by an independent agency. There's a need in the Indian Ocean for a scoping study on the best model for fisheries science advice as a key driver for improved fisheries governance.

- ***Indian Ocean Expedition***: But the Pacific can also learn from the Indian Ocean experience. In the Pacific there's never been a coherent scientific examination of the ocean as is occurring in the Indian Ocean through the Second International Indian Ocean Expedition. IIOE-2 provides a strong basis for improved scientific knowledge transfer to regional governments in the Indian Ocean and enables capacity development opportunities in support of regional and early career scientists.

- ***Pacific Ocean Expedition***: The Pacific Community and the University of the South Pacific should work with the International Oceanographic Commission to develop a similar program. A Pacific Ocean Expedition would make for a powerful "branding exercise" for the Pacific framed under the UN Decade of Ocean Science. It would be a once in a generation ocean science initiative to have a lasting legacy aimed at improving livelihoods and sustaining the region's ocean environment.

The United Nations has proclaimed a *Decade of Ocean Science for Sustainable Development* (2021-2030) to support efforts to reverse the cycle of decline in ocean health. It aims to gather ocean stakeholders worldwide behind a common framework to ensure ocean science can fully support countries in creating improved conditions for sustainable development of the ocean.

Pacific leaders have identified the need to strengthen national capacities in ocean science. They've recognised the benefits to be derived from investing more in ocean science to support national and regional economic growth in ocean sectors. To deliver on the promise of the Blue Pacific, regional leaders have stressed the need for a healthy and sustainably managed ocean. And to do this they've emphasised the need for ocean science. This comes through clearly in the *Blue Pacific Ocean Report 2021* where the Pacific Islands Forum secretariat set out a baseline review of the Pacific island region's ocean policy environment and identified critical and emerging priority issues for regional ocean management.[114]

Island leaders have understood that ocean science can make a significant contribution to both governments and broader Pacific communities in responding to regional challenges such as sea level rise, acidification and ocean warming, the impact of plastics on marine biodiversity and human health, offshore fisheries through tuna management and inshore fisheries through the development of marine protected areas. Ocean science is seen by Pacific island states as providing the means where the island states can be good ocean stewards.[115]

Island leaders have emphasised that the ocean is at the heart of the region's ambition for sustainable development. Their vision is expressed through the "Blue Pacific" narrative based on recognising the islands shared ocean identity, geography and resources.[116] In their ocean statement in 2021 Pacific leaders stated that they'll be guided by a new *2050 Strategy for the Blue Pacific Continent*[117] in order to protect people, place and prospects of the *Blue Pacific*.[118] This new strategy will reinforce the prioritisation of ocean and climate change considerations into all regional and national policies and plans, both public and private. In their ocean statement Pacific island leaders also committed to responsibly and effectively manage 100% of the Blue Pacific Ocean within and beyond national jurisdiction "based on the best available scientific information and traditional knowledge".[119]

The islands, while small, have huge ocean areas. That makes them large ocean states. Ocean and climate inter-connections create overlap across their respective interests, both geographically and thematically. That is why the islands prefer to badge themselves under the narrative of the Blue Pacific: the oceans are a lifeblood for many of their resources and marine based tourism. They rely on key regional bodies (see below) to deliver ocean science to inform policy.

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[114] Office of the Pacific Ocean Commissioner, Blue Pacific Ocean Report 2021, p126 https://opocbluepacific.net/publications/#blue-pacific-ocean-report

[115] *Pacific Community: Ocean science fundamental for sustainable development* https://en.unesco.org/news/pacific-community-ocean-science-fundamental-sustainable-development

[116] *The 2050 Strategy for the Blue Pacific Continent*, Pacific Islands Forum, https://www.forumsec.org/2050strategy/

[117] https://tinyurl.com/y5fu5uey

[118] https://www.forumsec.org/2050strategy/

[119] https://www.forumsec.org/2021/03/22/pacific-islands-forum-leaders-ocean-statement-2020-21/

Ocean science is broad. It encompasses natural and social science disciplines and includes the science-policy and science-innovation interfaces and includes marine technology. The UN Decade of Ocean Science for Sustainable Development is seen as a golden opportunity by Pacific island countries. It's focused on six key outcomes: a clean ocean, a healthy and resilient ocean, a predicted ocean, a safe ocean, a sustainably harvested and productive ocean, and a transparent and accessible ocean. It has a cross-cutting theme of knowledge transfer through ocean literacy, and related education and capacity development.[120] This isn't about "pure science." Rather, it's focused on sustainable development: the region has a core interest in ensuring ocean sciences are at the service of the region's sustainable development.

In 2021 Pacific leaders committed to the objective of building national capacities to enable countries to manage their own development. Ocean science is critical to achieving that goal:[121] the Pacific Ocean is considered by many researchers as the least investigated, researched and understood ocean, despite increased international interest.[122]

This Baseline Report #3 contains the following sections:

1. Framework
2. Problems
3. What's working well
4. Fixing the gaps
5. Bringing the Oceans together

1. Framework

The Pacific island countries have a relatively well organised framework for regional multilateral cooperation in marine science. This is largely based around:

- Council of Regional Organisations in the Pacific (CROP), which has a coordinating role
- the Pacific Community (SPC), a regional multilateral organisation
- South Pacific Regional Environment Program (SPREP), an intergovernmental organisation; and
- the University of the South Pacific, a regional university.

In contrast with these regional bodies, there is very little national-based marine research among Pacific island countries.

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[120] https://oceandecade.org see generally, A Polejack et.al, "The importance of ocean science diplomacy for ocean affairs, global sustainability and the UN Decade of ocean science" *Frontiers of Marine Science* March 2021

[121] Fifty first Pacific Islands Forum communique 6 August 2021 https://www.forumsec.org/2021/08/11/communique/ PIF Special Leasers' Retreat 3 February 2021 https://www.dfat.gov.au/sites/default/files/forum-communique-pacific-islands-forum-special-leaders-retreat-3-february-2021.pdf

[122] Office of the Pacific Ocean Commissioner, *Blue Pacific Ocean Report 2021*, p126 https://opocbluepacific.net/publications/#blue-pacific-ocean-report

Council of Regional Organisations in the Pacific: The Council of Regional Organisations in the Pacific (CROP) comprises the heads of regional organisations in the region, including the key regional organisations that contribute to ocean science. CROP has established the Marine Sector Working Group (MSWG) to provide effective and coordinated advice and support to Pacific island countries ocean interests that relate to sustainable development.

Pacific Community: The SPC is the main scientific and technical organisation for the region supporting ocean science. It is a regional multilateral organisation with 26 members: 22 Pacific island countries and territories, which were all previously territories or protectorates of the original founding members of the SPC, along with the larger states of Australia, France, New Zealand and the United States. It has around 650 staff and a budget of around 80 million euros. SPC's focus is on development, environment, climate and ocean science. It provides scientific and technical services across the ocean sector. This has principally been built on the Oceans and Maritime Program (OMP), based in Suva and the Division of Fisheries, Aquaculture and Marine Ecosystems (FAME) Division in Noumea. The organisation is financially supported through a combination of membership fees and donor funding. Its main funding partners include Australia, EU, New Zealand, France and the United States. In November 2020 Australia agreed to provide A$42.5 million in core funding to the SPC over the next 3 years to support the renewed 10-year strategic partnership (2014-2023) between Australia and SPC.

FAME provides specialist expertise and technical assistance to support fisheries management in the Pacific. It's composed of the Oceanic Fisheries Program and the Coastal Fisheries Program. The Oceanic Fisheries Program functions as SPC's regional centre for tuna fisheries and ecosystem research, fishery monitoring, stock assessment and data management. The Coastal Fisheries Program provides practical scientific, policy and technical support on all aspects of coastal fisheries, aquaculture and nearshore livelihoods.

Recently SPC established the Pacific Community Centre for Ocean Science (PCCOS)[123] with a mandate is to ensure the island countries are able to access ocean science data and information. PCCOS brings together SPC staff in fisheries, geoscience, agriculture, as well as regional and international partners and private sector maritime players to better manage ocean space together (see figure 1).

[123] https://www.spc.int/pccos

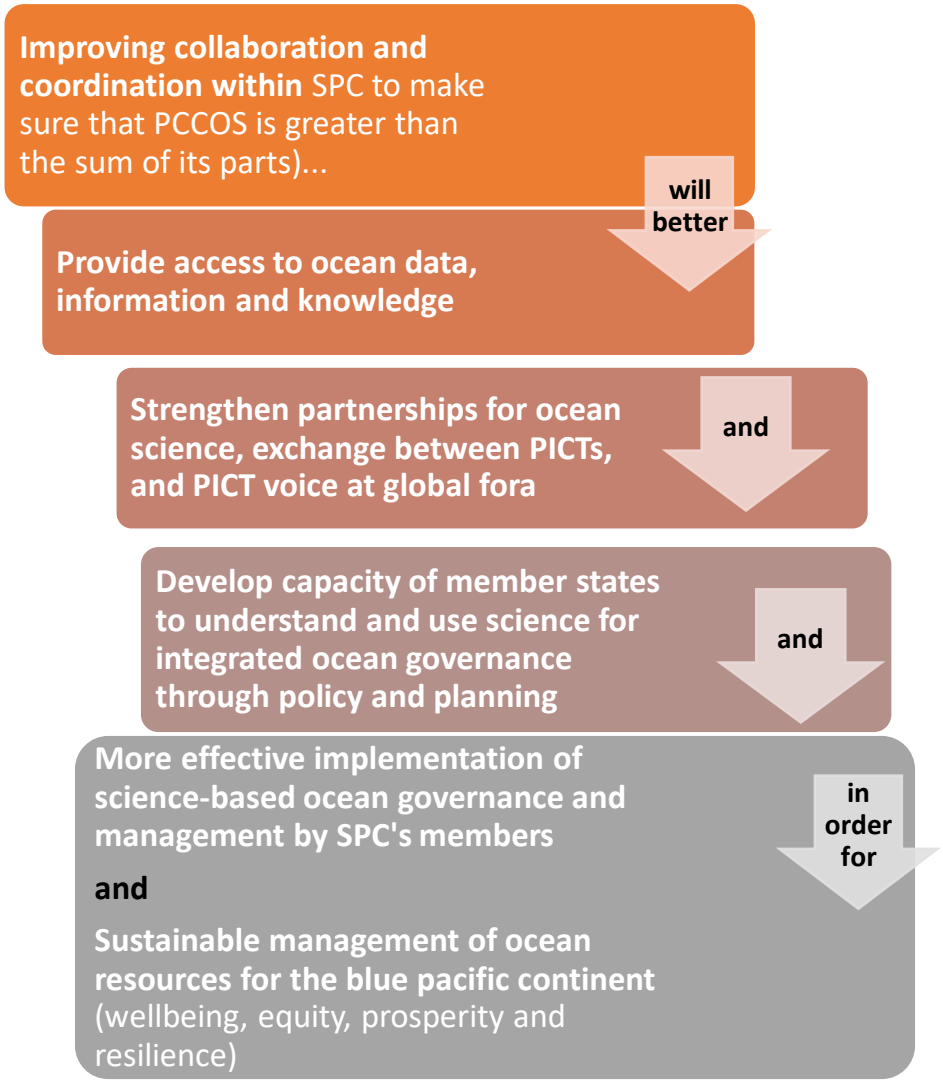

Figure 1: SPC and PCCOS collaboration

PCCOS focus is on adding value to existing SPC ocean science capability by strengthening information assimilation and dissemination and improving ocean science data discoverability and accessibility. It can contribute scientific support to the Council of Regional Organisations in the Pacific under regional mechanisms. It provides scientific support to the Office of the Pacific Ocean Commissioner hosted by the Pacific Islands Forum Secretariat by coordinating ocean science in the region. PCCOS, at this point, only has four full time staff, so in that sense it's a "virtual" centre. But the Pacific Data Hub[124] and ocean

[124] In 2018 SPC pooled resources across several different web portal projects to develop a platform to meet the needs of SPC divisions and all Pacific data producers and users. It was created with the aim of establishing a sustainable data infrastructure to catalogue Pacific datasets, improve data management and policy, and encourage informed decision making using this data. https://pacificdata.org

portal[125] offer an indication of the potential for PCCOS, showing promising collaboration between regional bodies.[126]

The key challenge for PCCOS will be to demonstrate that it can facilitate inter-divisional collaboration across ocean science at SPC, leverage new resources and partnerships and provide a focal point for cross-sectoral and mutually beneficial multi-national ocean science information dissemination for SPC, the island countries and partners.

South Pacific Regional Environment Program: The Secretariat of the South Pacific Regional Environment Program (SPREP), an intergovernmental organisation based in Samoa, has around 80-100 staff. Its budget in 2021 was US$30 million. Australia is the largest provider of core funding to SPREP ($4.3 million per year) but it receives funding from a wide range of states and organisations.[127] SPREP doesn't generally conduct ocean science research per se. Rather SPREP is involved in managing and funding external "ocean research" projects. But SPREP does undertake training for SPREP member-country scientists for capacity building.

SPREP is the regional point of contact for the UNESCO IOC linked Pacific regional alliance for the Global Ocean Observing System, which has a geographically linked mandate with the US PacIOOS based in Hawaii. PI-GOOS (Pacific Islands Global Ocean Observing System) is a long-term sustained scientific cooperation program between SPREP, US, Australia, New Zealand and other Pacific Community constituents to monitor the Pacific Ocean as part of the Global Ocean Observing system. The alliance was established in 2005 and has been sponsored and supported through the auspices of the UNESCO IOC Perth Office.

SPREP hosts the Pacific Climate Change Centre (PCCC). The PCCC is a regional centre of excellence for climate change information, research and innovation. It's a partnership between Japan and Samoa. The PCCC aims to deliver capacity development program in adaptation, mitigation, climate services and project development. It promotes and fosters applied research in these areas.[128]

SPREP's main work is mainly focused on environment conservation and biodiversity, climate change and meteorology, and waste management. Members of environment agencies make up its governing body.[129] If the focus is on the environment, climate change and science, it's SPREP, rather than SPC, that takes the lead.

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[125] This website provides ocean data relevant to a range of sectors and applications such as tourism, fishing, shipping, coastal inundation, and environmental management. The portal serves up data from a variety of sources including near real-time observations, historical information and forecast data. http://oceanportal.spc.int/portal/ocean.html

[126] For full list of regional and international data portals see Office of the Pacific Ocean Commissioner, Blue Pacific Ocean Report 2021 Annex 9

[127] https://www.sprep.org/sites/default/files/30-SPREP-Meeting/Officials/Eng/WP_9.2_Att.1.rev_.1-PIP3_2022.2023_WPB_29.07.2021.pdf

[128] https://www.sprep.org/pacific-climate-change-centre

[129] This contrasts with SPC that covers many areas. SPC's governing body members are made up of heads of government and Foreign Affairs departments or representatives from science agencies, education and health bodies.

University of the South Pacific: The University of the South Pacific is a regional university jointly, based in Fiji, owned by 12 Pacific governments: Cook Islands, Fiji, Kiribati, Marshall Islands, Nauru, Niue, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu and Samoa. It is a regional hub for international ocean research, especially on ocean management and climate change. The Marine Studies division of the university collaborates with external partners and organises marine education and training. USP's marine studies program relies on foreign donors and funding from USP member countries.

2. Problems

The main challenges hindering the Pacific islands participation in, and fully benefiting from, ocean science research range from a lack of research infrastructure, limited education opportunities, funding and multi-disciplinary integrating frameworks. Most island countries haven't developed national ocean science strategies, although there's now a number of national ocean policies that have been produced in the region.

The financial and technological requirements of undertaking ocean science research is generally beyond the capacity of the island countries alone: they lack offshore ocean research vessels, sampling equipment and have limited onshore laboratory equipment. Conducting ocean science isn't cheap and coordinating required efforts across individuals, institutions and countries (from within and outside of the region) is complicated and almost an art in itself.

There's only one oceanographer in the region to be found working for a national government (who works for the meteorology services in Solomon Islands), and no national oceanographic centres. Most island states have only a handful of people with ocean science backgrounds in their key maritime agencies. The Palau International Coral Reef Center may be the only national marine research facility in the region.

The islands are reliant upon foreign research vessels, (most of the USP countries don't have ocean research vessels) and depend on foreign expertise for much of their ocean science requirements, particularly from Australia and France. Unfortunately, a lot of foreign research cruises aren't always undertaken in partnership or coordination with the region. There's limited opportunities for islanders to participate in regional research cruises as well as philanthropic backed cruises (see box).

Law of the sea and ocean science research

Under the 1982 Law of the Sea Convention (UNCLOS) island states have the right to regulate and authorise marine scientific research in their ocean areas. The consent of the island state is required. Appropriate official channels must be used by the researching state to obtain consent for marine science research.

Within the EEZ and continental shelf, where island states have sovereign rights over the resources, they may withhold consent for marine science research when the research

project is of direct significance for the exploration and exploitation of natural resources, whether living or non-living.

Under UNCLOS, island states have the right to participate or be represented in the marine science project, including having representatives on-board the vessel. The Convention places a duty on vessels conducting marine science research to comply with requests from the coastal state in whose EEZ and/or continental shelf the research is being conducted. This includes complying with requests from the island state for preliminary reports and final results of the research conducted. It also includes providing access to the coastal state all data and samples derived from the research, together with an assessment of such data, samples and research results. Sometimes there's problems with the island country obtaining data because of copyright/data ownership or foreign researchers being reluctant to provide copy of their data to an island state's agency. An island state may have limited capacity for data management.

Island state participation in any marine science cruises may occur prior to, during, and following the proposed research program. The researching state would normally cover the expenses of the island state's participant. This may include bringing the research vessel near shore or to a port that's convenient for the boarding of the participant(s).

Take the example of seabed minerals. There have been many marine science cruises in the Pacific that have identified promising mineral resources. But PIC national agencies have limited capacity to understand deep sea ecosystems because of the high cost of conducting deep sea research.[130]

What ocean science capacity that's in the region is largely concentrated in those regional institutions noted above.[131] Regional leaders have made clear, however, that they want trained ocean scientists in the Pacific working at the national and regional levels. They don't like the fact that too often traditional ocean scientists are "parachuted" in and then leave without taking the time to train locals. There is a perennial limited legacy resulting from "parachute science" in this context.[132] When an ocean science project ends often capacity can dissipate. Island leaders feel they're no better off: the capacity doesn't always "stick". The ocean research that's done in partnership with the Pacific is good. But it can undermine research capacity if the islands don't feel ownership of it.[133]

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[130] M Bourrel, *et al*, "Building in-country capacity and expertise to ensure good governance of deep-sea minerals industry within the Pacific region" *Marine Policy* September 2018

[131] There are marine science stations in Fiji, New Caledonia, Palau and FSM. There is some capacity in Vanuatu and Samoa. See generally C Salpin et.al, "Marine scientific research in Pacific small island developing states" *Marine Policy* September 2019

[132] P Stefanoudis, et. al "Turning the tide of parachute science" *Current Biology* February 2021

[133] See generally, H Harden-Davies, "Research for regions: strengthening marine technology transfer for Pacific island countries and biodiversity beyond national jurisdiction" *International Journal of Marine and Coastal Law*, 2017

Island leaders understand that to protect their resources it's better to have local people trained in ocean science who can inform policy, whether that be in fisheries or climate change monitoring. But, for the reasons noted above, the island countries lack the actual capacity to do much of the ocean science themselves.

For those islanders trained in ocean science retention of capacity once built may be difficult. Often the most talented and experienced personnel choose to leave the region, although some work in regional organisations where the wages may be higher. More generally, there's limited promotion of oceanography as a career in the islands secondary-level education systems. Most graduates of the USP's marine studies program return home with a first degree. There's no Pacific islands professional ocean science association.

Much of the existing ocean science-related activities across the Pacific region are largely structured around themes. Promoting a coordinated multisectoral approach has been difficult. Traditional government structures at the national level are compartmentalised between fisheries, environment and meteorological departments.

There's a strong regional commitment to international ocean agreements. But they're not always implemented at a national level: in part that's because there is in the islands a lack of ocean science capacity in areas such as climate change and biodiversity. The region does well on ocean policy frameworks.[134] But it needs to translate those regional frameworks to the local context. But to do that successfully the island countries need more people trained in ocean science.

At the national level, there's still a gap between ocean science and policy: there aren't the trained people that really understand the ocean science to ask the right management questions. It's not just the science but rather a need to draw in the social and economic dimensions of ocean issues. That's a real challenge for USP's marine studies program; producing graduates who can look at problems in an inter-disciplinary way, whether that be in coastal development or marine resource management.

In summary, when it comes to ocean science in the Pacific most of the support is provided by regional bodies, but at the national level it's lagging.

3. What's working well

There's a number of other areas in ocean science that are working well in the region.

Regional science: The Pacific is made up of small islands and small populations: capacity building around ocean science was always going to face steep challenges in building deep expertise. But the region has been fortunate to have a well-supported ocean science framework focused on SPC, SPREP and USP. They share capacity for all the countries of the region. The islands draw upon that shared resource.

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[134] For a compendium of key ocean regional ocean policies and frameworks see Office of the Pacific Ocean Commissioner *Blue Pacific Ocean Report 2021*, Annex 5 https://opocbluepacific.net/publications/#blue-pacific-ocean-report

In particular, there's a lot of trust by the islands in SPC. It's not viewed as producing "national" science: its ocean science isn't seen as filtered through a national prism. Rather SPC is viewed as an independent regional ocean science advisory body: its core strength is a central repository of ocean information with data managers who can get that information to member countries.

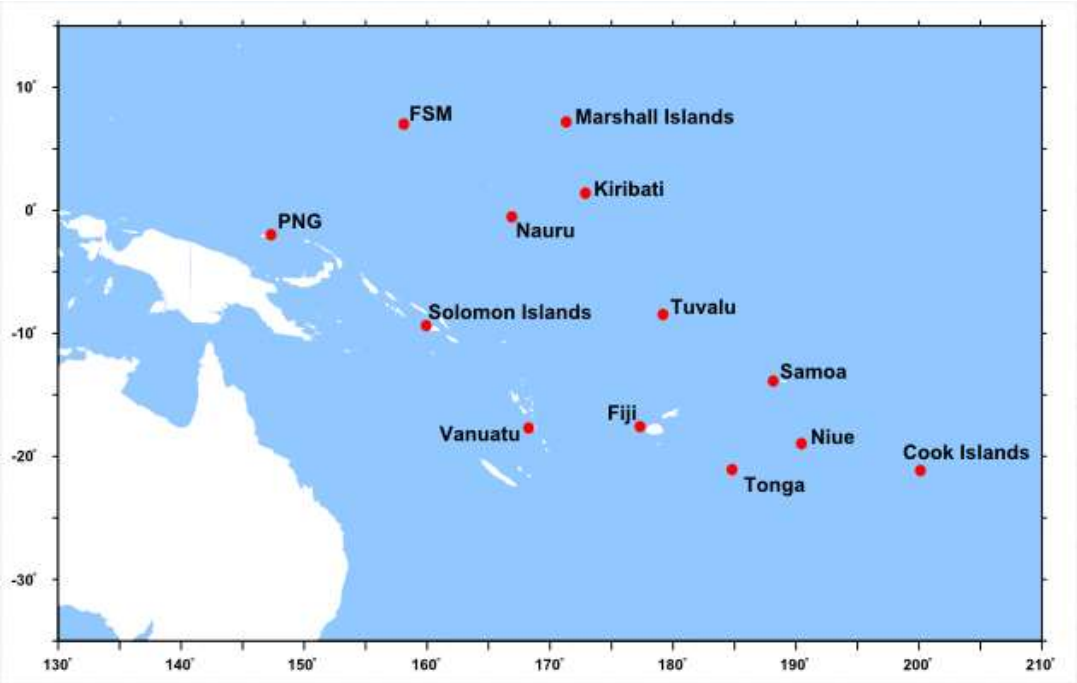
A lot of the ocean science done by countries such as Australia, US, Japan, New Zealand, France and collaborating partners on topics of interest ranging from marine conservation to fisheries is fed into SPC. In that way SPC serves the region impartially. That directly assists in translating ocean science into regional and national policy on oceans management. In terms of coordination, SPC and SPREP operate under the Council of Regional Organisations in the Pacific. The heads of the key agencies meet regularly to ensure coordination. But there's always challenges in competing mandates and making sure the two bodies work cooperatively.

Tsunami Warning: The *Pacific Tsunami Warning and Mitigation System* relies on the warning system in Hawaii and ensures the timely issuance of tsunami warnings and advisories.[135] Tsunami early warning is of critical importance in the Pacific islands. Meteorological services work closely with national disaster management agencies to coordinate early warnings. The region has gone a long way to train experts at the national level when it comes to extreme weather warnings.

Measuring Sea Level Rise: There's a network of sea-level stations in the region established in the early 1990s. Long-term variation in sea level is done through observation and analysis of sea level uses tide gauges (managed and operated by the Australian Bureau of Meteorology), changes in the height of the land using the global navigation satellite system (managed by Geoscience Australia) and levelling data (managed by SPC).

[135] https://www.tsunami.gov/?page=info

Figure 2: Pacific Island countries hosting both global navigation satellite system and tide gauge infrastructure



Source: Geoscience Australia

There's been some useful mentoring in ocean science through internship programs at SPC and SPREP. They've hosted islanders in training courses as part of a push to build ocean science capacity in the region. The Climate and Oceans Support Program in the Pacific (COSPPAc), for example, is doing in-country capacity building in ocean monitoring, training islanders in the use of monitoring equipment for sea level rise.[136]

Fisheries science: Fisheries science, in particular tuna research, is probably the most integrated of the ocean sciences in the region. That's been heavily influenced by the FAME group at SPC. They've been very successful in recruiting top fisheries scientists.[137] SPC are world leaders in tuna fisheries and have made an enormous contribution to ensuring that the region's tuna fisheries are sustainably managed. Its science has been closely linked to the work of the Forum Fisheries Association, Parties to the Nauru Agreement and Western & Central Pacific Fisheries Commission. They've done world leading tuna science (see box). There's also been some very strong fisheries research undertaken at USP in collaboration

[136] COSPPAc is funded by the Australian government and implemented by the Australian Bureau of Meteorology who partner with SPREP and SPC. http://cosppac.bom.gov.au/about-cosppac/ see M .Powers et.al "Lessons from the Pacific Ocean portal: Building Pacific Island capacity to interpret, apply and communicate ocean information" *Frontiers in Marne Science* August 2019 https://www.frontiersin.org/articles/10.3389/fmars.2019.00476/full

[137] The PNA group of countries has recruited fisheries scientists as consultants.

with Wildlife Conversation Society in Fiji on the role of women and fisheries[138] and community-based fishing.[139]

Climate change and tuna migration

In recent work SPC found that as climate change warms the waters of the Pacific, some tuna will be forced to migrate to the open ocean of the high seas, away from the jurisdiction of any country. The research, published in the journal *Nature Sustainability*, quantifies the potential financial losses that these Pacific islands are likely to incur as tuna are redistributed due to climate change. It found that if ocean warming continues at current rates the tuna catch in the combined waters of the 10 Pacific island states would be expected to decline by an average of 20% by 2050 resulting in annual losses of total government revenue in the range of 8-17% for some Pacific islands by 2050 under a high emissions scenario.

Maritime boundaries: There's been a lot of first-rate ocean science and practical work in the Pacific on sea level rise and maritime boundaries. This issue is critical for the Pacific islands. Rising sea levels threaten to reduce the extent of coastal states' maritime zones as coastlines retreat, or offshore features, such as islands, rocks and reefs, used as part of the baseline, are eroded or submerged.

Australia has been working with the islands by supporting a Pacific maritime boundaries project, enabling Pacific island states to not only delimit their maritime boundaries with each other but update legislation, define baselines and delineate the outer limits of their maritime zones where there's no overlapping claim with a neighbouring state. The baseline data of maritime mapping is essential to establishing maritime boundaries and ocean science is instrumental to the entire process.[140] The updates are shared with the UN secretary-general, consistent with obligations under UNCLOS.[141] At the 2021 Pacific Islands Forum meeting PIF leaders endorsed the *Declaration on preserving maritime zones in the face of change-related sea-level rise*.

Marine conservation: There's been a lot of very good ocean science work done around marine conservation by non-government groups such as the World Wildlife Fund, World Conservation Society and the International Union for the Conservation of Nature (IUCN) which has been pushing the goal of protecting 30% of the planet by 2030 (the 30x30

[138] https://fiji.wcs.org

[139] See for example, J. Veitayaki et al, "Future use of past practice: policy implications of insights from two community-based marine resource management initiatives in Fiji" in *Ocean Yearbook* 32 (1) 2018

[140] V.Kumar, "Ocean science plays an important role in mapping the region's maritime boundaries says SPC Deputy Director General" *Fiji Times 25* July 2019 https://www.spc.int/updates/blog/2019/07/ocean-science-plays-an-important-role-in-mapping-the-regions-maritime

[141] https://gem.spc.int/projects/pacific-islands-regional-maritime-boundaries-project

initiative).[142] WCS, in particular, has had a strong ocean science research emphasis. They've contributed some very good regional work on a holistic approach to managing seascapes.

Locally managed marine protected areas (MPAs) in the Pacific have been a stunning success. The Cook Islands, for example, hosts one of the world's largest marine reserves, that protects the entire southern half of the nation's waters in a continuous reserve. Apart from large MPAs in the Pacific, numerous shark sanctuaries have been designated by many island states. [143] The Pacific Islands Roundtable for Nature Conservation, that includes governments and NGOs, is working well on the 30x 30 initiative.[144]

Climate change: Climate change is now big area of focus for the region. It's been well supported by SPREP, SPC and the Pacific Centre for Environment and Sustainable Development at USP.[145] Because people working in many parts of the world understand that the Pacific is on the frontline on climate change many international scientists and bodies are making strong connections with researchers in the Pacific and linking up different climate research areas. One interesting area of research, for example, has been fish aggregating devices (FAD) tracking data that provides a source oceanographic pattern that can inform climate impacts.[146]

There's been considerable progress on the ocean acidification issue in the region. There's a global ocean acidification network. As part of that network there's been one started in the Pacific to train and provides equipment to Pacific island countries and scientists to conduct monitoring activities. Some studies are being conducted under the Commonwealth Blue Charter[147] with an action group on ocean acidification.[148]

Reef research: The resilience of the region's coral reef ecosystems is becoming increasingly important. With almost 50 per cent of reefs in the Pacific currently considered threatened, ecological monitoring is critical to inform and guide the most efficient management interventions.[149] Many Pacific island countries rely on coral reefs for food security (through

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[142] https://www.iucncongress2020.org/newsroom/all-news/global-ambition-30x30-protection-target-opportunity-diversify-governance-and

[143] https://pipap.sprep.org/content/status-large-marine-protected-areas-pacific

[144] https://www.sprep.org/pirt/about-pirt

[145] https://pace.usp.ac.fj The centre's work is led by noted ocean science scholar Professor Elisabeth Holland.

[146] https://www.tunapacific.org/2021/06/15/numbers-of-drifting-fads-underestimated-spc-study-shows/

[147] https://bluecharter.thecommonwealth.org

[148] https://bluecharter.thecommonwealth.org/wp-content/uploads/2019/12/Commonwealth-Ocean-Acidification-Action-Group-Workshop-Report.pdf By contrast the deoxygenation issue in the region is barely on the radar. It's another impact of climate change. https://www.iucn.org/resources/issues-briefs/ocean-deoxygenation

[149] https://gcrmn.net/about-gcrmn/2020-global-report-status-coral-reefs/ See also *Effects of climate change on coral reefs relevant to the Pacific Islands,* Commonwealth Marine Economies Program, Science Review, 2018

an ongoing supply of fish and other edible marine species) and to support their tourism industries. Reefs are deeply tied to Pacific islanders' cultural identity.

Reef research has been a strong area in the Pacific, and is undertaken by regional bodies, such as USP and some NGOs. There's good coral reef science in French Polynesia, Palau, Guam, Fiji and American Samoa, although it's been somewhat ad-hoc and would benefit from a dedicated research foundation.[150] The Australian Institute of Marine Science is doing interesting work with French researchers on coral reef ecosystems in the region.[151]

Sustainable transport: One innovative area of ocean science that's being undertaken in the region is on sustainable sea transport and the links between shipping, climate change and trade. The USP's sustainable sea transport research program and the Micronesian Centre for Sustainable Transport are doing interesting work around low carbon shipping. It's an important area: the Pacific is the most dependent region in the world on imported fossil fuels (of which transport, and often shipping, is the biggest user). Sea transport is the lifeline of Pacific island communities.[152] This work has revolved around shipping decarbonisation and supporting the Pacific Blue Shipping Partnership launched in 2019 by Fiji, the Marshall

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[150] The Global Environment Facility funded reef work in the Pacific has been strong.

[151] AIMS in partnership with French research institutes, is leading a project that seeks to utilise artificial intelligence and machine learning to assist with mapping and understanding the condition of the Pacific's coral reefs. https://www.pacificislandtimes.com/post/2020/06/12/picrc-to-develop-an-open-access-coral-reef-online-platform

[152] P Nuttall, *et al* "Pacific island domestic shipping emissions abatement measures and technology transition pathways for selected ship types" *Marine Policy* July 2021; One example of this work is a pilot ship for outer island trade. https://www.mcst-rmiusp.org/index.php/news/breaking-stories/1189-cerulean-the-first-new-build-low-carbon-ship-in-the-pacific See generally P Nuttall *et a*l, "To tax or not to tax: The case for a 1.5°C carbon price on international shipping—perspectives from the climate most vulnerable nations " in *Ocean Yearbook 35* 2021. In September 2021 the Marshall Islands, Kiribati and the Solomon Islands officially asked the IMO to drastically scale up its ambition for decarbonising the shipping sector. Their joint resolution would commit the agency to reducing greenhouse gas emissions from global shipping to zero by 2050 at the latest. Casten Ned Nemra, "Global shipping is a big emitter, the industry must commit to drastic action before it is too late" *The Guardian* 20 September 2021. https://www.theguardian.com/world/2021/sep/20/global-shipping-is-a-big-emitter-the-industry-must-commit-to-drastic-action-before-it-is-too-late The QUAD countries (US, India, Japan, Australia) meeting in Washington on the 24 September 2021 agreed to launch a Quad Shipping Taskforce and invite leading ports, including Los Angeles, Mumbai Port Trust, Sydney (Botany), and Yokohama, to form a network dedicated to greening and decarbonising the shipping value chain. The Quad Shipping Task Force aims to establish two to three Quad low-emission or zero-emission shipping corridors by 2030. https://www.whitehouse.gov/briefing-room/statements-releases/2021/09/24/fact-sheet-quad-leaders-summit/

Islands, Solomon Islands, Tuvalu and Vanuatu. It aims to make shipping in the Pacific zero carbon by 2050.[153]

Educational services: There's been some useful developments in ocean science education worth noting. USP and the World Bank are starting a new program on the Pacific islands and ocean stewardship. There's a new USP post-graduate degree being offered in sustainability with the University of New Caledonia. It's attracting an increasing number of African students.

Meteorological services: Climate services are working well with in the Pacific. National meteorological services are closely cooperating in providing marine and ocean services around marine observations and marine weather services.[154] The meteorological services in Pacific are very well organised on ocean science needs. They've been guided by the *Pacific Island Meteorological Strategy* (PIMS) 2017-2026 that's identified marine and ocean weather services as one of high priority areas for coordination and investment.[155] The strategy has been very successful in generating a Weather Ready Pacific Decadal Program of Investment endorsed by the 51st Pacific Island Forum Leaders Meeting in weather, marine and ocean services and meteorology.[156] There's also the *Pacific Roadmap for Strengthened Climate Services 2017-2026* that's aligned with the PIMS strategy.[157]

The Pacific Meteorological Council (PMC) is working very well as a specialised subsidiary body of SPREP. It provides policy advice to SPREP on the priorities in weather and climate related fields.[158] The PMC established 6 expert panels to support the implementation and advisory support to the meteorological strategy. One of these panels is the Pacific Island Marine and Ocean Services (PIMOS) Panel. Through PIMOS members report on their progress in implementing the SOLAS Convention (on safety of life at sea) and the obligations of the meteorological services.[159]

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[153] https://mcst-rmiusp.org/index.php/hlpu/pacific-blue-shipping-partnership

[154] World Meteorological Council, *Ocean Science for services in small island developing states,* section 2 https://public.wmo.int/en/resources/bulletin/Products_and_services/oceanic_science_SIDS

[155] https://library.sprep.org/content/pacific-islands-meteorology-strategy-pims-2017-2026

[156] https://www.pacificmet.net/sites/default/files/inline-files/documents/Agenda%203.1%20-%20Weather%20Ready%20Pacific%20PPT_V5.2_O.Fanunu%20FINAL.pdf

[157]https://www.sprep.org/attachments/2017SM28/Officials/French/WP%2012.2.2.Att4-Roadmap%202017-2026.pdf

[158] https://www.pacificmet.net/pmc

[159] In October 2020 a workshop was held in Solomon Islands to examine this issue and a range of other priorities for Pacific weather services. https://solomons.gov.sb/workshop-on-impact-based-forecast-underway/

4. Fixing the gaps

As the SPC and SPREP are "owned" by the region the output in ocean science is seen as the islands' science. The islands are broadly comfortable that they don't have all the expertise in-country but that they can govern the science through SPC and SPREP.

As already noted, SPC's ocean science work is generally in the applied space and focused on ocean development outcomes. But having said that, there's still a strong view in the region that the islands need to set the agenda for ocean science in the region. They appreciate that too big a reliance on expertise in ocean science by external providers is high risk.

Building expertise at the national level is required. Regional organisations should be doing more to promote ocean science as a service, not research, so island countries can establish positions, as has occurred in Solomon Islands appointing an oceanographer to the meteorology services.

There should be a Pacific islands regional oceans science strategy developed that could assist here by enabling a clearer identification of ocean science capacity development needs. There's also a need build physical capacity. SPC is working on a project to get a vessel for tuna research and ocean science. It's only a concept at this stage. But it would certainly make sense given that Pacific EEZs are a third of the planet's EEZs.

Regional organisations collaborating more with USP will be useful. USP must continue to foster a pipeline of post-doctoral students to ensure there's an ocean science capability from within the region. Palau and Samoa have national science research institutions. Some of the island countries have national universities that can also be supported to deliver on this front. More scholarships would help.[160] There's scope for closer partnerships between USP, SPREP and the Pacific Community Centre for Ocean Science. An overarching MOU to do that would be worthy of consideration.

While it's good that seven island states have released national ocean policies,[161] increasing the number of qualified scientists would spearhead the ocean science-based information for decision making. The capacity in regional ocean science could be better understood here if there is some assessment of where the individual countries are in terms of their ocean science capability.

While national level capacity internships at SPC are promoting ocean services as a career, island governments need to establish positions at national level for ocean scientists, especially climate specialists. Developing a network of the limited number marine science

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[160] The University of Newcastle in Australia is a good example here. It works cooperatively with SPREP. https://www.newcastle.edu.au/__data/assets/pdf_file/0005/389111/Samoa-Roadmap-Low-Res-Single-Pages.pdf

[161] Cook Islands Marae Moana Policy, 2016, Vanuatu National Ocean Policy, 2016, Solomon Islands National Ocean Policy, 2018, Samoa Ocean Strategy, 2020, National Oceans Policy of Papua New Guinea, 2020, Niue Moana Mahu regulation, 2020 and the Fiji National Ocean Policy, 2020.

laboratories in the region would allow some economies of scale and sharing of data. USP, for example, has laboratories in some of its 11 campuses around the region. These can be supported to help reach out to the Pacific islands.

Finally, given the importance of fisheries to the region it's surprising that there's no fisheries management training centre in the Pacific. It's something that warrants concept development.

5. Bringing the oceans together

The key lesson from the Pacific in ocean science is the way in which the islands have advocated for ocean science and taken responsibility to advance ocean science through regional bodies.

In the Indian Ocean, while states such as the US and France do large-scale deep-water research, there's not much coordination. There's certainly nothing in the Indian Ocean Commission and the IOTC like SPC's work in fisheries and the way SPC's FAME's work feeds into fisheries management. There's also nothing like SPREP's work on biodiversity when it comes to coordinating the delivery of ocean science in the Indian Ocean region around biodiversity and environmental issues.

The Indian Ocean region might look more closely at these Pacific models for ocean science cooperation and coordination. Ocean science bodies in the Indian Ocean could, for example, reach out to PCCOS for information sharing.

In particular, as noted in the Report on regional arrangements in the Pacific on IUU fishing, one issue-area of the Indian Ocean region needs particular attention: IOTC stock assessment modelling is provided by members of the Commission and not by an independent agency. There's a need in the Indian Ocean for a scoping study on best model for fisheries science advice. The IOTC could certainly benefit from closer interaction with SPC's FAME group.

SPC has taken on the coordination role for the preparations and planning of the UN Decade in the region.[162] It has developed funding proposals to UNESCO-IOC. This Program seeks to increase scientific capacity and create opportunities for ocean science to feed into decision making and bridge the gap between science and policy. This will be achieved by focusing on major aspects including law and policy, decision support systems for ocean science, and increased considerations for Pacific culture and context.

But the Pacific can also learn from the Indian Ocean experience. There's never been a coherent examination of the Pacific as is occurring in the Indian Ocean through the Second International Indian Ocean Expedition[163] that has been coordinated out of the UNESCO IOC

[162] A Pacific regional ocean science planning group has been established and is chaired by PCCOS. It reports to the CROP's marine sector working group. This group works with the Office of the Pacific Ocean Commissioner, FFA, the Secretariat of SPREP and the Pacific Tourism Organisation.
[163] https://iioe-2.incois.gov.in

Office in Perth Western Australia (now closed) and Indian National Centre for Ocean Information Services in Hyderabad India. The International Indian Ocean Expedition 2 (IIOE-2) is a global coordination effort that's advancing understanding of the physical, biological, geological, climatological and socio-economic role of the Indian Ocean. Launched in 2015 and extended out to at least 2025, the IIOE-2 brings together institutions and scientists under a multi-national framework to support research for sustainable development under a multi-disciplinary science plan and associated implementation strategy, both co-designed by stakeholders from within the Indian Ocean region. IIOE-2 brings a contemporary approach and capacities for vastly improved ocean observational techniques and associated research on key processes and knowledge transfer.

IIOE-2 is one of the major initiatives in global oceanography in the Indian Ocean region. It was motivated by the need to advance understanding of geologic, oceanic and atmospheric processes and their interactions in the Indian Ocean, and to determine how these dynamics affect climate, marine biogeochemical cycles, ecosystems and fisheries, both within the region and globally. This is required to predict the impacts of climate change, pollution, and increased fish harvesting on the Indian Ocean.

The Pacific could adopt a similar type of overarching ocean science program as IIOE-2. In the Indian Ocean, IIOE-2 has established the basis for improved scientific knowledge transfer to regional governments and enabled capacity development opportunities in support of regional and early career scientists.[164] An IIOE-2 Steering Committee sets the high-level policies, inclusive of regional and global institutions, national reference alliances, leading and emerging scientists, community stakeholders as drivers and beneficiaries of the science, and early career researchers. It's taken responsibility for the delivery of the project.

Six over-arching science themes have derived from the IIOE-2 science plan.[165] These themes provide scientific areas for interested parties to engage in IIOE-2 and identify and select scientific relevancies for their respective interests. IIOE-2 working groups have been formed.[166]

Twenty-eight countries are represented in the IIOE-2 and 45 projects have been endorsed by the IIOE-2 steering committee to date. Seventeen research cruises have been completed

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[164] The sponsors of IIOE-2 are IOGOOS, **(**an association of marine operational and research agencies in the Indian Ocean region), the Scientific Committee on Ocean Research and UNESCO's Intergovernmental Oceanographic Commission. Collectively these international bodies, each involved in ocean science in the Indian Ocean, have taken responsibility for facilitating funding of the infrastructure of IIOE-2.

[165] The six themes are human impacts; boundary current dynamics; upwelling variability and ecosystem impacts; monsoon variability and ecosystem response; circulation, climate variability and change; extreme events and their impacts on ecosystems and human populations and unique geological, physical, biogeochemical, and ecological features of the Indian Ocean.

[166]Science and research; data and information management; capacity development; operational coordination; outreach and communication; translating science for society; and resources and sponsorship.

as part of the IIOE-2, with more to come. More than 100 scientific papers have published. IIOE-2 national committees provide engagements in the IIOE-2.[167] There's an IIOE-2 early career scientists network to connect emerging scientists.

SPC and USP could work with the International Oceanographic Commission to draw up a prospectus similar to the IIOE-2 type program. It could be taken to stakeholder meetings in the Pacific to identify key ocean science needs at the regional and sub-regional level.

That could produce a united ocean science plan for the Pacific islands region. It would leverage the islands knowledge and priorities, Pacific and international scientists and their institutions, targeted international funding prospects, government and philanthropic resources. National committees could be formed under an inclusive steering committee to secure endorsement for projects under a Pacific Ocean Expedition. This has been already achieved for the Indian Ocean in the IIOER-2. It would make for a powerful "branding exercise" framed under the UN Decade of Ocean Science. This could start small, utilising the experience of the UNESCO IOC in having helped to conceive and now run the IIOE-2.

A number of "influencers" from bodies such as SPC, USP, SPREP, CSIRO, AIMS, the Pacific Islands Ocean Observing System, ocean "champions" from Pacific island countries and other scientific institutions, such as the University of Hawaii, might form a collegiate association to "kick start" a Pacific Ocean Expedition. This would be a once in a generation ocean science initiative to have a lasting legacy aimed at improving livelihoods and sustaining the region's ocean environment.

[167] Eight so far have been established: Australia, France, Germany, India, Japan, South Africa, UK and the US.

Baseline Report 4

Marine Plastic Pollution in Southeast Asia: Cooperation, Challenges and Opportunities

Julius Cesar Trajano
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Executive Summary

Below are findings for inter-regional cooperation in marine plastic pollution from Southeast Asia:

- ***ASEAN Framework/Action Plan***: The establishment of an ASEAN regional framework and regional action plan in combatting marine plastic pollution in Southeast Asia provides lessons for exploring a much wider action plan and strategy for the Pacific, Indian Ocean and Southeast Asia.

- ***Collaboration with extra-regional states***: Collaboration initiated by ASEAN member states with South Korea, Norway and Japan provides regional pathways towards a capacity-building collaboration framework for the wider Indo-Pacific.

- ***Indo-Pacific consortium of marine scientists***: Scientists from Southeast Asia and the Indian Ocean region may form an Indo-Pacific consortium of marine scientists, based on the MICROSEAP Consortium of Southeast Asian universities.

- ***Regional knowledge centres***: Existing regional knowledge centres such as the Regional Knowledge Centre for Marine Plastic Debris (RKC-MPD) by the Economic Research Institute for ASEAN and East Asia (ERIA) and the Regional Capacity Center for Clean Seas (RC3S) provide a good model that can be expanded to the wider Indo-Pacific.

- ***Business initiatives***: There is an opportunity for states to collaborate with regional partners through bodies like business-initiated recycling alliances/associations to accelerate the shift towards plastics circularity in the broader Indo-Pacific. Growing alliances of business conglomerates and multinational corporations in Southeast Asia may also seek a regional platform where they can share information and good practices on how their respective recycling alliances can contribute to the circular economy approach at the national level and regional level.

- ***Cross-sectoral groups***: The complementary roles of governments, regional organisations such as ASEAN, universities and their scientists, regional knowledge centres, donor countries, the private sector and civil society organisations strengthen regional arrangements in Southeast Asia, which may be replicated in the broader Indo-Pacific.

Marine plastic pollution poses a serious threat to the global marine ecosystem. Southeast Asia and the broader Indo-Pacific region are facing the toughest challenge in this regard. Nonetheless, there has been growing momentum in Southeast Asia, in cooperation with the international community, to look for solutions, evidenced by the inclusion of the issue in the ASEAN agenda. ASEAN member states have expressed their strongest commitment to tackling this growing transboundary environmental issue through the adoption of the *Bangkok Declaration on Combating Marine Debris in the ASEAN Region* and the *ASEAN Framework of Action on Marine Debris* at the 34th ASEAN Summit in June 2019. As a follow up, the *ASEAN Regional Action Plan for Combating Marine Debris* was issued in 2021, proposing the phased implementation of a systematic and integrated response to guide regional actions in addressing the issue of marine plastic pollution in ASEAN over the next five years (2021-2025).

This report analyses the implementation of the regional framework and action plan by member states, regional knowledge centres, the private sector, scientists and civil society organisations. It highlights key areas where regional collaborative arrangements work well such as capacity-building cooperation, river protection, regional centres for knowledge sharing and capacity building, building recycling alliances among private companies, and scientific cooperation among universities, albeit these arrangements are still in the stage of infancy.

This report likewise underscores the key role being played by civil society organisations which are conducting grassroots campaigns on sustainable consumption and plastic waste reduction system at the community level. Nonetheless there are gaps and limitations, as cited in this report, such as weak implementation of Southeast Asian countries' plastic waste policies, including how to address single-use plastics, the need to increase public awareness and boost public education, lack of common standards as a key barrier to supporting the development of recycling markets in the region, the need to pursue marine scientific research cooperation in the South China Sea, and a lack of knowledge on the exact concentration of microplastics in the oceans and the marine food chain.

This report argues that the regional approach to addressing this transboundary issue should be comprehensive and multi-sectoral – that includes not only reduction in the use of single-use plastic products but also better waste management, technological solutions, and sustainable economic models. The active participation of both state and non-state actors, at the national and regional levels, is essential. It recommends potential pathways to apply key lessons from Southeast Asia on the broader Indo-Pacific region, namely, a broader regional framework and a plan of action for Indo-Pacific Oceans, expanded capacity-building cooperation, building technological and knowledge regional 'hubs', and establishing regional platforms for recycling alliances in Indo-Pacific.

This Baseline Report #4 has the following sections:

1. What is the marine plastic pollution problem in Southeast Asia?
2. Regional Arrangements in Southeast Asia
3. Areas where the regional arrangements work well
4. Gaps and limitations
5. Bringing the Oceans Together

1. What is the marine plastic pollution problem in Southeast Asia?

Southeast Asia is a major contributor to land-based plastic waste leaking into the world's oceans. Around 80 percent of marine plastic debris can be traced back to land-based plastic waste. Southeast Asia and the broader East Asia region are facing the toughest challenge in this regard. Kakuko Nagatani-Yoshida, UN Environment Programme's Regional Coordinator for Chemicals and Waste, was quoted as saying that *"South-East Asia is a primary source and victim of plastic, where it is choking seas and threatening ecosystems and livelihoods… If we want to solve the marine litter problem globally, we have to solve it in this region."*[168]

China is the world's biggest contributor of plastic waste, responsible for 8.9 million tonnes annually, followed by five Southeast Asian countries, namely Indonesia, the Philippines, Vietnam, Thailand, and Malaysia. Collectively, those five Southeast Asian countries generate 8.9 million tonnes of mismanaged plastic waste every year. Indonesia, for instance, contributes 3.22 million tonnes a year, with half ending up in the seas.[169]

Table 1. Top 10 Countries that Generate Much of Marine Plastic Waste

Country	Share
China	28%
Indonesia	10%
Philippines	6%
Vietnam	6%
Sri Lanka	5%
Thailand	3%
Egypt	3%
Malaysia	3%
Nigeria	3%
Bangladesh	2%

Source: JICA, 2020; Jambeck, et al., 2015[170]

The volume of solid waste and marine debris generated across Southeast Asia has rapidly increased in recent years. According to the ASEAN Secretariat, six of the 10 ASEAN countries

[168] " UNEP report warns plastic policies lagging behind in South-East Asia," UNEP, 13 November 2019, https://www.unep.org/news-and-stories/press-release/unep-report-warns-plastic-policies-lagging-behind-south-east-asia

[169] Venkatachalam Anbumozhi, "Circular economy for plastics: What is at stake for ASEAN?", *Jakarta* Post, 13 September 2019, https://www.thejakartapost.com/academia/2019/09/13/circular-economy-for-plastics-what-is-at-stake-for-asean.html.

[170] JICA, *Data Collection Survey on the Marine Plastic Litter and Application of Japanese Technologies for Resource Circulation* , March 2020; Jenna R., Jambeck et al. "Plastic Waste Inputs from Land into the Ocean." *Science* 347, no. 6223 (2015).

generated more than 31 million tonnes of plastic waste in a year.[171] At present, it is estimated that 53 percent of the waste generated in ASEAN is uncollected. Less than 25 percent of the collected waste is recycled while a large chunk is either unlawfully discarded after collection (around 34 percent of collected waste) or treated and disposed of (around 43 percent of collected waste). Considering the population in these six countries (in 2016) and the share of plastics in the municipal waste in each of these countries, approximately 31.7 million tonnes of plastic waste is generated (16.8 million tonnes of which is uncollected). Meanwhile, the percentage of uncollected plastic waste that leaks into the marine environment from the six countries has not been calculated yet.[172]

Shared river systems, connected coastlines and the international trade in plastic products and plastic waste exacerbate the threat of marine debris for the entire region. The lack of proper disposal facilities is a major constraint on the efforts of many developing countries, including Southeast Asian countries, to curb plastic pollution. It is thus important that countries in the region increase investment on their respective infrastructure for waste management so as to cut marine plastic litters from the source. Shared river systems and waterways are the conduits for ocean plastic pollution. The *Bangkok Declaration* and the *ASEAN Framework of Action on Marine Debris* have underscored critical importance of protecting ASEAN's major river systems. Ten rivers in the world contribute 90 per cent of plastic waste washed to the oceans, eight of which are in Asia.[173]

Table 2. Top 20 Rivers Discharging Largest Amounts of Plastic Litter into the Ocean

RIVER	COUNTRY	ESTIMATED AMOUNT (x10,000 tonnes/year)
Yangtze	China	33.3
Ganges	India, Bangladesh	11.5
Xi	China	7.39
Huangpu	China	4.08
Cross	Nigeria, Cameroon	4.03
Brantas	Indonesia	3.89
Amazon	Brazil, Peru, Colombia, Ecuador	3.89
Pasig	Philippines	3.88
Irrawaddy	Myanmar	3.53
Solo	Indonesia	3.25
Mekong	China, Thailand, Cambodia, Laos, Myanmar, Vietnam	2.28

[171] ADB Southeast Asia Development Solutions. "Southeast Asia Takes Action against Plastic Pollution," 14 June 2021, https://seads.adb.org/news/southeast-asia-takes-action-against-plastic-pollution.
[172] ASEAN, *ASEAN Regional Action Plan for Combating Marine Debris in the ASEAN Member States* (Jakarta: ASEAN Secretariat, 2021).
[173] World Economic Forum, "90% of plastic polluting our oceans comes from just 10 rivers," 8 June 2018, www.weforum.org/agenda/2018/06/90-of-plastic-polluting-our-oceans-comes-from-just-10-rivers/.

Imo	Nigeria	2.15
Dong	China	1.91
Serayu	Indonesia	1.71
Magdalena	Colombia	1.67
Tamsui	Taiwan	1.47
Zhujiang	China	1.36
Hanjiang	China	1.29
Progo	Indonesia	1.28
Kwa Ibo	Nigeria	1.19

Source: Lebreton et al., 2017[174]

The Mekong River is among these plastic-polluted rivers mainly due to inadequate waste management systems in countries where the Mekong flows. Mekong is being choked by about 37,000 tonnes of plastic bags and bottles near its mouth in southern Vietnam.[175]

[174] Laurent C.M. Lebreton, et al., "River Plastic Emissions to the World's Oceans," *Nature Communications* 8, no. 15611 (2017).
[175] Ibid.

Map 1: The Mekong river in mainland Southeast Asia, running through China, Myanmar, Laos, Thailand, Cambodia, and Vietnam.

Source: Shannon via Wikimedia under Creative Commons

The Mekong River Commission, that promotes joint management of the shared water resources and sustainable development in the countries of the Mekong River basin, has various coordinating instruments but does not include initiatives to address transboundary plastic pollution. Riparian countries should consider joint plastic waste reduction in transboundary rivers as part of their environmental cooperation.

Major rivers from Indonesia and the Philippines also carry large volumes of plastic waste. Manila's Pasig River, for instance, dumps over 63,000 tonnes of plastics into the ocean every year, making it the world's eighth largest contributor of ocean plastic. Four of Indonesia's rivers are among the 20 most polluted in the world due to mismanaged plastic waste. In this regard, adequate national efforts should be made to reduce plastic waste leakage to oceans through rivers. Collective efforts should not just focus solely on regional seas but also on the protection of rivers from plastic pollution. Protection of rivers from plastic pollution and improvement of land-based waste management could significantly reduce ocean plastic pollution.

The sudden increase in single-use plastics and personal protective equipment during the COVID-19 crisis has put additional stress on countries working to tackle marine plastic debris. Plastic waste from mismanaged disposal of single-use face masks, gloves and other personal protective equipment (PPE) used during COVID-19 has ended up choking our oceans. Its complex consequences may last even beyond this pandemic. The new wave of pandemic-related single-use plastics has partly reversed the hard work by both consumers and governments in Southeast Asia to mitigate the plastic crisis, according to several NGOs the author consulted with.[176] Every year about 8-12 million tonnes of plastic debris find their way into the oceans, including microplastics. With the COVID-19 pandemic, plastic pollution has even been exacerbated. A report by marine conservation organisation OceansAsia estimated that 1.56 billion face masks had entered the oceans in 2020. This has resulted in an additional 4,680 to 6,240 tonnes of marine plastic debris. It will take 450 years for these face masks to degrade, gradually disintegrating into more hazardous microplastics while endangering marine wildlife.[177]

In the region, Malaysia, Thailand, the Philippines and Indonesia have seen a surge in plastic waste as environmental awareness takes a back seat to health concerns. There has been a heavy reliance on food-delivery services and online shopping as well as disposable PPEs and face masks amid the pandemic, while recycling has dropped off. In Thailand, plastic waste jumped from 5,500 tonnes per day before the pandemic to 6,300 tonnes as of mid-May 2020. During Singapore's circuit-breaker lockdown from April to June 2020, an extra 1,334 tonnes of plastic waste – enough to fill 92 double-decker buses – were produced from takeaway and delivered meals. Malaysia's medical waste, including PPE, gloves, and swab test tools, surged 27 percent in March 2020 month on month, followed by a 31.5 percent increase in April and 24.6 percent climb in May.[178]

In the most recent 2021 study, in terms of plastic waste being transported by rivers to the seas, the Philippines was identified as the largest contributing country estimated by the study's model with 4,820 of its rivers emitting 356,371 tonnes of mismanaged plastic waste per year. While this figure already appears substantial, it represents only 8.8 percent of the total mismanaged plastic waste of the country, which is estimated at 4,049,670 tonnes per year. In Malaysia, it was estimated that 73,000 tonnes of plastic waster per year goes through its 1,070 rivers. Indonesia's 5,540 rivers disperse 56,000 tonnes of plastic waste into the ocean every year.[179]

Transboundary factors, such as marine debris carried away by rivers and ocean currents as well as plastic waste trade restrictions imposed by relevant countries, pose challenges to addressing marine debris in the region. More plastic waste shipments have been sent to Indonesia, Malaysia, Thailand, and Viet Nam, for instance, after China's "National Sword"

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[176] Author's consultations with Filipino and Thai experts, December 2021.
[177] OceansAsia, "COVID-19 Facemasks & Marine Plastic Pollution," 2020, https://oceansasia.org/covid-19-facemasks/.
[178] Chermaine Lee, "Why the pandemic is fuelling Asia's plastic crisis," *Plastic Atlas,* 14 April 2021, https://hk.boell.org/en/2021/04/14/why-pandemic-fuelling-asias-plastic-crisis
[179] Lourens Meijer, et al., "More than 1000 rivers account for 80% of global riverine plastic emissions into the ocean," *Science Advances* 7, no. 18 (2021), DOI: 10.1126/sciadv.aaz5803.

policy restricted plastic waste imports. With China's policy to reject half of the world's plastic waste since 2018, discarded plastic items—primarily from industrialised economies—are re-routed to other developing countries, including some in Southeast Asia. To illustrate, Malaysia's imports of plastic waste from its ten biggest source-countries rose to 456,000 tonnes in the first six months of 2018 compared to 316,600 tonnes received in 2017, and 168,500 tonnes in 2016. Consequently, with the sudden deluge of imported plastic scraps, there has been a mushrooming of many illegal plastic recycling factories using low-end technology and environmentally harmful methods of disposal.

2. Regional Arrangements in Southeast Asia

National Action Plans of Southeast Asian countries

In recent years, some ASEAN member states have individually launched national policy initiatives to address marine plastic debris issues. The following national strategies have been adopted or are in the process of adoption in the ASEAN member states:[180]

- ***Brunei Darussalam***. The government implements the Minor Offences Act and the Environmental Protection and Management Order (2016), and is developing the first Waste Management Regulation for the management of non-hazardous solid waste in the country. In addition to that, the government has also imposed a 3 percent increase in excise duty on plastic product imports effective from April 2017.
- ***Cambodia.*** Its government has developed its National Waste Strategy and Action Plan (2018-2030) which centres on segregation of plastic waste and management of plastic bags. The Phnom Penh Waste Management Strategy and Action Plan (2018-2035) aims to guide solutions to plastic waste management problems and advances actions supporting the development of plastic recyclers.
- ***Indonesia.*** Indonesia's Plan of Action on Marine Plastic Debris (2017-2025) contains five pillars including improving behavioural change, boosting funding mechanisms, and instituting policy reform. Indonesia has issued its Extended Producer Responsibility (EPR) implementation roadmap. The Ministry of National Development Planning (Bappenas) is working on a national circular economy roadmap, with a focus on plastic packaging.
- ***Lao PDR.*** The country's main legal frameworks for solid waste management are the Environmental Protection Law (EPL) No 29 / NA and the Green Growth Strategy. Lao PDR's national government also plans to develop a masterplan for solid waste management while the Vientiane local government is considering regulations on single-use plastic shopping bags.
- ***Malaysia***. Malaysia has a Roadmap towards Zero Single-Use Plastics (2018-2030) which concentrates on reducing single-use plastics and seeking alternatives to plastic. Priority actions include developing eco-labelling criteria for biodegradable and compostable plastic packaging materials as well as biomass-based products. The country is crafting its Circular Economy roadmap for bottles and other single-use plastics, focusing on EPR schemes.
- ***Myanmar***. The National Waste Management Strategy and Master Plan (2018-2030) is the first national initiative aimed at institutionalising waste management and

[180] ASEAN Regional Action Plan for Combating Marine Debris in the ASEAN Member States,

provides a vision and strategy to address key issues, needs and challenges, whilst also raising awareness amongst key stakeholders towards achieving a resource-efficient and zero-waste society. The masterplan has six goals ranging from extending efficient waste collection service to all citizens to ensuring sustainable financing mechanisms.

- ***Philippines.*** Major solid waste management legislation includes Republic Act #9003 (which mandates universal waste collection services and source separation) and the Philippine Clean Water Act of 2004 (Republic Act No. 9275). There are still pending legislative bills in the Congress on regulating single-use plastics. The government adopted in November 2021 a national plan of action for the reduction of marine litter toward zero waste in Philippine waters by 2040.
- ***Singapore***. The country launched its Zero Waste Masterplan in 2019, focusing on areas such as developing local recycling capabilities, implementing measures to address three priority waste streams (e-waste, food waste and packaging waste, including plastics), reducing waste so as to extend the lifespan of Singapore's only landfill and improving messaging on recycling. Other policies focus on introducing a mandatory packaging reporting framework in 2021 and an EPR scheme for the management of packaging waste, including plastics, to be implemented in phases no later than 2025, starting with a Deposit Refund Scheme for beverage containers. A citizens' workgroup has been convened in 2020 to co-create solutions with members of the public to reduce the excessive consumption of disposables.
- ***Thailand.*** In 2019, the government has announced the Thailand Roadmap on Plastic Waste Management (2018-2030), which recommends phasing out certain types of plastics (such as plastic cap seals and plastic bags less than 36 microns in thickness), and incentives for using alternatives (such as biodegradable plastics).
- ***Vietnam***. In 2020, its government issued its National Action Plan for Management of Marine Plastic Litter by 2030 in 2020. The plan accentuates behavioural change, collection and classification of plastic waste, control of plastic litter at source, international cooperation and regular assessment of marine plastic litter management.

With the growing public consciousness towards ocean plastics pollution, Southeast Asian countries have recently come up with additional national strategies to mitigate this issue. Since 2020, Thailand has formally outlawed the use of microbeads in the production, sale and import of cosmetic products. Cambodia, with the aim of decreasing the volume of single-use plastics, has commenced working on a sub-decree that bans the import, production and consumption of single-use plastics such as spoons, cups and straws. In 2020, Singapore also enacted a legislation to restrict the export of contaminated plastic waste and hard-to-recycle plastics. However, the regulation of single-use items such as plastic bags is still challenging in all countries in the region, where the total ban of plastic bags is not yet implemented, but instead have imposed very minimal charges on these items in places such as groceries and shopping malls.[181]

[181] Emily Curren, et al., "Marine microplastics in the ASEAN region: A review of the current state of knowledge," *Environmental Pollution* 288 (2021), https://doi.org/10.1016/j.envpol.2021.117776.

Road Towards Circular Economy

These national action plans and initiatives are anchored on the circular economy approach that many Southeast Asian countries have started to espouse and pledged to adopt. The East Asia Summit Leaders' *Statement on Combating Marine Plastic Debris*, adopted in Singapore during the ASEAN Summit in 2018, recommends the promotion of environmentally sound management of plastic waste and resource efficiency, including the circular economy. The circular economy model offers a fundamental and crucial alternative to the linear take of a – "make – consume – dispose" economic model that is currently prevalent in Southeast Asian economies. The circular economy model is simple: minimise the disposal of waste and the need for raw materials by reducing, reusing, recycling, refurbishing, and remanufacturing materials (5R) in production, distribution, and consumption processes.[182]

Singapore's landmark *Resource Sustainability Act* in 2019 put in place major steps to catalyse Singapore's transition to a circular economy such as the Extended Producers' Responsibility framework (to be discussed in Section 3). Malaysia has outlined a roadmap towards zero single-use plastics, and is developing a Circular Economy Roadmap to combat plastic waste. Indonesia also seeks to adopt a circular economy approach towards sustainable growth and development.[183]

The full implementation of national action plans is crucial in reversing plastic pollution within national waters. These strategies may serve as pillars of collaborative action among states. However, these would not be adequate to address transboundary plastic pollution. There is need for a regional strategy or action plan on marine litter which recognises the transboundary nature of the problem, and the need for regional coordination mechanisms.

ASEAN framework and regional action plan on combatting marine plastic pollution

ASEAN member states have demonstrated their strongest commitment to tackling this growing environmental issue through the adoption of the *Bangkok Declaration on Combating Marine Debris* in the ASEAN Region and the *ASEAN Framework of Action on Marine Debris* at the 34th ASEAN Summit in June 2019. Building on this commitment, the World Bank supported Thailand (as chair of ASEAN in 2020) in the preparation of the ASEAN *Regional Action Plan for Combating Marine Debris*.

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[182] ASEAN, "East Asia Summit Leaders' Statement on Combating Marine Plastic Debris," 15 November 2018, https://asean.org/east-asia-summit-leaders-statement-combatingmarine-plastic-debris/. Venkatachalam Anbumozhi and Fukunari Kimura, "Industry 4.0: What Does It Mean for the Circular Economy in ASEAN?" In *Industry 4.0: Empowering ASEAN for the Circular Economy*, edited by Venkatachalam Anbumozhi, and Fukunari Kimura (Jakarta: Economic Research Institute for ASEAN and East Asia, 2018).

[183] Speech by Ms Grace Fu, Minister for Sustainability and the Environment, at the Launch of the Plastics Recycling Association of Singapore on 17 August 2021, https://www.mse.gov.sg/resource-room/category/2021-08-17-speech-at-the-launch-of-pras/.

Drawing from inputs from regional stakeholders and the 10 ASEAN member states, the Regional Action Plan proposes an integrated approach to address marine plastic pollution in ASEAN over the next five years (2021-2025) through 14 regional actions at three key stages of the value chain:
1) Reduce Inputs into the System,
2) Enhance Collection and Minimise Leakage, and,
3) Create Value for Waste Reuse.

The Regional Action Plan does not set specific targets for the reduction of marine debris. Instead, the Plan focuses on preventing marine debris pollution through upstream measures to address land-based sources of plastic waste, which is assessed to account for 80 percent of marine plastic debris in the oceans. To this end, the Plan has identified 14 regional actions to facilitate the development of national-level policies to reduce the use of plastics; enhance plastic waste management and minimise leakage; and create value from plastic waste reuse and recycling, to enable a more sustainable and circular approach to plastics in the region. According to the Singapore Minister for Sustainability and the Environment, the implementation of these regional actions will support ASEAN member states' efforts to strengthen domestic policies and practices to reduce plastic waste pollution in their respective countries, to the benefit of the shared regional environment.

The Regional Action Plan supports ASEAN's overall commitment to tackle the challenge by reducing plastic inputs into the system, enhancing collection and minimizing leakage, as well as creating value for waste reuse. Actions include guidelines for countries to phase out single-use plastics, harmonize regional policies on recycling and plastics packaging standards, and strengthen regional measurement and monitoring of marine debris. These coordinated measures will also enhance regional platforms for innovation, investments, and training.

ASEAN Secretary General H.E Dato Lim Jock Hoi said that: "The ASEAN Regional Action Plan for Combating Marine Debris in the ASEAN Member States is testament of our collective and forward-looking response to the challenge with the aim to support regional policies, platforms and align resources to complement existing country actions."[184]

The approach for this RAP has built on other regional action plans, such as the Co-ordinating Body on the Seas of East Asia (COBSEA) action plan, and has the potential for replicability to other regions that are tackling the issue of plastic pollution, such as South Asia.

Another important document is the *2018 Bali Declaration on Protection of the Marine Environment from Land-based Activities* which was endorsed by the representatives of 60 Governments and the European Union, having met in Bali, Indonesia, on 31 October and 1 November 2018 at the fourth session of the Intergovernmental Review Meeting on the Implementation of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities, organised by the UN Environment Programme (UNEP) and hosted by the Government of Indonesia.

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[184] "ASEAN Member States Adopt Regional Action Plan to Tackle Plastic Pollution," The World Bank Press Release, 28 May 2021.

In this declaration 60 countries,[185] including a majority of Southeast Asian nations, agreed to continue work on:

(a) Enhancing the mainstreaming of the protection of coastal and marine ecosystems, especially from the environmental threats caused by increased nutrients, wastewater, and marine litter and microplastics; and
(b) Enhancing capacity-building, know-how and knowledge sharing through collaboration and partnerships involving governments, the private sector, civil society and experts at the regional and global levels in the protection of coastal and marine ecosystems from land-based activities and sources of pollution.[186]

3. Areas where the regional arrangements work well

Capacity-building cooperation

One critical area that the ASEAN Regional Action Plan cited is that there is a general lack of capacity around plastic waste management in the region, both in the public and the private sectors. In this regard, one component of the action plan and the ASEAN Framework of Action deals with research, innovation and capacity building. There have been significant cooperative initiatives in this area, with the robust assistance from donor countries and dialogue partners of ASEAN.

Guided by the ASEAN Framework of Action, Ms Grace Fu, Minister for Sustainability and the Environment of Singapore, relayed in the Parliament how Singapore is an active contributor to international and regional platforms that address marine litter. Last November, Singapore organised a virtual training programme on urban solid waste management for ASEAN Member States, to build regional capacity on sound waste management practices and prevent the leakage of litter into waterways and the ocean. Singapore also partnered with

[185] Representatives of the following States participated in the UNEP Intergovernmental Review Meeting session that led to the adoption of the Bali Declaration: Algeria, Armenia, Bangladesh, Belize, Bhutan, Brazil, Burkina Faso, Cambodia, Cameroon, China, Colombia, Congo, Cuba, El Salvador, Estonia, Eswatini, Ethiopia, Finland, Georgia, Germany, Guatemala, Indonesia, Iran (Islamic Republic of), Iraq, Israel, Japan, Kenya, Lao People's Democratic Republic, Liberia, Madagascar, Malta, Mauritania, Mauritius, Mongolia, Mozambique, Netherlands, Norway, Philippines, Qatar, Saudi Arabia, Seychelles, Sierra Leone, Singapore, Somalia, South Africa, Sweden, Thailand, Timor-Leste, Togo, Tonga, Trinidad and Tobago, Turkey, Turkmenistan, Tuvalu, Uganda, United Arab Emirates, United Kingdom of Great Britain and Northern Ireland, United States of America, Viet Nam and Yemen.

[186] Report of the fourth session of the Intergovernmental Review Meeting on the Implementation of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities, UN Environment Programme, Bali, Indonesia, 31 October and 1 November 2018.

Norway to conduct two runs of a joint capacity training programme on waste management and reduction of marine litter for Asian countries in October 2017 and March 2019.[187]

The *ASEAN+3 Marine Plastics Debris Cooperative Action Initiative* was also launched in November 2018. In line with the ASEAN+3 initiative, Japan has conducted the JAIF (Japan-ASEAN Integration Fund) funded project targeting the ASEAN member states to tackle the marine plastic litter. From 2021, the second phase of the project will be started in the selected countries (Cambodia, Myanmar) to develop National Action Plans (NAPs) on marine plastic litter and monitor the leakages into the ocean.[188]

There are also ongoing regional projects and activities such as the *ASEAN-Norway Cooperation Project on Local Capacity Building for Reducing Plastic Pollution in the ASEAN Region* (ASEANO) Project, which commenced in 2019. ASEANO is a regional capacity building project led by the Norwegian Institute for Water Research (NIVA) and the Center for Southeast Asian Studies in Indonesia (CSEAS), in close collaboration with Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) and the ASEAN secretariat, under the purview of the endorsing ASEAN sectoral body ASEAN Working Group on Coastal and Marine Environment (AWGCME).

ASEANO, a US$3 million project of Norway in the ASEAN region, mainly focuses on capacity and knowledge development in tackling plastic pollution in the ASEAN region and targets Indonesia, Vietnam and the Philippines as the areas of first case studies. ASEANO wants to determine driving forces behind plastic pollution and evaluate the implications of plastic pollution for the economy, development, environment, and human well-being, with a focus on local municipality/city level sustainability. Dr Arisman, executive director of the CSEAS, explained that the objective of the ASEANO is to provide an opportunity for knowledge transfer and know-how among academics in ASEAN member countries and more importantly, to build capacity among local actors such as local governments, NGOs, and local academic institutions with a view to find the solution to plastic pollution by evidence-based policy and local participation.[189]

ASEANO initiatives spearheaded by CSEAS include finding ways to transfer knowledge from Norway to local actors in Southeast Asian countries on the methodology of monitoring. CSEAS also partners with grassroots NGOs in the field of capacity building on changing socio-cultural mindset and behaviour in local communities. One important contribution of ASEANO project is its training programmes for local public school teachers so they can effectively teach the issues of sustainability and plastic waste pollution to the young generation. This programme has been launched in selected Indonesian communities where

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[187] Ministry of Sustainability and the Environment, Written Reply to Parliamentary Question on Marine Debris by Ms Grace Fu, Minister for Sustainability and the Environment, https://www.mse.gov.sg/resource-room/category/2021-05-10-written-reply-to-pq-on-marine-debris/

[188] ASEAN Regional Action Plan for Combating Marine Debris in the ASEAN Member States, https://asean.org/storage/FINAL_210524-ASEAN-Regional-Action-Plan_Ready-to-Publish_v2.pdf.

[189] Author's consultation with an Indonesian regional expert, December 2021.

major rivers are located. This is aimed at changing the behaviour of local students and enhancing public awareness towards better protection for these rivers which have become pathways for land-based plastic waste to be carried to the seas. The first phase of the ASEAN project runs from 2019 to 2022, covering Vietnam, Indonesia and the Philippines. The second phase is now being considered to expand the coverage of the project to include all other Southeast Asian countries after 2022.[190]

Another key aspect of the ASEANO project is on the effective participation of the private sector. In CSEAS' regular workshops and webinars, the EPR framework has been comprehensively discussed. These workshops serve as effective platforms for the private sectors as well as regional and national experts to exchange views and explore on how to utilise this framework as a way to institutionalise private sector's engagements in reducing plastic waste. This paper's subsection on private sector explains what EPR is and some EPR examples that have been initiated by alliances of big companies.

In an effort to find new solutions to the problem of plastic pollution, ASEANO, in collaboration with CSEAS, provides research grants to young scientists or researchers in ASEAN to conduct research on how to reduce plastic pollution and come up with new innovative solutions and ideas. Four academic scientists from Indonesia, the Philippines and Thailand were awarded with the grant to support their respective research studies on marine plastic pollution.[191]

Addressing marine plastic/litter pollution in Southeast is another collaborative area between South Korea and ASEAN countries. For instance, the ASEAN Centre for Biodiversity and the Embassy of South Korea in the Philippines are exploring areas for collaboration, including heightening awareness on marine environmental protection in the country, where marine plastic pollution is causing environmental damage and posing health risks.[192] The Philippines is the world's third largest contributor of mismanaged plastic waste entering the ocean every year.[193] KOICA has recently commenced a multi-year marine litter management (2021-2025) programme in collaboration with Philippine government. South Korea's contributions focus on building a marine litter monitoring system, donating a clean-up vessel to be deployed near Manila Bay, and strengthening marine litter management capacity in the Philippines. The clean-up vessel from South Korea will be the Philippines' first

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[190] Ibid.

[191] Zazithorn Ruengchinda, "Norway provides grants for ASEAN researchers to reduce plastic waste," *ScandAsia*, 12 March 2021, https://scandasia.com/norway-provides-grants-for-asean-researchers-reducing-plastic-waste-in-the-region/

[192] ACB, South Korea Embassy explore partnership on marine debris pollution, *Business Mirror*, 9 May 2021, https://businessmirror.com.ph/2021/05/09/acb-south-korea-embassy-explore-partnership-on-marine-debris-pollution/

[193] World Bank Group, *Market Study for the Philippines: Plastics Circularity Opportunities and Barriers. Marine Plastics Series, East Asia and Pacific Region* (Washington DC: World Bank, 2021).

vessel that can collect marine litter.[194] Furthermore, the Korea Green Growth Trust Fund also funded a 2021 World Bank study on plastic circularity in the Philippines.[195] South Korea hopes that such assistance programme can help the Philippines improve its capacity to manage marine pollution.[196]

South Korea's Ministry of Oceans and Fisheries and Indonesia's Ministry of Maritime Affairs and Fisheries jointly developed the Indonesia Marine Litter Management Improvement Project in 2019. The Korea Marine Environment Management Corporation (KOEM) is tasked to transfer Korea's know-how in managing marine litter to Indonesia, one of the top global emitters of marine litter, with the objective of enhancing its national capacity to manage the marine environment until 2022. KOEM offers a hands-on training programme for Indonesian officials and local NGOs to share South Korea's marine litter policies and monitoring methodology and to conduct a pilot marine litter monitoring. Through the project, South Korea helps Indonesia develop customized marine litter monitoring guidelines.[197]

River protection

The project on *Promotion of Countermeasures Against Marine Plastic Litter in Southeast Asia and India* (hereafter referred to as "CounterMEASURE") was officially launched in May 2019 aiming to identify a region-based model for monitoring and assessment of plastic leakage and pollution reduction. The target is land-based plastic leakage entering water ways such as rivers and canals or drainage to the sea. This project, funded by the Japanese Ministry of Foreign Affairs is implemented by UNEP Regional Office for Asia and the Pacific.

The first phase (2018-2020) of the project focused on Mekong (in mainland Southeast Asia) and the Ganges (in South Asia) rivers, the lifeblood for hundreds of millions of people in these two regions. However, scientific knowledge on marine plastic litter and effective countermeasures remains insufficient to tackle the problem properly. The CounterMEASURE project works to identify sources and pathways of plastic pollution in river systems in Asia, particularly the Mekong and the Ganges. The project has developed plastic leakage models for localities in 6 different countries using an innovative and replicable approach. Deploying technologies like GIS, machine learning and drones has allowed the CounterMEASURE team to augment ground-level research in an efficient and scalable way. This scientific knowledge can then be used to inform policy decisions and actions to beat plastic pollution and ensure rivers are free of plastic waste.[198]

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[194]ACB, "South Korea Embassy explore partnership on marine debris pollution," *Business Mirror*, 9 May 2021, https://businessmirror.com.ph/2021/05/09/acb-south-korea-embassy-explore-partnership-on-marine-debris-pollution/

[195] World Bank Group, *Market Study for the Philippines*.

[196] ACB, South Korea Embassy explore.

[197] Korea Marine Environment Management Corporation, KOEM, Strengthening and Improvement for Marine Litter Response in Indonesia, 4 November 2019, https://www.koem.or.kr/site/eng/ex/board/View.do?cbIdx=506&bcIdx=28742

[198] "CounterMeasure for Plastic Free Rivers, "About," https://countermeasure.asia/about/.

Although the CounterMEASURE Project conducted micro and macro plastic monitoring in several places, it is short of data to estimate the volume of leakage to the ocean from the Mekong. Hence, future research should be conducted to measure the actual leakage of micro and macro plastics in the Mekong River and the identification of potential sources of the micro and macro plastic leakage.[199] Learning from the findings of the CounterMEASURE Phase 1, the second phase of the project - Promotion of action against marine plastic litter in Asia and the Pacific (CounterMEASURE II) - aims to generate scientific knowledge on plastic pollution in the Ganges, Mekong and selected rivers in Sri Lanka and Myanmar which will be shared and disseminated to inform policy and decision-making processes at local, national, regional and global level. The expanded CounterMEASURE II project (2020-2022) now covers 7 countries in Indo-Pacific, i.e., 4 countries of the lower Mekong River Basin (Cambodia, Lao PDR, Thailand, Vietnam), India and Sri Lanka in South Asia, and Myanmar.[200]

Establishment of regional centres for knowledge sharing and capacity building

Knowledge sharing and adequate capacity are essential for effective policies and programs. There is still limited research capacity in some ASEAN member states and research efforts are not coordinated at the ASEAN level, hampering knowledge exchange and causing potential duplication of efforts. In this regard, the ASEAN Framework and the Regional Plan of Action stress the significance of strengthening existing ASEAN regional knowledge networks on marine plastics.

In this regard, it is important to note the initial progress that has been made in knowledge sharing. Examples of initiatives promoting research and innovation collaboration across ASEAN exist, including the Regional Knowledge Centre for Marine Plastic Debris *(*RKC-MPD) by the Japan-funded Economic Research Institute for ASEAN and East Asia (ERIA), based in Indonesia and the Regional Capacity Center for Clean Seas (RC3S) managed and funded by Indonesian government.

Regional Knowledge Centre for Marine Plastic Debris

The RKC-MPD and its activities which was established under ERIA in October 2019 in order to address marine plastic pollution in ASEAN+3 Member States (ASEAN countries plus China, Japan and South Korea). The goals of the RKC-MPD are to:
(1) create a regional network and raise awareness regarding marine plastic debris,
(2) promote innovative actions in each member country, and
(3) facilitate national and regional cooperation.

[199] V. Anbumozhi, et al., "Environmental and Sustainability Challenges in the Mekong Subregion," in Kimura, Fukunari (ed.), *Subregional Development Strategy in ASEAN after COVID-19: Inclusiveness and Sustainability in the Mekong Subregion (Mekong 2030)* (Jakarta: ERIA, 2020).
[200] UNEP, "Promotion of action against marine plastic litter in Asia and the Pacific (CounterMEASURE II)," https://countermeasure.asia/wp-content/uploads/CounterMEASURE-II-Brochure-updated-Mar-2021-1.pdf.

Capacity development and information sharing are the two chief pillars that underpin the RKC-MPD's work. Partnering with the private sector to promote good practices implemented is one of the important on-going activities.[201]

In this regard, the RKC-MPD knowledge centre of ERIA is actually fulfilling two primary regional goals. In addition to institutionalising regional capacity building and knowledge exchange, the centre is also advancing the private sector engagement, a key component of the ASEAN Regional Action Plan and Regional Framework. RKC-MPD is aware that many companies in the region have started contributing to finding solutions to the plastic problem and adopting a business strategy paradigm shift. The private sector (often perceived as the biggest plastic polluters) can be part of the solution by changing the linear way of consumption and production to a more sustainable and circular economic system.[202]

The private sector in ASEAN+3 (China, Japan, South Korea) countries has been contributing to the reduction of plastic waste and by consequence marine plastic debris in the region. Their efforts can range from improved resource efficiency, to enhanced waste management, to innovative technologies leading to a more sustainable production and consumption patterns. But many such initiatives are not sufficiently recognised and acknowledged. RKC-MPD recognises that suitable public policy and raising public awareness are essential to heighten private sector participation. The Centre helps connect the public, the private sector and governments and draws lessons from good practices and initiatives from companies in the ASEAN+3 region. One of the important objectives of the RKC-MPD is to promote private companies whose business activities help combat marine plastic litter.[203]

On this front, an online platform to support private sector initiatives to reduce plastic waste and marine plastic debris was launched in 2021.[204] The regional online platform collects and disseminates private companies' business activities in the ASEAN+3 region that are conducive to marine plastics mitigation. It showcases ASEAN+3 companies' initiatives, technologies, and innovations to manage marine plastic debris, track debris and reduce plastic waste. Inspired by the private companies' representatives invited at this occasion, it is hoped that the forum would attract a larger number of private companies to take part in this initiative and join forces in the fight against marine plastics.[205]

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[201] Regional Knowledge Centre for Marine Plastic Debris, "Private Sector Initiatives To Reduce
Plastic Waste And Marine Plastic Debris,"
https://rkcmpd-eria.org/story; ERIA, "RKC-MPD's Ayako Mizuno Shares the Private Sector Platform for Tackling Marine Plastic Debris," 25 October 2021, https://www.youtube.com/watch?v=ZjKjzalagVU.

[202] https://rkcmpd-eria.org/story; https://www.youtube.com/watch?v=ZjKjzalagVU

[203] https://rkcmpd-eria.org/story; https://www.youtube.com/watch?v=ZjKjzalagVU

[204] https://rkcmpd-eria.org/story

[205] ERIA, "CONCEPT NOTE 'ASEAN on Point' Public Forum How Policies Can Support the Private Sector in Combatting Marine Plastic Debris," 17 June 2021,
https://www.eria.org/uploads/media/Events/2021-June-Agenda-AoP-MPD.pdf

The platform hosts information submitted by private companies from all ASEAN+3 countries to showcase their products, services, or technologies contributing to the reduction of plastic waste and marine plastic debris. It can appeal to potential customers and investors that can support their efforts. It aims to be conducive to Business-to-Business and/or Business-to-Consumer opportunities in the ASEAN+3 region. Since the launched of the online platform in early 2021, it has already included 48 stories of innovations from various companies from the ASEAN+3. Their innovations are categorised into seven solution types: reduce, reuse, recycle, repurpose, remove, disposal and service.[206] With this categorisation, the platform vividly reflects the viability and sustainability of a plastic circular economy approach. Recognising that it has just been recently established, RKC-MPD has begun exploratory talks with other providers of capacity building programmes in the region such as the CSEAS-ASEANO project. This linking up between regional knowledge centres is a good step towards a more comprehensive and systematic approach to pursuing a multistakeholder approach to plastic pollution.

RKC-MPD has also recently set up an Experts Working Group on Marine Plastic Debris composed of scientists, private sector organisations, and civil society movement to guide the regional centre in possible effective interventions that it can provide for ASEAN, China, Japan and South Korea.[207]

Regional Capacity Center for Clean Seas

Another key capacity building initiative that can complement the RKC-MPD is the *Regional Capacity Center for Clean Seas* (RC3S), whose main work are structured into 3 areas:
(1) Clean Seas Knowledge Management,
(2) Clean Seas Capacity Building and Awareness,
(3) Clean Seas Solution Model.

Launched and funded by the Government of Indonesia, RC3S aspires to be a regional hub for capacity building with a view to contribute to the reduction and mitigation of land-based sources of marine pollution, with particular focus on nutrients, wastewater, marine litter and microplastics.

In this respect, RC3S is a form of implementation of the *2018 Bali Declaration on Protection of the Marine Environment from Land-based Activities* particularly in:
(1) fostering the Global Partnership on Marine Litter and Microplastics, Nutrient Management and the Wastewater Initiative;
(2) enhancing the coordination, engagement and support of the work on marine pollution; and
(3) encouraging exchange of information, practical experience, scientific and technical expertise, as well as cooperative and collaborative action and partnership.[208]

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[206] https://rkcmpd-eria.org/latestproduct.php#paginate-13; Author's consultation with a regional expert, December 2021.
[207] Author's consultation with an Indonesian expert, December 2021.
[208] Regional Capacity Centre for Clean Seas, "About," accessed 14 Dec 2021, https://194.59.165.94/about

The progress of the RC3S as a regional centre has been noteworthy despite the fact that it was only established in 2019 when ASEAN member states had commenced their collective efforts to advance the framework for cooperation in the area of marine plastic pollution. Since 2019, RC3S has been putting together programmes and activities to accomplish its function of becoming a hub for strengthening capacity building in marine environment protection, especially in fighting marine litter/microplastics pollution. Regularly held RC3S's programmes and activities in recent years have been regarded as notable accomplishments of a dedicated regional centre for raising the regional capacity to combat plastic pollution. While being at the early stages, RC3S has already organised forums, capacity building and awareness raising activities – nationally and regionally. It has been exploring a comprehensive solution model to mitigate marine pollution from land-based activities.

One concrete solution RC3S is exploring is a model to monitor marine litter transboundary movement. Given that 95 percent of plastic in our ocean is transported by ten major rivers, eight of which are in Asia, RC3S aims to address this challenge by facilitating the simultaneous use of smart technology (remote sensing) and crowdsourced data collection from ground to monitor and visualise plastic waste leakages into coastal and marine areas, as well as to determine hotspots in order to reform waste management.[209]

The private sector's recycling alliances

The private sector has been recently a major driver of the growing recycling ecosystem in Southeast Asia. National recycling associations/alliances have been setup by companies in Singapore, Malaysia, Vietnam, the Philippines, Vietnam and Indonesia to ramp up their recycling efforts and reduce plastic packaging waste. These coalitions are particularly very much active in the Southeast Asian countries that have been identified as among the world's top plastic polluters. While currently the approach remains voluntary, this should progressively move towards a legally mandated Extended Producer Responsibility (EPR) approach.

The EPR mandates producers and suppliers of regulated products to be responsible for the collection and proper treatment of their products at end-of-life.

The Philippines aims to promote 60% recovery and recycling of plastic by 2030 and offers opportunities for the private sector for technology transfer and assimilation in plastic waste management, particularly for different plastic waste streams. For example, Polystyrene Packaging Council of the Philippines, a group of 21 foam polystyrene producers, has set up a recycling plant. The Philippine Alliance for Recycling and Materials Sustainability (PARMS), a multi-sectoral coalition composed of top consumer goods companies, also plans to build a 25 million PhP (0.46 million US$) recycling facility for sachets in Metro Manila.[210]

In Malaysia, MAREA, also known as the Malaysian Recycling Alliance, was recently established in January 2021 as an industry-led, pioneering initiative towards circular

[209] Regional Capacity Center for Clean Seas Working Agenda 2020, p. 36
[210] SEA Circular, Philippines, https://www.sea-circular.org/country/philippines/

economy. Ten like-minded initial member companies from consumer goods sector are voluntary taking the lead in EPR in Malaysia namely, Coca-Cola Malaysia, Colgate-Palmolive Malaysia, Dutch Lady Milk Industries, Etika Group of Companies, Fraser & Neave Holdings Bhd, Mondelēz International Malaysia, Nestlé Malaysia, Spritzer, Tetra Pak Malaysia and Unilever Malaysia.[211]

Meanwhile, nine companies have discussed, aligned and joined hands to organise the Packaging Recycling Organization Vietnam (PRO Vietnam) in June 2021. The nine founding members who have come forward with the initiative to form PRO Vietnam are Coca-Cola Vietnam, FrieslandCampina, La Vie, Nestlé Vietnam, NutiFood, Suntory PepsiCo Vietnam, Tetra Pak Vietnam, TH Group, and URC Vietnam. PRO Vietnam demonstrates that competing firms are collaborating in Vietnam to jointly work on improving the environment of Vietnam. PRO Vietnam will also cooperate with the government in the "Recycle" aspect of 3R (Reduce, Reuse, and Recycle). It is banking on unique voluntary, public-private partnership aims to improve livelihood conditions and create jobs for individuals and businesses working on post-consumer packaging. Besides, PRO Vietnam will also co-ordinate with research centres of universities to find the most suitable solutions for the environment of Vietnam.[212]

A similar development is also observed in Indonesia with an alliance of top food and beverage companies recently established to ramp up their recycling efforts and reduce plastic packaging waste. In August 2020, they created the Packaging Recovery Organization (PRO) to find ways to fast track the implementation of the circular economy, from waste collection to recycling. Among the members are PT Coca-Cola Indonesia, Danone-Aqua, PT Indofood Sukses Makmur, PT Nestle Indonesia, Tetra Pak Indonesia and Unilever Indonesia. The new organization would have at least three programs: to build a system to recycle polyethylene terephthalate (PET), which is commonly used in plastic bottles; to increase the collection rate for used beverage cartons, flexible and high-density polyethylene packaging; and to educate the public on recycling. PRO aims to achieve a 60 percent recycling rate for PET plastics before moving on to recycling other kinds of packaging.[213]

Most recently, Singapore also established the Plastics Recycling Association of Singapore (PRAS) in August 2021. It brings together stakeholders from industry and research – including waste management companies, chemical producers, Institutes of Higher Learning and government agencies – to exchange knowledge and best practices on plastic waste

[211] MAREA, "Making a Difference in Consumer Packaging Waste, https://www.marea.com.my/

[212] Packaging Recycling Organization Vietnam, "Nine companies join hands to set up a packaging recycling alliance in Vietnam," 12 May 2021, https://provietnam.com.vn/en/news/signing-ceremony-of-viet-nam-packaging-recycling-alliance-pro-viet-nam/

[213] A Muh and Ibni Aqil, "Companies establish organization to combat growing plastic waste," 27 August 2021, https://www.thejakartapost.com/news/2020/08/27/companies-establish-organization-to-combat-growing-plastic-waste.html.

management and recycling. The aim is to deepen Singapore's capability in plastics recycling.[214]

In climate change mitigation, it is important to measure our carbon footprint. This concept of measuring our footprint can also be replicated in addressing marine plastic pollution by measuring our plastic footprint. What is a plastic footprint? It is how much plastic we contribute (consume and produce) to the world's plastic waste. For instance, some members of Thailand's private sector through the Solid Waste Management Association of Thailand (SWAT) presented through a roundtable workshop the outcomes of their ongoing Plastic Footprint Reduction Project in 2021. The project involves five important sectors: plastics & packaging, food & beverage, hotel & hospitality, municipality, and education. The main target of this project is to minimise plastics at source through multisectoral partnerships with the private, public and education sectors. This project focuses on underlying factors that led to plastic pollution as more than 80 percent of marine plastic pollution comes from land-based activities, with the majority coming from Asia, including Thailand. It entails plastic footprint measurement training for members of the partner organisations and each partner organisation conducting a survey of their plastic footprint to identify baseline plastic footprints and areas for action. This was then followed by consultations to discuss possible solutions and shared learnings.[215] This initiative must be replicated in other Southeast Asian countries, across all sectors. What needs to be done, however, is to find a common regional platform in Southeast Asia where this good practice from Thailand's private sector can be shared, adopted or replicated in the wider region.

The private sector can also support scientific marine research expeditions, which can include marine plastic pollution assessment and hotspots identification. This has been done for instance in the Philippines where its marine scientists have received funding support for their marine voyages and scientific expedition particularly in the South China Sea and Philippine Sea. One group of scientists has conducted a preliminary assessment of the marine plastic pollution impact on Philippine-claimed waters and territories in the contested Spratlys in the South China Sea.[216]

Role of scientific cooperation, consortium for baseline studies

In the current formal cooperative arrangements, there is a substantial space given to finding science-based solutions and inform policy making. Currently, the basic knowledge gap that scientists in several Southeast countries are attempting to fill in, is measurement standards and methodology for the volume, sources, areas of concentration and types of plastic debris. This aspect is where scientists have a big role to play given that existing published studies on plastic waste volume from each Southeast Asian country is based on estimation. There is still a need to gather hard scientific data to verify whether the current rankings of

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[214] Speech by Ms Grace Fu, Minister for Sustainability and the Environment, at the Launch of the Plastics Recycling Association of Singapore on 17 August 2021

[215]SEA Circular, " Thai Plastic Footprint Reduction Project identifies changes for reducing marine plastic pollution," 15 September 2021, https://www.sea-circular.org/news/thai-plastic-footprint-reduction-project-identifies-changes-for-reducing-marine-plastic-pollution/

[216] Author's consultation with Filipino experts, December 2021.

some Southeast Asian countries in the listing of top sources of global marine plastic waste are accurate or not.[217]

One of the pioneers in the region in this regard is a group of Filipino scientists from the Marine Science Institute of the University of the Philippines. Given that the current rankings of top countries in the world that contributed to ocean plastic pollution are based on approximation, they wanted to instead provide scientific hard data on how much the Philippines has been generating mismanaged plastic waste in the seas. But the first step that they aim to do is to come up with a standardized method of measurement and assessment which is important because it would allow them to have an appreciation of the gravity of the problem. With their baseline study, it is hoped that scientists in the Philippines and in the region will be able to systematically evaluate and assess the efficacy of methods of plastic waste reduction being implemented. It will also allow Filipino scientists to be able to have an accurate depiction of the state of Philippines' plastic waste problem, in comparison with those of other countries using a standardized and systematic methodology.[218]

In order to achieve a standardization of marine plastic pollution assessment, marine scientists in the region have formed a collaboration platform- MICROSEAP Consortium - formed in 2020. It is composed of universities from Singapore, Indonesia, Malaysia, Vietnam, Thailand and the Philippines. Their scientists are researching microbes on plastic waste found in the region, investigating the threats caused by plastic pollution and searching for solutions to the plastic problem.[219] They are also part of a collaborative research project under the "Understanding the Impact of Plastic Pollution on Marine Ecosystems in south-east Asia (South-East Asia Plastics (SEAP) programme)" which began in October 2020. This three-year collaboration is funded and fully supported by Natural Environment Research Council (NERC), Singapore's National Research Foundation (NRF) and UK government funding supported by the Department for Business, Energy and Industrial Strategy (BEIS).[220]

This growing informal scientific research cooperation contributes to filling in the broad gap in the area of evidence-based policy making. This highlights the role of non-state stakeholders such as scientists in advancing regional cooperation and enhancing current cooperative frameworks and arrangements in Southeast Asia. However, the scientific cooperation in the region is still in an infant stage. There seems to be a relatively low level of regional scientific cooperation in assessing and mitigating the problem. The next section tackles some of the challenges to regional arrangements, including factors behind the slow progress in scientific cooperation, particularly in the South China Sea.

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[217] Author's consultation with a Filipino expert, December 2021.
[218] Author's consultation with a Filipino expert, December 2021.
[219] Ibid.
[220] UK Research and Innovation, "Impacts of marine plastic pollution in south-east Asia researched." 22 Oct 2020, https://www.ukri.org/news/impacts-of-marine-plastic-pollution-in-south-east-asia-researched/

4. Gaps and limitations

Weak Implementation of National Laws and Standards

The UNEP report of Southeast Asian countries' plastic waste policies has pointed out that limited packaging-related policies and inadequate enforcement are exacerbating the problem of plastic pollution in the region.[221] Table 3 shows the current legislative and regulatory frameworks in Southeast Asia, indicating that the efforts are fragmented and no single country has a comprehensive approach towards packaging and packaging waste.

[221] UNEP, *The Role of Packaging Regulations and Standards in Driving the Circular Economy,* 2019, http://sos2019.sea-circular.org/wp-content/uploads/2019/11/FINAL_THE-ROLE-OF-PACKAGING-REGULATIONS-AND-STANDARDS-IN-DRIVING-THE-CIRCULAR-ECONOMY.pdf

Table 3. Summary of packaging regulations and standards in ASEAN[222]

Legislation	BN	KH	ID	LA	MY	MM	PHL	SG	TH	VN
Municipal Solid Waste	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Marine Litter			✓		✓		✓	✓	✓	✓
Anti-Litter	✓			✓	✓	✓	✓	✓	✓	✓
Plastic bag restriction							Under Review			
Single use plastic limit			✓			✓	Under Review		✓	
Biodegradable plastic requirement					✓					
Oxo-biodegradable plastic requirement					✓					
Source separation		✓	✓	✓	✓		✓			✓
National targets for recycling/recovery	✓		✓		✓	✓		✓	✓	✓
Reduction of waste to landfill		✓	✓		✓	✓	✓		✓	
Waste-to-energy			✓		✓				✓	✓
Legal framework Extended Producer Responsibility (Packaging)			✓		✓					
Import restrictions of scrap plastics			✓		✓				✓	✓
Green procurement plan- recycled content for packaging							✓			
Green procurement plan- alternative materials for packaging			✓						Under Review	

Countries: Brunei (BN), Cambodia (KH), Indonesia (ID), Lao PDR (LA), Malaysia (MY), Myanmar (MM), Philippines (PHL), Singapore (SG), Thailand (TH), Vietnam (VN)

The UNEP report accentuates that policy and standards impacting packaging waste in each of the ASEAN countries vary in scope, impact and priority. Whilst all nations have some form of a solid waste management regulation, the legislation and enforcement of a comprehensive legal framework for source separation and separate collection of packaging waste have been inadequate and in some instances there is no progress.

The author's informal consultations with regional experts and practitioners in Southeast Asia reveal that weak enforcement mechanisms are a common problem that besets the region's effort to reduce marine plastic debris. One legal expert from the Philippines informed the author that civil society organisations have filed several petition cases to the Philippines' Supreme Court to ask the Philippine government to take immediate actions to reverse the worsening conditions of the country's seas and rivers, including the growing plastic pollution. Even though key legislative and regulatory frameworks on solid waste

[222] Ibid.

management are already in place, the implementing regulations pertaining to plastic waste and usage of single-use plastics have yet to be crafted.[223]

Addressing Single Use Plastics (SUPs)

The issue of SUPs is significant, due to their high consumption generating huge amounts of waste after a relatively short life. More policy efforts are needed to address the issue of single-use plastic items, including the root causes that have engendered the culture and habits of using disposable items. A few of the Southeast Asian countries have some sort of single-use plastic regulations, especially concerning plastic bags, but there are no outright bans or penalties. In addition, more coherent actions at the regional level are needed, particularly to avoid industries moving towards countries that have not implemented stricter regulations on the use of plastic.[224]

The need to increase public awareness and boost public education

But aside from policy innovations, there is a need for a consumer-driven movement that will encourage companies to drastically minimise, if not completely eradicate, single-use plastics. Another gap is the need to increase public awareness and boost public education. The pandemic has affected the momentum of societies and communities in shifting towards reduced use of plastics and recycling them. The COVID-19 pandemic has disrupted the momentum in terms of sustainable, environmentally friendly consumption that has been seen in past recent years. Intensive public education campaigns to institutionalise behavioral changes are essential.

Currently, several civil society organisations, including environmental groups in the Philippines, Indonesia and Thailand, for instance, conduct grassroots campaigns on sustainable consumption and waste reduction system at the community level. They also inform communities of the harmful effects of microplastic contamination of the food supply chain. There is still a need, however, to mainstream the contributions of civil society organisations and establish collaborative platforms for knowledge and information sharing both at the national and regional level across Southeast Asia.[225]

Challenges to plastic recycling

Another gap in the ASEAN is that demand for recyclates and, in more general terms, the recycling of plastic waste remains very low in most of the ASEAN member states. Specific quality standards are needed as a guarantee that recycled plastics are safe and fit for use as raw material. Standards are also needed for separately collected and sorted plastics to demonstrate that they are sufficiently clean and homogenous to meet the requirements of recycling facilities. In the ASEAN member states, different standards are applied. Mutual recognition of these recycling standards is needed. Homogeneous standards for plastic product and packaging in the region are also lacking. The existence of different product

[223] Author's consultation with a Filipino regional expert, December 2021.
[224] Author's consultation with Filipino and Thai experts, December 2021.
[225] Author's consultation with Filipino, Thai, and Indonesian experts, December 2021.

standards is a key barrier to supporting the development of recycling markets in the region and there is a need for coordination on standards.[226]

There is limited implementation of comprehensive policies to support waste and plastic waste cost-recovery mechanisms in ASEAN. Cost recovery mechanisms are essential to ensure that basic waste management services, such as waste collection and recycling, are economically feasible. At present, there are not enough investments for the management of plastic waste during the whole life-cycle of plastic-containing products. Such investments are essential to address not just the environmental cost of plastics but also the economic costs to industries such as fisheries, shipping and tourism. One of the main obstacles to increasing the investments in plastic waste management projects and innovative products is that many of the companies involved are too small to attract financing and there is a lack of proper channels for connecting investors with entrepreneurs and service providers. Another obstacle for attracting more capital in the sector is that, at present, only a few plastic waste management projects are capable of returning investments and are therefore not attractive for investment. The RKC-MPD's project to help SMEs involved in plastic recycling and waste management should be further expanded to be able to address this challenge.

Lack of coordinated marine research in the South China Sea

Coordinated marine scientific research remains problematic in the South China Sea, which is geographically surrounded by countries that generate much ocean plastic waste and at the same time have overlapping maritime and territorial claims. There have been past attempts to forge joint marine scientific research between claimant states such as the Joint Oceanographic and Marine Scientific Research Expedition in the South China Sea (JOMSRE-SCS) between the Philippines and Vietnam that run from 1994 to 2007. There were proposals from scientists from Vietnam and the Philippines to resume it together with other claimant states including China. In November 2021, Vietnam and the Philippines have agreed in principle to resume JOMSRE-SCS. Nonetheless, one scientist the author consulted with pointed out that the current geopolitical environment remains not conducive to joint scientific research as this has already been heavily politicised in recent years. Some states have been using marine scientific research to assert their territorial and maritime claims in the South China Sea, hindering it to become a confidence-building measure and an area of functional cooperation. In this regard, while scientists from several claimant states may have already begun marine plastic pollution assessment in their claimed waters, there is currently no common platform for joint research or information sharing covering the South China Sea. Joint marine scientific research would be essential to measure the level of contamination of microplastic in different locations of the South China Sea. This type of research would be very helpful in finding solutions to these challenges.[227]

[226] ASEAN Regional Action Plan for Combating Marine Debris in the ASEAN Member States, https://asean.org/storage/FINAL_210524-ASEAN-Regional-Action-Plan_Ready-to-Publish_v2.pdf

[227] Author's consultation with Filipino and Vietnamese experts, December 2021.

The need to broaden scientific research on microplastic to inform evidence-based policy making

Many studies have documented the impact of large plastic debris on the marine environment. However, further studies are needed to provide reliable and accurate assessment of the potential damage caused by microplastics which can be ingested by marine animals, including fish. Together with the toxic chemicals that have accumulated on microplastics, they can be transferred through the food chain and be ingested by humans through the consumption of seafood. This has been identified as a health hazard but has not yet been adequately researched. The major challenge for scientists and policymakers in dealing with ocean plastic pollution is a lack of knowledge of the exact concentration of microplastics in the oceans and the marine food chain.

In Southeast Asia, the microplastic impacts and solutions are not fully conveyed from scientists to the policymakers and more importantly to the public. Scientists, if not directly, may work with policy researchers to get connected with policymakers. Policy researchers will bring the empirical evidence to raise awareness of policymakers and the public and integrate the findings and recommendation to the on-going or future strategic plans and laws (if needed). Scientists are encouraged to produce easy-to-read articles and policy briefs in local language to communicate with the policymakers and the public. Policy makers need not to be only the central government, the research findings can be presented to the industry or the communities or local authorities to raise awareness and find solutions on the ground.

Interdisciplinary research clusters established in several Southeast Asian universities such as the Chulalongkorn University's research cluster on microplastics and plastic pollution is a good example of finding interdisciplinary and evidence-based solutions to plastic pollution.[228]

5. Bringing the Oceans Together

A broader regional framework and a plan of action for Indo-Pacific Oceans

The establishment of a regional framework and issuance of a regional action plan in combatting marine plastic pollution in Southeast Asia provide a good lesson for the wider Indo-Pacific in exploring a much wider action plan and strategy for the Pacific, Indian Ocean and Southeast Asia. This would be in recognition of the fact that marine plastic pollution is a transboundary problem and affects all Indo-Pacific regions. For instance, labels on plastic debris found in a Philippine-held island in the South China Sea make clear that the debris did not originate from the Philippines but from other coastal states. An island community in Thailand, located in the Andaman Sea, finds marine plastic waste carried away from Bay of Bengal regional states, Malaysia, Indonesia and mainland Thailand. In this regard, there must be a wider action plan for the Indo-Pacific.[229]

[228] Author's consultation with a Thai expert, December 2021.
[229] Author's consultation with Thai experts and a Filipino expert, December 2021.

One potential foundational document that can be used is the ASEAN Framework of Action on Marine Debris together with its Regional Action Plan. Drafters of the ASEAN Regional Action Plan wrote that it has the potential for replicability to other regions that are tackling the issue of plastic pollution, such as South Asia.[230] This can be negotiated and drafted through existing ASEAN-led mechanisms such as ASEAN-India dialogue, EAS and ARF.

Capacity-building cooperation

Southeast Asia demonstrates that capacity-building assistance from extra-regional countries and donor countries should be welcomed and integrated in the overall regional strategy towards reducing marine plastic pollution. Clearly, Southeast Asian countries are in dire need of technical and financial assistance in combatting plastic pollution.

In this regard, the various types of collaboration initiated by ASEAN member states with South Korea, Norway and Japan must be used as regional pathways towards a broader capacity-building collaboration framework for the wider Indo-Pacific. The CounterMeasure programme, for instance, intended for the Mekong River in mainland Southeast Asia and the Ganges River in South Asia can be further replicated in other problematic rivers in all sub-regions of Indo-Pacific. The ASEANO project may also be expanded to include the Pacific states and Bay of Bengal littoral states for local capacity-building framework of cooperation and knowledge sharing.

Building technological and knowledge regional 'hubs'

Scientists from Southeast Asia and the Indian Ocean region may form an Indo-Pacific consortium of marine scientists, banking on what has already been started through the MICROSEAP Consortium of Southeast Asian universities. Marine scientific research constitutes a precondition for effective environmental protection in the Indo-Pacific oceans since protection activities such as risk assessment, identification of priorities, and formulation of solutions rely on accurate scientific knowledge and data. Since many aspects of the marine environment and ecosystem are borderless, scientific collaboration – such as joint research expeditions, and sharing of information and data related to MEP like fish stocks and the level of various pollutants – among the countries concerned, is necessary. The consortium of regional scientists may also utilise a common scientific expedition ship platform that can be used to conduct macro and microplastic pollution research. To reduce further tensions among claimant states, a state from Indo-Pacific that has no territorial claims in the South China Sea may offer such platform ship.[231] Scientists from the sub-regions of the Indo-Pacific may also use such consortium to share data, establish common methodology and exchange good practices.

Existing regional knowledge centres such as the Regional Knowledge Centre for Marine Plastic Debris (RKC-MPD) by the Economic Research Institute for ASEAN and East Asia (ERIA)

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[230] ASEAN Regional Action Plan for Combating Marine Debris in the ASEAN Member States Jakarta, ASEAN Secretariat, May 2021.
[231] Author's consultation with a Filipino expert, December 2021.

and the Regional Capacity Center for Clean Seas (RC3S) provide a good model from Southeast Asia that can be expanded in the future, to the wider Indo-Pacific.

While these regional centres are still in their infancy, the progress made capacity-building workshops and related activities signifies an opportunity for the Indo-Pacific Ocean states to bank on the current and future work of such centres. And Indo-Pacific regional centres can assist countries in developing their national ecological policies, integrating sound science into policymaking and environmental management, and fostering cost-effective strategic actions that enhance inter-regional cooperation encompassing the Pacific island states, Indian Ocean region and Southeast Asia.

Regional platforms for recycling alliances in Indo-Pacific

There is an opportunity for every state to collaborate with regional partners through bodies like the business-initiated recycling alliances/associations to accelerate the shift towards plastics circularity in our region and the broader Indo-Pacific. The growing alliances of business conglomerates and multinational corporations in Southeast Asian countries may also seek a regional platform where they can share information and good practices on how their respective recycling alliances can contribute to the circular economy approach at the national level and regional level. These platforms may be established first in each sub-region of the Indo-Pacific and seek inter-regional dialogues thereafter.

In conclusion, the regional approach to addressing this transboundary issue should be comprehensive and multi-sectoral – that includes not only reduction in the use of single-use plastic products but also better waste management, technological solutions, and sustainable economic models.

The active participation of both state and non-state actors, at the national and regional levels, is essential. In this study, the complementary roles of governments, regional organisations such as ASEAN, universities and their scientists, regional knowledge centres, donor countries, the private sector and civil society organisations strengthen the current regional arrangements in Southeast Asia, which much be replicated in the broader Indo-Pacific region, with the primary goal of addressing the worsening marine plastic pollution in our oceans.

Baseline Report 5

Emergency Response and the Maritime Space in Southeast Asia: Regional Cooperative Arrangements

Lina Gong
Research Fellow, RSIS Singapore

Executive Summary

Below are the key findings on regional cooperative arrangements in emergency response in the maritime space in Southeast Asia:

- ***Growing vulnerability to natural disasters:*** Southeast Asia is becoming more vulnerable to natural hazards due to climate change. In particular, the socio-economic impacts of droughts should receive greater attention as the region is predicted to experience more frequent extreme heat waves in the decades to come.

- ***Key focus for ASEAN***: Emergency response, has been and will continue to be a key channel for ASEAN to build regional cohesion in Southeast Asia and to engage extra-regional partners.

- ***Institutionalisation of ASEAN arrangements***: Regional emergency response in Southeast Asia has been well institutionalised within the ASEAN framework. However, a fine balance between institutionalisation and flexibility is necessary, as flexible arrangements facilitate swift and timely responses in many cases.

- ***Ongoing engagement among stakeholders***: Regular engagement in the forms of workshops, meetings and joint exercises helps maintain active working relations between the relevant counterparts, which is conducive for communication and coordination during disasters.

- ***Need for improved information sharing***: A platform for information-sharing is useful for emergency response, which provides timely information related to the emergency, such as damage assessment, deployment of manpower and assets, the points of contact and other information related to the country and community affected.

- ***Role of private sector***: Funding remains a challenge facing emergency response, and efforts should be made to tap into non-public sources, such as the private sector.

- ***COVID-19***: The COVID-19 pandemic has exposed the need to enhance integration between regional mechanisms to deal with different types of disasters, as the concurrence of multiple disasters is increasingly likely. In the double disasters of volcanic eruption and tsunami in Tonga during the pandemic, a lack of communication and coordination between different stakeholders involved hampers the responses.

- ***Enhancing localised responses***: A new modality of emergency response should be explored, such as remote programming, since the pandemic has shown that deployment of international personnel can be difficult in certain circumstances. Localisation therefore should be promoted.

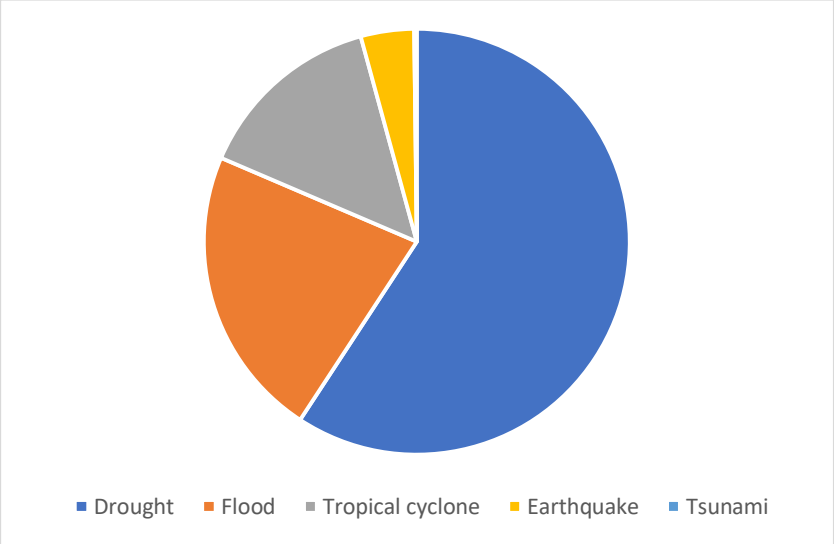
Emergency response is a core component of Southeast Asia's vision to build a resilient regional community led by the Association of Southeast Asian Nations (ASEAN), as reflected in the ASEAN Community Vision 2025.[232] High exposures to natural hazards and extreme weather events are a major factor behind ASEAN's commitment to enhancing disaster management and emergency response in the region. Between 2012 and 2021, the region was stricken by 2903 disaster events, with 97.3 million people affected, 8.5 million displaced, and 5916 killed.[233] In the same period, disasters led to economic losses worth of US$2.8 billion. Moreover, studies by the Intergovernmental Panel on Climate Change (IPCC) predict that the effects of climate change such as heatwaves and strong monsoons will become more pronounced in Southeast Asian countries in the coming decades. This projection further highlights the importance of emergency response for ASEAN collectively and the member states individually.

The maritime space takes an important place in ASEAN's emergency response for several reasons. First, natural hazards originating from the seas such as tropical storms and tsunamis that are induced by submarine earthquakes and landslides can lead to significant losses in Southeast Asia. The Indian Ocean tsunami in 2004 for instance was one of the deadliest disasters in history, killing over 200,000 people in the littoral countries, including Indonesia, Thailand, and Myanmar. Storms and tsunami accounted for about 10 percent of natural hazards in the region and contributed to 14.5 percent of annual economic losses.[234] Second, Southeast Asian countries, except Lao PDR, have long maritime borders and high percentages of population living in the coastal areas. The coastal communities are vulnerable to hazards such as coastal flooding, erosion, inundation, and their security and livelihood are increasingly threatened by the effects of climate change, such as sea level rise.[235] Third, navies are among the first responders to natural hazards in the region and sealift is an important means of transport, owing to the naval capabilities and assets which are critical for opening

[232] "ASEAN Community Vision 2025" (ASEAN, 2015), https://www.asean.org/wp-content/uploads/images/2015/November/aec-page/ASEAN-Community-Vision-2025.pdf.
[233] ADInet. (2021), 'Homepage', AHA Centre Disaster Information Network (ADInet), http://adinet.ahacentre.org/.
[234] ADInet. (2022), 'Homepage', AHA Centre Disaster Information Network (ADInet), http://adinet.ahacentre.org/, accessed 10 January 2022; "The Disaster Riskscape across South-East Asia: Key Takeaways for Stakeholders" (Bangkok: United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), 2020), https://www.unescap.org/sites/default/files/IDD-APDR-Subreport-SEA.pdf.
[235] Jack Board, "Millions More in Southeast Asia Face Sea Level Rise Risks than Previously Thought: Satellite Imagery Study," CNA, 2 July 2021, https://www.channelnewsasia.com/sustainability/sea-level-rise-southeast-asia-satellite-imagery-climate-change-1989406.

humanitarian access in the immediate aftermath of disasters.[236] Given these factors, an examination of emergency response in Southeast Asia from the maritime perspective contributes to a more comprehensive understanding of the region's disaster management.

Figure 1: Average Annual Losses of Different Natural Hazards in Southeast Asia



Source: ESCAP (2020):1.

Effective emergency response constitutes an important basis of the legitimacy of the government concerned and has bearing on its international image. While Southeast Asian countries have made notable progress in strengthening their capabilities to deal with disasters, regional and international cooperation remains essential in the face of large-scale or complex disasters. In addition, emergency response provides a useful channel for ASEAN to enhance intra-regional cohesion and to engage extra-regional partners through dialogues, capacity-building, joint exercises and operations.

This baseline report examines the status of regional cooperation in Southeast Asia on emergency response and the broad disaster management by scanning the existing cooperative arrangements, assessing the effectiveness of these arrangements, analysing the problems, challenges and opportunities to enhance regional cooperation, and exploring possible pathways. This study finds that emergency response in Southeast Asia features a mix of bilateral and multilateral cooperation. The national government concerned takes the lead in responding to disasters and determines the modality of external involvement. When the national response is inadequate, assistance from ASEAN and other partners fills in the gaps. Through institutionalisation, ASEAN has developed the necessary capacities and resources to assumes the central role in regional response. However, ASEAN still faces challenges in mandate, capacity and financial resources to respond to the range of emergencies occurring in the region.

This Baseline Report #5 contains the following sections:

1. Why emergency response matters in Southeast Asia

[236] Serkan Tezgel, "Medium Navy: A Trilateral Capability Building for HA/DR in Asia Pacific," *Procedia Engineering* 107 (2015): 122–32, https://doi.org/10.1016/j.proeng.2015.06.065.

2. Regional arrangements for emergency response: ASEAN and ASEAN-centered platforms
3. What works well: Moving towards collective responses led by ASEAN
4. Fixing the gaps: Inadequacy in coping with different emergencies
5. Bringing the oceans together

1. Why Emergency Response Matters in Southeast Asia

Natural hazards threaten human and national security in many ways: the loss of human life, displacement of people, disruption of livelihood, and economic losses. The affected communities need protection, shelter, food, water, healthcare, and education. As one of the world's most disaster-prone regions, Southeast Asia was hit by multiple large-scale episodes in the past two decades, such as Cyclone Nargis in 2008 in Myanmar, Typhoon Haiyan in 2013 in the Philippines, and the earthquake and tsunami in 2018 in Central Sulawesi, Indonesia.

Among the ten ASEAN member states, Indonesia and the Philippines are most vulnerable to natural hazards. Out of the 19 largest-recorded natural hazards in ASEAN in the past century, Indonesia and the Philippines accounted for seven each.[237] Indonesia is highly prone to earthquakes.[238] It was the worst affected country in the Indian Ocean tsunami, with over 180,000 people killed in the Aceh province, the epicentre of the disaster. In 2018, Indonesia was hit by multiple major disasters, with over 4,600 deaths and tens of thousands of people displaced.[239] The Philippines is affected by around 20 tropical storms a year.[240] Typhoon Haiyan in 2013 killed over 6,000 people, displaced over a million, and led to economic losses of more than US$10 billion, which amounted to 3.72 percent of the country's GDP in the same year. Countries in the Mekong River Basin such as Vietnam, Thailand, Cambodia, and Lao PDR face high risks of flood and drought.

Between 2000 and 2016, natural hazards caused the death of 362,000 people and affected 250 million in the region.[241] Moreover, the mortality rate increased from 8 deaths per 100,000 between 1990 and 2003 to 61 deaths per 100,000 between 2004 and 2014.[242] In terms of

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[237] *Valerie Bayhon, Shintya Kurniawan, and William Shea*, "Southeast Asia's Largest Recorded Disaster," *The Column*, vol. 44, , https://thecolumn.ahacentre.org/posts/insight-posts/vol-44-southeast-asias-largest-recorded-disasters/.

[238] "Indonesia Rocked by More than 11,000 Earthquakes Last Year," *Straits Times*, 12 June 2019. https://www.straitstimes.com/asia/se-asia/indonesia-rocked-by-more-than-11000-earthquakes-last-year

[239] Agence France-Presses and Restidia Putri, "The Dead and Displaced: Indonesia Counts the Cost of 2018's Wave of Natural Disasters," *South China Morning Post*, 28 December 2018, https://www.scmp.com/news/asia/southeast-asia/article/2179919/dead-and-displaced-indonesia-counts-cost-2018s-wave-natural.

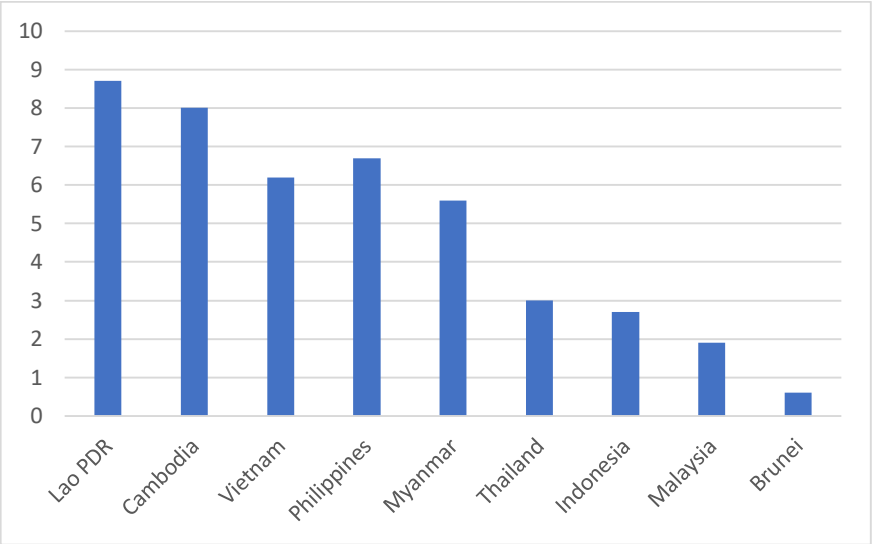
[240] UNESCAP, *Disaster Resilience for Sustainable Development*, 10.

[241] United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), *Disaster Resilience for Sustainable Development: Asia-Pacific Disaster Report 2017* (Bangkok: United Nations Publication, 2018), 10.

[242] Angaindrankumar Gnanasagaran, "Mitigating Natural Disasters in ASEAN," *The ASEAN Post*, 21 May 2018.

economic cost, the total economic losses from natural hazards between 2000 and 2014 amounted to US$91 billion.[243] As a percentage of GDP, Lao PDR loses 8.7 percent of its GDP to natural hazards annually, the highest among ASEAN member states (Figure 2). The significant losses in human life and economic assets show that natural hazards are therefore one of the most salient non-traditional (NTS) security threats in the region.

Figure 2 Annual average losses as percentage of GDP in Southeast Asia



Note: Singapore is not included in the chart as its value is below 0.5%. Source: ESCAP (2020).

Given the security and socioeconomic impacts of natural hazards, emergency response that aims to lessen the impacts of disasters and relieve human suffering has been placed high on the work agenda of ASEAN and the governments of ASEAN member states. Since the Indian Ocean tsunami, ASEAN member States have invested substantively and achieved continuous progress in disaster management.[244] Nevertheless, there were still instances when national responses were overwhelmed. In 2013, the Philippines had to seek international assistance after the record-scale typhoon Haiyan.[245] Similarly, the Indonesian government, which is usually reluctant to accept foreign assistance, opened to international relief aid in the aftermath of the earthquake and tsunami hit Central Sulawesi in September 2018, as the national response system was over-stretched by multiple earthquakes in July and August.[246]

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[243] Gnanasagaran, "Mitigating Natural Disasters."

[244] "ASEAN Disaster Resilience Outlook - Preparing for a Future Beyond 2025" (Jakarta: ASEAN, 2021), 15, https://asean.org/book/asean-disaster-resilience-outlook-preparing-for-a-future-beyond-2025/.

[245] "Philippines Calls for Help as Huge Rescue Operation Begins after Typhoon Haiyan," Associated Press, November 10, 2013, sec. World news, https://www.theguardian.com/world/2013/nov/10/philippines-outside-help-rescue-operation-typhoon-haiyan.

[246] Sheany, "Indonesia Weighs Foreign Aid Offers; Resists Declaring National Disaster in C. Sulawesi," Jakarta Globe, October 1, 2018, https://jakartaglobe.id/news/indonesia-weighs-foreign-aid-offers-resists-declaring-national-disaster-in-c-sulawesi.

The gaps in national and regional capacity and resources necessitate international cooperation. In particular, maritime response is often a key element of such cooperation. The US Navy led the US response in Aceh, Indonesia in 2004, whose logistical operations were viewed by the Indonesian government as critical.[247] The massive humanitarian assistance and disaster relief (HADR) efforts of foreign navies in the aftermath of typhoon Haiyan revealed the limitations of Southeast Asian navies in HADR.[248] Beyond the humanitarian domain, emergency response also has political and strategic significance, as countries, particularly major powers, use HADR as a tool to build a benign image and increase international influence.[249]

2. Regional arrangements for emergency response: ASEAN and ASEAN-centered platforms

Regional arrangements for emergency response in Southeast Asia can be categorised in two groups: ASEAN institutions and the ASEAN-centered multilateral mechanisms. ASEAN institutions consist of legal and political frameworks, policy guidelines, decision-making and operational bodies, physical infrastructure and facilities. The Indian Ocean tsunami prompted ASEAN member states to accelerate negotiations on the *ASEAN Agreement on Disaster Management and Emergency Response* (AADMER), which was adopted in 2005 and came into effect in 2009. AADMER serves as the legal basis to define the roles and responsibilities of different stakeholders in regional disaster management.

The establishment of the ASEAN Coordinating Centre for Humanitarian Assistance on disaster management (AHA Centre) in 2011 was another key event in ASEAN's insitutionalisation of emergency response. As the operational arm of ASEAN, the AHA centre is designed to coordinate and facilitate collective responses of ASEAN to disasters. Since its founding, the AHA Centre has been developing its talent pool, knowledge basis, material resources, and logistic infrastructure to enable its growth beyond a coordinator to be an assistance provider. In the aftermath of the earthquake and tsunami in Central Sulawesi in 2018, the AHA Centre was entrusted with the responsibility of coordinating all international assistance to Indonesia, with the support of the United Nations Office for the Coordination of Humanitarian Affairs. Moreover, the AHA center serves as a key point of contact for international cooperation, contributing to growing international recognition of ASEAN's work in disaster management.[250]

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[247] John Bradford, "Waves of Change: Evolution in the US Navy's Strategic Approach to Disaster Relief Operations between the 2004 and 2011 Asian Tsunamis," Asian Security 9, no. 1 (2013): 19–37, https://doi.org/10.1080/14799855.2013.760983.
[248] Collin Koh, "Typhoon Haiyan and ASEAN's Naval Effort," The Diplomat, December 6, 2013, https://thediplomat.com/2013/12/typhoon-haiyan-and-aseans-naval-effort/.
[249] Richard Salmons, "Disaster Relief, International Status and Regional Order: A Case Study of Typhoon Haiyan," Global Change, Peace & Security 31, no. 3 (2019): 293–301.
[250] "ASEAN Disaster Resilience Outlook - Preparing for a Future Beyond 2025" (Jakarta: ASEAN, 2021): 19, https://asean.org/book/asean-disaster-resilience-outlook-preparing-for-a-future-beyond-2025/.

Beyond the regional organisation of ASEAN, there are regional platforms that allow ASEAN member states and dialogue partners, such as the ASEAN Regional Forum (ARF), the ASEAN Defence Ministers' Meeting–Plus (ADMM Plus), the Asia-Pacific Economic Cooperation (APEC) and East Asia Summit (EAS). The activities of ARF include Inter-Sessional Meeting, Expert Group Meeting, and seminars and workshops on themes related to disaster relief.[251] Apart from meetings, the ARF holds regular exercises on humanitarian assistance and disaster relief as well as maritime search and rescue, such as desk-top exercises in 2007 and 2009 and joint exercises co-chaired by the two member states since 2010. The ARF issued the *Statement on Disaster Management and Emergency Response* in 2006,[252] and the *Statement on Disaster Management Cooperation* in 2018.[253] The ADMM-Plus is now a major platform for ASEAN to engage dialogue partners on security issues, including emergency response. The mechanisms are similar to ARF. Disaster relief is one of the seven focal areas of ADMM-Plus, with one Experts' Working Group to promote cooperation in this area. Similar to that of ARF, cooperation in the ADMM Plus framework includes meetings, workshops, and joint exercises.[254]

Apart from the ARF and ADMM Plus which focus on the military dimensions of emergency response, there are other arrangements in the Asia-Pacific that prioritise disaster preparedness and response. APEC set up the APEC Emergency Preparedness Working Group to reduce disaster risks and lessen the economic impact of disasters.[255] The EAS issued the *Cha-am Hua Hin Statement on EAS Disaster Managemen*t in 2009 and the *Statement on Rapid Disaster Response* in 2014.[256] These various platforms provide opportunities for ASEAN member states and dialogue partners to build and enhance trust and familiarise with each other's practices and procedures related to emergency response.

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[251] ASEAN Regional Forum, "ASEAN Regional Forum: List of Track I Activities," 10 December 2019, http://aseanregionalforum.asean.org/wp-content/uploads/2020/03/List-of-ARF-Track-I-Activities-by-Inter-Sessional-Year-as-of-10-Dec-2019.pdf.

[252] Centre for International Law-NUS, "2006 ASEAN Regional Forum Statement on Disaster Management and Emergency Response," Kuala Lumpur, 28 July 2006, https://cil.nus.edu.sg/wp-content/uploads/2019/02/2006-ARF-STATEMENT-ON-DISASTER-MANAGEMENT.pdf.

[253] ASEAN Regional Forum, "ASEAN Regional Forum Statement on Disaster Management Cooperation," 4 August 2018, http://aseanregionalforum.asean.org/wp-content/uploads/2019/01/ARF-Statement-on-Disaster-Management-Cooperation-Singapore-4-August-2018.pdf.

[254] ASEAN Defence Ministers' Meeting (ADMM), "Past Meetings and Events (2006–2019)," 5 January 2015, https://admm.asean.org/index.php/admm-news/7-news.html?start=5.

[255] Asia-Pacific Economic Cooperation (APEC), "Emergency Preparedness Working Group Strategic Plan 2017–2019," 2017/SOM1/SCE/010, http://mddb.apec.org/Documents/2017/SCE/SCE1/17_sce1_010.pdf.

[256] East Asia Summit (EAS), "Cha-am Hua Statement on EAS Disaster Management," Cha-am Hua Hin, Thailand, 25 October 2009, https://www.mofa.go.jp/region/asia-paci/eas/state0910-3.pdf; EAS, "East Asia Summit (EAS) Statement Rapid Disaster Response," Nay Pyi Taw, Myanmar, 13 November 2014, https://reliefweb.int/sites/reliefweb.int/files/resources/EAS%20statement%20on%20Rapid%20Disaster%20Response.pdf.

3. What works well: Moving towards collective responses led by ASEAN

Institutionalisation contributes to ASEAN's vision towards "One ASEAN One Response". ASEAN has developed work programmes on disaster management every five years since 2004 and organised regular emergency simulation exercises since 2005. ASEAN has also achieved progress in institution-building, with the ASEAN Committee on Disaster Management as the decision-making body and the AHA Centre as the operational arm.[257] To support its lead in regional response, ASEAN has set up the ASEAN Emergency Response and Assessment Team (ASEAN-ERAT), the ASEAN Disaster Information Network, the Disaster Emergency Logistics System for ASEAN (DELSA), and three satellite warehouses across the region (Subang in Malaysia, Aguinaldo in the Philippines, and Chainat in Thailand). These developments culminated in the set of procedures and guidelines, institutions and physical infrastructure that have enabled ASEAN to lead collective responses to natural hazards in the region.

A variety of external partnerships allow ASEAN to diversify financial and resource support. Japan has been the biggest source of financial support for the AHA Centre's activities since 2011.[258] The European Union signed an agreement with ASEAN in June 2019 to provide US$11 million to support the AHA Centre.[259] Australia funded ASEAN's recovery projects in Palu after the double disasters of earthquake and tsunami in 2018, offered US$1 million to support AHA to build capacity to respond to human-induced disasters, and deployed experts to support the center's work on logistics.[260] The United States has been a leading provider of military assets in times of disasters in the region, from the Indian Ocean tsunami to typhoon Haiyan in 2013.[261] China has scaled up its engagement with ASEAN on emergency response in recent years. In November 2020, China and ASEAN agreed to establish the mechanisms for regular meetings at the ministerial and senior official levels.[262] As part of the agreement, the ACDM

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[257] Mely Caballero-Anthony, *Negotiating Governance on Non-Traditional Security in Southeast Asia and Beyond* (New York: Columbia University Press, 2019), 146-50; Angela Pennisi di Floristella, "Dealing with Natural Disasters: Risk Society and ASEAN: A New Approach to Disaster Management," *The Pacific Review* 29, no. 2 (2016): 296-297.
[258] Will Shea, "Japan-ASEAN Integration Fund," *The Column*, Vol. 39, 16 July 2018, https://thecolumn.ahacentre.org/posts/partnership/vol-39-japan-asean-integration-fund/.
[259] "Integrated Programme in Enhancing the Capacity of AHA Centre and ASEAN Emergency Response Mechanisms (EU Support to AHA Centre)," EU Action Centre, 27 June 2019, https://eeas.europa.eu/headquarters/headquarters-homepage/64686/integrated-programme-enhancing-capacity-aha-centre-and-asean-emergency-response-mechanisms-eu_fr.
[260] "The AHA Centre Annual Report 2020: Transformation through Adversity" (Jakarta: AHA Centre, 2021), https://ahacentre.org/wp-content/uploads/publications/AHA-Centre-Annual-Report-2020.pdf.
[261] Richard Salmons, "Disaster Relief, International Status and Regional Order: A Case Study of Typhoon Haiyan," *Global Change, Peace & Security* 31, no. 3 (2019): 289.
[262] "Chairman's Statement of the Eighth Ministerial Meeting on Disaster Management (AMMDM) and Ninth Meeting of the Conference of the Parties (COP) to the ASEAN Agreement on Disaster Management and Emergency Response (AADMER)," ASEAN Secretariat, 27 November 2020, https://asean.org/storage/ADOPTED_Chairman-Statement-

Plus China mechanism was launched to facilitate regular dialogues on enhancing cooperation on disaster management.[263] The array of multilateral arrangements have facilitated regional cooperation on emergency response in Southeast Asia to evolve from dialogues and consultation to collective responses.

Mutual trust constitutes a foundation for cooperation on emergency response, particularly military response. The deployment of foreign military assets for relief efforts in a sovereign country remains a sensitive issue in Southeast Asia and is subject to the level of mutual trust and military relations between the sending and the recipient countries. In the wake of the KRI Nanggala 402 submarine incident in April 2021, Singapore and Malaysia were the first to respond, which indicates the good working relations between the navies of ASEAN member states. Singapore dispatched its submarine rescue vessel a few hours after the Indonesian Navy submitted the request for assistance to the International Submarine Escape and Rescue Liaison Office (ISMERLO) on 21 April 2021. Malaysia deployed a submarine rescue ship the next morning.[264] The swift response of Singapore and Malaysia indicates the good level of trust and close working relations between ASEAN militaries. India deployed its rescue vessel on the same day as Malaysia and was followed by Australia and the US, which demonstrates the value of ASEAN's confidence building with dialogue partners at various regional platforms. Although the sinking of the submarine is not a natural hazard, the deployment of military assets for such search and rescue operations shares similarities with that for HADR after natural hazards.

4. Fixing the gaps: Inadequacy in coping with different emergencies

Financial sustainability has been a key agenda of ASEAN's disaster management. The current funding arrangements primarily relies on governmental contributions of Member States and external partners. The ASEAN Disaster Management and Emergency Response (ADMER) Fund was established in 2012 to fund emergency-related work in the region. Reliant solely on voluntary contributions from Member States, the ADMER Fund accounts for a modest share in the overall spending of ASEAN's disaster management. For instance, the AHA Centre had a revenue inflow of $4.3 million in 2020, out of which US$900,000 was annual contributions from Member States, US$2.7 million from external partners and US$36,800 from the ADMER Fund.[265]

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to-8th-AMMDM-9th-COP-to-AADMER_27-Nov-2020.pdf. The same dialogue mechanism between Japan and ACDM was also established in the same period.

[263] "ASEAN, China Holds 1st Meeting Committee on Disaster Management," ASEAN Secretariat, 10 June 2021, https://asean.org/asean-china-holds-1st-meeting-committee-disaster-management/

[264] John Bradford, "KRI Nanggala-402: Time to Boost Maritime Cooperation," RSIS Commentary, April 26, 2021, https://www.rsis.edu.sg/rsis-publication/rsis/kri-nanggala-402-time-to-boost-maritime-cooperation/#.Ybn2JWhBxD8.

[265] "The AHA Centre Annual Report 2020: Transformation through Adversity" (Jakarta: The AHA Centre, 2021), https://ahacentre.org/wp-content/uploads/publications/AHA-Centre-Annual-Report-2020.pdf.

In recognition of its reliance on external financial sources, ASEAN has initiated a range of reforms and innovations to generate funding within the region. For example, it endorsed *Bandar Seri Begawan Declaration on the Strategic and Holistic Initiative to Link ASEAN Responses to Emergencies and Disasters* (ASEAN SHIELD) in October 2021.[266] One strategic component outlined in the declaration is to link the people of ASEAN to regional relief efforts more closely by promoting a participatory approach to disaster management. This will involve establishing a platform that will enable the peoples of ASEAN to contribute during natural hazards, such as through the ADMER Fund. While it is still under discussion on the specific arrangement for people to contribute to the ADMER Fund, this plan points to the need to diversify channels of financing for emergency response.

Beyond government funding, ASEAN member states have turned to the capital market to address financial constraints on disaster management and emergency response. The Philippines had its first two sovereign catastrophe bonds worth of US$225 million issued by the World Bank in 2019.[267] This provided financial protection against losses from earthquakes and tropical cyclones for a period of three years, strengthening the state's long-term disaster management capacities. Indonesia, with the support of the World Bank, is exploring to capitalise on the capital market to strengthen its financial resilience in the wake of shocks.[268]

The COVID-19 pandemic has exposed the inadequacy of ASEAN's existing structure to deal with the range of disasters and emergencies occurring in the region and the concurrence of different disasters. During the pandemic, particularly in the early period, ASEAN focused on information-sharing and coordination, but did not deliver the urgently needed medical supplies to its member states in need, raising questions over the vision of "One ASEAN, One Response".[269] Although there calls for ASEAN to take a more active role to facilitate COVID-19 vaccine procurement in the region, the member states in the end secured their supplies through bilateral channels. ASEAN supporters can argue that a high level of unity of action is not likely given the nature of the regional organisation. However, the decision to establish the ASEAN Center for Public Health Emergencies and Emerging Diseases in 2020, which can be seen an equivalent of the AHA Centre in the health sector, indicated ASEAN's interest to tighten its responses to public health emergencies in the future.

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[266] "Bandar Seri Begawan Declaration on the Strategic and Holistic Initiative to Link ASEAN Responses to Emergencies and Disasters (ASEAN SHIELD)" (ASEAN, October 26, 2021), https://asean.org/wp-content/uploads/2021/10/2.-BSB-Declaration-on-ASEAN-SHIELD.pdf.

[267] "World Bank Catastrophe Bond Transaction Insures the Republic of Philippines against Natural Disaster-Related Losses Up to US$225 Million," World Bank, November 24, 2019, https://www.worldbank.org/en/news/press-release/2019/11/25/world-bank-catastrophe-bond-transaction-insures-the-republic-of-philippines-against-natural-disaster-related-losses-up-to-usd225-million.

[268] "Strengthening Indonesia's Fiscal Resilience to Natural Disasters and Health-Related Shocks," World Bank, January 21, 2021, https://www.worldbank.org/en/news/press-release/2021/01/21/strengthening-indonesias-fiscal-resilience-to-natural-disasters-and-health-related-shocks.

[269] Thi Ha Hoang, "Covid-19 Challenges Asean to Act as One," The Straits Times, March 31 2020, https://www.straitstimes.com/opinion/covid-19-challenges-asean-to-act-as-one.

There was an attempt within ASEAN to respond to humanitarian needs in the region induced by the COVID-19 pandemic. This attempt was reflected in the *Declaration of the Special ASEAN Summit on Coronavirus Disease 2019* on 14th April 2020, which placed the AHA Centre together with regional bodies for emergency response to deal with public health emergencies in the future.[270] As the COVID-19 situation in the region deteriorated, the AHA Centre provided support for national responses. ASEAN member states were able to request items such as mobile storage units, hygiene kits and prefabricated offices from the Centre's relief stockpiles.[271] However, conventional stocks of humanitarian aid do not meet the specific needs in this outbreak given the differences between the pandemic and natural hazards. Hence, due to its primary responsibility to respond to natural hazards, the AHA Centre is under-equipped to lead the region's response to COVID-19 compared with natural hazards.

Moreover, the pandemic has limited ASEAN's response to natural hazards in the region, as deployment of international personnel to the affected areas has become unlikely, due to restrictions on international travel. Several Southeast Asian countries had to deal with natural hazards. The Philippines has been affected by at least three major typhoons in 2020, Vongfong in May, Goni in October, and Vamco in November.[272] Cambodia and Vietnam were hit by successive tropical storms in October 2020, which caused deadly floods.[273] While delivering relief goods to the affected countries, the AHA Centre was not able to dispatch personnel due to border closures.[274] The COVID-19 pandemic is a powerful reminder about the need for ASEAN to adopt a more holistic approach to emergency response, which takes into consideration the possibility of concurring emergencies.

The humanitarian situation in Myanmar after the military coup in February 2021 has posed another challenge to ASEAN's self-positioning as a central humanitarian actor in the region. Given the nature of ASEAN and its adherence to non-interference, a proper mandate is

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[270] "Declaration of the Special ASEAN Summit on COVID-19" (ASEAN, April 14, 2020), https://asean.org/wp-content/uploads/2021/09/FINAL-Declaration-of-the-Special-ASEAN-Summit-on-COVID-19.pdf.

[271] Ina Rachamawati, "Mobilising DELSA Relief Items For Covid-19 Response", The Column, vol 61, https://thecolumn.ahacentre.org/posts/highlight/vol61-mobilising-delsa-relief-items-for-covid-19-response/.

[272] AHA Centre, "Flash Update No.2 -Typhoon 'Vamco', Philippines," 17 November 2020, https://reliefweb.int/sites/reliefweb.int/files/resources/FlashUpdate_02_17Nov2020-TY-VAMCO-Philippines.pdf; AHA Centre, "Situation Update No.1 – Super Typhoon Goni in the Philippines," 7 November 2020, https://drive.google.com/file/d/1PS2qVyBigeswlkk3WRyUYV3LeSvkxHAM/view; AHA Centre, "Flash Update: No.03 – Tropical Cyclone Vongfong, Philippines," 16 May 2020, https://ahacentre.org/flash-update/flash-update-no-03-tropicalcyclone-vongfong-philippines-16-may-2020/.

[273] Loy Irwin, "Twin Storms Drive 'Catastrophic' Vietnam Floods as a Third Approaches," The New Humanitarian, 21 October, 2020, https://www.thenewhumanitarian.org/maps-and-graphics/2020/10/21/asia-vietnam-cambodia-laos-floods.

[274] Jeffrey Hutton, "Vietnam's Handling of Deadly Floods Shows How Covid-19 May Slow Disaster Response," Straits Times, 28 October 2020, https://www.straitstimes.com/asia/se-asia/vietnams-handling-of-deadly-floods-shows-how-covid-19-may-slow-disaster-response.

essential for ASEAN bodies to respond to emergencies in the region. While the AHA Centre was designated to lead the humanitarian response to Myanmar in the Five-Point Consensus adopted on 24 April 2021,[275] the reservation on its role in this case is due to a lack of mandate and capacity, as the AHA Centre is primarily mandated to deal with natural hazards. The situation in Myanmar is political in nature and within the ambit of the ASEAN Political and Security Community, while the AHA Centre belongs to the ASEAN Socio Cultural Community. Cross-sectoral nature of this arrangement indicates that more efforts are possibly needed for communication and reporting.

In addition, ASEAN has encountered challenges in promoting regional cooperation due to issues such as differing levels of capacity among member states, the reluctance to share sensitive data and varying exposure to disaster risk.[276] To narrow differences and bridge cooperation, ASEAN follows the lowest common denominator and adopts the consensus-based decision making, which has drawn criticism over its inaction and slow response in some cases.

5. Bringing the Oceans together

The following recommendations are made regarding applicable lessons from regional cooperation in emergency response in the maritime space in Southeast Asia:

- Institutionalisation facilitates collective responses to emergencies. Despite doubts and criticisms, ASEAN's capacity to deal with natural hazards has been substantively improved compared to 20 years ago, thanks to the set of regional institution, talent pool, material resources, and facilities. Moreover, a formal regional institution provides a focal point for such engagement activities between the region and extra-regional partners.

- Striking a balance between institutionalisation and flexibility remains a challenge for ASEAN. ASEAN's consensus-based approach to regional affairs contributes to its limited role in responding to humanitarian needs in situations, which are deemed sensitive in the region, such as the military coup in Myanmar. Moreover, as mentioned, the AHA Centre as a regional body in the socio-cultural sector in the region can face potential challenges in getting involved in situations of political and security concerns. Mechanisms for coordination between different stakeholders involved can contribute to reduce fragmentation in emergency response.

- Mechanisms for regular engagement, which can range from workshops and meetings to joint exercises, lay the groundwork for deeper cooperation. Regular engagement that brings together the contact points of different countries, institutions and sectors

[275] "Chairman's Statement on the ASEAN Leaders' Meeting" (ASEAN, 24 April 2021), https://asean.org/wp-content/uploads/Chairmans-Statement-on-ALM-Five-Point-Consensus-24-April-2021-FINAL-a-1.pdf.

[276] Angela Pennisi di Floristella, "Dealing with Natural Disasters: Risk Society and ASEAN: A New Approach to Disaster Management," *Pacific Review*, Vol. 29, No. 2 (2016), pp. 298–300.

facilitates the establishment of trust and working relations.[277] Pre-existing partnerships increase efficiency in cooperation and communication in times of disasters.

- A platform for information-sharing is useful for emergency response, which provides timely information related to the emergency, such as damage assessment, deployment of manpower and assets, related points of contact and other information related to the country and community affected. The Changi Regional HADR Coordination Centre (RHCC) supported by the government of Singapore was established in 2014 to coordinate military responses in ASEAN and the neighbouring regions. The RHCC Centre monitors disaster-related information in the region and share with partner militaries. In the event of a disaster, if the affected country accepts foreign military response, the RHCC is able to coordinate with international liaison officers to provide update on deployment of foreign military assets.[278] Such information-sharing platforms can contribute to more effective response and reduce duplication in offer of assistance. While it is beyond the capacity of many organisations to respond to all types of emergencies, a regional institution or platform can assume the role of convening and moderating international assistance and thus relieve the pressure on the governments concerned.

- Sustainability of funding and resources is a key issue, and regional organisations should consider tapping into non-public sources. In 2019, humanitarian funding from private sources (individuals, foundations, corporations, national societies and other) amounted to US$9.15 billion. Large corporations and their private trusts accounted for 14 percent of the total private humanitarian funding between 2015 and 2019, and the number is projected to growth further.[279] Instead of viewing the private sector as donors, regional initiatives/mechanisms should engage them as partners, as they possess strength and advantages that are essential for emergency response, such as local transport and technology. DHL, for instance, is a key partner of the UN and ASEAN in disaster relief. After the double disasters, DHL was entrusted by Indonesian authorities to support the airports Palu and Balikpapan to manage the incoming relief items.[280] Such assistance is crucial as logistics is critical for relief operations.

- Greater involvement of social groups should be encouraged, such as diaspora communities. Remittances from diaspora communities contribute significantly to socio-economic development in developing countries, including disaster relief. Remittances are larger in volume than official development assistance and more stable than private

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[277] Bradford, "Waves of Change," 25.

[278] "Fact Sheet: Changi Regional HADR Coordination Centre (RHCC)," Ministry of Defence of Singapore, December 6, 2017, https://www.mindef.gov.sg/web/portal/mindef/news-and-events/latest-releases/article-detail/2017/december/06dec17_fs.

[279] "Global Humanitarian Assistance Report 2021" (Bristol: Development Initiatives, 2021): 52-53, https://devinit.org/documents/1008/Global-Humanitarian-Assistance-Report-2021.pdf.

[280] DHL, "Following Palu Earthquake and Tsunami Deutsche Post DHL Group Sends Disaster Response Team to Indonesia," Press Release, October 5, 2018, https://www.dhl.com/global-en/home/press/press-archive/2018/following-palu-earthquake-and-tsunami-deutsche-post-dhl-group-sends-disaster-response-team-to-indonesia.html.

capital.[281] ASEAN has been exploring the possibility of issuing diaspora bonds to support disaster-related activities, as part of its strategy to ensure financial sustainability for disaster management.[282] Many Indian Ocean countries share similarities with some ASEAN member states, in terms of high percentages of overseas citizens and urgent needs for financing disaster relief. India previously issued diaspora bonds when having difficulty in financing through the international capital market.[283] Multilateral cooperative arrangements in the Indian Ocean region should consider supporting some member states to explore this financial instrument, in collaboration with international organisations. Effective mobilisation of these communities can create a substantive pool of financial and material resources.

- Remote programming can provide a solution to the challenges caused by COVID-19 and similar situations. This modality of deployment enables foreign relief organisations to connect to those affected by disasters without being physically present. The connection is facilitated by local organisations. Remote programming is not new in the humanitarian sector. It was previously adopted by international humanitarian organisations in situations where security risks heightened. However, the COVID-19 pandemic has shown that infectious diseases can also reduce humanitarian access. With the support of technological advancement, partners at local, national and international levels are able to communicate and coordinate more efficiently through online platforms such as Zoom, MS Teams and Blue Jeans. Regional organisations and donor countries should use remote programming not only to cope with the barriers created by the pandemic but also support the growth of local partners.

[281] "Migrants Play Key Role in Disaster Response, IOM Explores Diaspora's Engagement in Humanitarian Assistance," International Organization for Migration, February 5, 2021, https://www.iom.int/news/migrants-play-key-role-disaster-response-iom-explores-diasporas-engagement-humanitarian.
[282] "ASEAN Disaster Resilience Outlook - Preparing for a Future Beyond 2025," 49.
[283] Suhas L. Ketkar and Dilip Ratha, "Diaspora Bonds: Tapping the Diaspora during Difficult Times," *Journal of International Commerce, Economics and Policy* Vol.1, No.2 (2010): 252.

Baseline Report 6

Regional Cooperation on Marine and Coastal Protection and Conservation: Learning from the CTI-CFF Experience

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Executive Summary

Below are findings for inter-regional cooperation in marine and coastal protection from the Coral Triangle Initiative:

- ***An inter-regional initiative***: The Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security (CTI-CFF) demonstrates that countries from different regions can work together to protect and conserve the marine and coastal environment in a designated sea area.

- ***Transboundary nature of challenges***: Regional states need to acknowledge the transboundary nature of marine and coastal problems and endorse dedicated regional cooperation to solve them. This will also require commitments of necessary support, including funding.

- ***Guidelines and action plans***: Technical working groups have been effective in formulating guidelines and action plans to address identified issue. These documents assist member states to implement measures at the national and local levels.

- ***Navigating differences***: Navigating differences is critical to keep member states focused on shared objectives. Different cultural practices can be manifested in the governance of coastal communities where member countries have specific systems, technologies, logistics, protocols, communication styles, and cultural practices. These differences need to be understood and respected to enable the formulation of inclusive regional approaches.

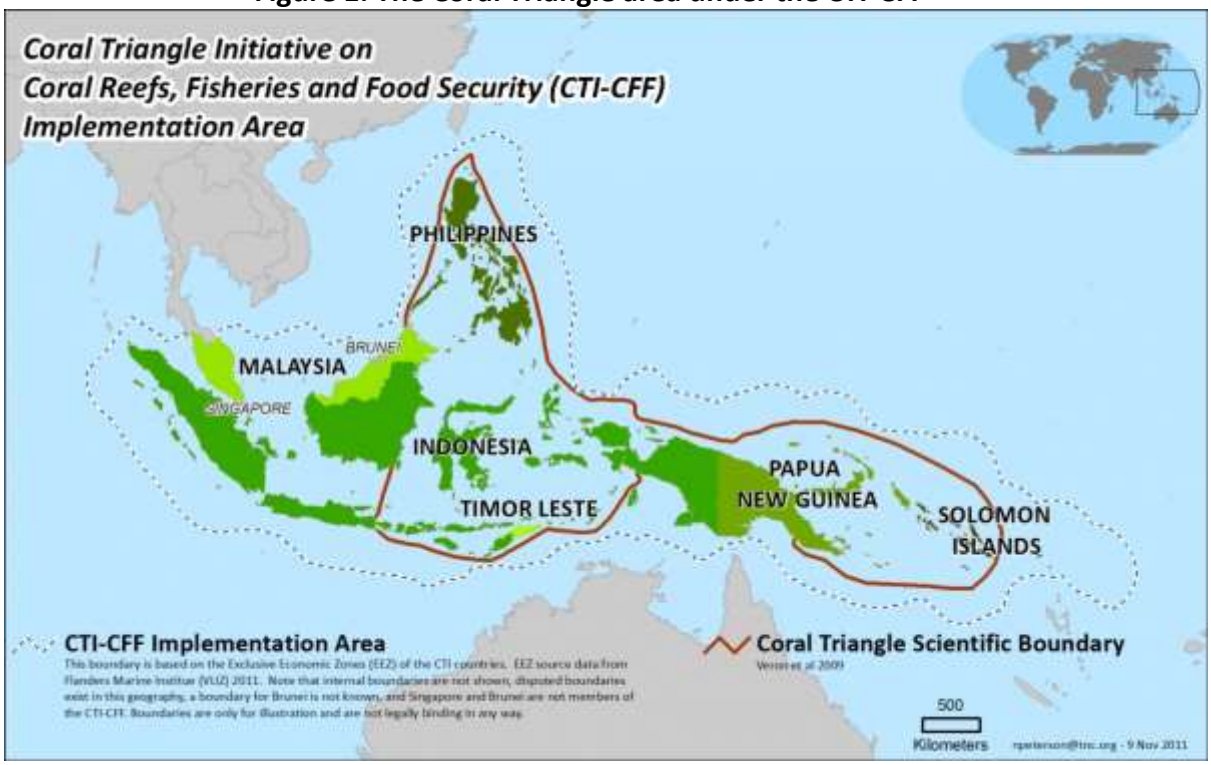
- ***Building communication***: The key to bridging cultural gap among member states is by forming at an early stage mechanisms that will allow good communication and mutual understanding. These include giving all member states an equal voice in discussions and establishing a rotational mechanism for all member states to chair working groups. Continuous dialogues are critical to get member states on the same page and strengthen understanding among them.

- ***Dealing with transboundary disputes***: Transboundary issues that already existed between two or more countries prior to the founding of the CTI-CFF are acknowledged and considered, but are not engaged. This enables member states to continue working on their shared objectives without pre-existing transboundary problems hampering their cooperation.

- ***Flexibility on regional standards***: Some flexibility on regional standards and definitions needs to be on the table to accommodate the various national and local contexts.

The Coral Triangle is a marine area of 5.7 million square kilometers in the western Pacific Ocean that is shared among Indonesia, Malaysia, Papua New Guinea, the Philippines, Solomon Islands, and Timor-Leste. Dubbed 'the Amazon of the Seas,'[284] the area houses close to 600 species of reef-building corals, six of seven turtle species in the world, and over 2000 reef fish species.[285] The rich marine diversity in the Coral Triangle is critical to the livelihoods of more than 120 million people in the area and contributes significantly to global food supply.[286]

Figure 1: The Coral Triangle area under the CTI-CFF[287]



Given its importance, the protection and conservation of the Coral Triangle against various threats to biodiversity loss draws strong interest from the six coastal states in the sub-region. Climate change, for example, is likely to warm the Coral Triangle seas by 1 to 4 degrees Celsius by the end of this century, increase their acidity levels, and alter rainfall

[284] "Coral Triangle – The Amazon of the Seas – is at Risk," Asian Development Bank, last modified October 25, 2011, https://www.adb.org/features/coral-triangle-amazon-seas-risk
[285] "Coral Triangle," World Wildlife Fund, https://www.worldwildlife.org/places/coral-triangle
[286] Ibid.
[287] "About," Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security, https://www.coraltriangleinitiative.org/about

patterns in the coastal areas.[288] This in turn will result in coral bleaching, disease, and death; damage corals' ability to develop fully; and bring about more severe flooding and longer dry spells in the area.[289]

To safeguard its economic and environmental assets against such pressures, the Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security (CTI-CFF) was established through the signing of the Leaders Declaration on 15 May 2009.[290] The establishment of the regional initiative was a follow-up to the work of some non-governmental organisations such as the Nature Conservancy and the WWF that assessed the state of coral reefs in the region. They identified the presence of rich, abundant, and diverse marine biotas - one of the highest in the world - at the Coral Triangle area that cut across the six countries. They communicated their findings to the Indonesian President Susilo Bambang Yudhoyono who subsequently took the initiative to galvanise commitments from the leaders of the other five countries to protect and conserve the said area through a regional mechanism.[291]

This Baseline Report #6 contains the following sections:

1. Description of Regional Arrangements
2. Progress and Achievements
3. Challenges
4. Lessons Learnt

1. Description of Regional Arrangements

The CTI-CFF is an intergovernmental cooperation arrangement with a regional secretariat located in Manado, Indonesia. The regional secretariat has legal personality and receives funding from member states, voluntary contributions, and other funds such as investment income.[292] A General Fund is established to house contributions from the six member states. The CTI-CFF Funds is set up to pool funding from donors and fulfil monitoring and reporting

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[288] Hoegh-Guldberg, O., Hoegh-Guldberg, H., Veron, J.E.N., Green, A., Gomez, E. D., Lough, J., King, M.,
Ambariyanto, Hansen, L., Cinner, J., Dews, G., Russ, G., Schuttenberg, H. Z., Peñaflor, E.L., Eakin, C. M., Christensen, T. R. L., Abbey, M., Areki, F., Kosaka, R. A., Tewfik, A., Oliver, J., *The Coral Triangle and Climate Change: Ecosystems, People and Societies at Risk* (Brisbane: WWF Australia, 2009), 276,
https://core.ac.uk/download/pdf/11702742.pdf .

[289] Ibid.

[290] "Coral Triangle Initiative Leaders' Declaration on Coral Reefs, Fisheries, and Food Security," Coral Triangle Initiative,
https://www.coraltriangleinitiative.org/sites/default/files/resources/Leader%20Declaration%20coral%20triangle%20initiative_0.pdf

[291] Personal communication with a CTI-CFF representative.

[292] The Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security (CTI-CFF), *The Agreement on the Establishment of the Regional Secretariat of the Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security*, (Manado: CTI-CFF Regional Secretariat, 2016),
https://www.coraltriangleinitiative.org/sites/default/files/resources/The%20Agreement%20on%20The%20Establishment%20of%20RS%20CTI-CFF_Newest_2017_compressed.pdf

obligations to them. The Asian Development Bank, the USAID, and the Australian government are among the CTI-CFF's donors.[293] The 2019 Annual Report shows that other than contributions from the six member states, the Department of the Interior of the Government of the United States of America and the Department of the Environment and Energy of Australia also gave grants to the CTI-CFF.[294] The Special Funds is set up for any other funds that are neither for the General Fund or the CTI-CFF Funds. The Regional Secretariat works to promote and facilitate collaborations among the six member states to achieve goals laid out in the CTI-CFF Regional Plan of Action.

The CTI-CFF aims at ensuring the sustainability of marine and coastal resources that include coral reefs, seagrasses, mangroves, and fishes by focusing on five issue areas, each with their own working groups. These are seascapes, Ecosystem Approach to Fisheries Management (EAFM), Marine Protected Areas (MPAs), Climate Change Adaptation (CCA), and Threatened Species (TS).[295] The working groups comprise of government officials of various agencies who represent each member state as seen in Table 1.

[293] Personal communication with the CTI-CFF representative.
[294] The Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security (CTI-CFF), *Annual Report 2019,* (Manado: CTI-CFF Regional Secretariat, 2019), https://www.coraltriangleinitiative.org/sites/default/files/resources/07September_2019%20CTI-CFF%20Annual%20Report_compressed.pdf
[295] Ibid.

Table 1: Country Representatives in the CTI-CFF's Working Groups

Working Groups	Malaysia	Solomon Islands	Indonesia	Papua New Guinea	The Philippines	Timor Leste
Seascapes[296]	Department of Fisheries, Sabah	Ministry of Environment, Climate Change and Disaster Management	Ministry of Marine Affairs and Fisheries	Conservation and Environment Protection Authority	Department of Environment and Natural Resources	Ministry of Agriculture and Fisheries
EAFM[297]	Department of Fisheries, Sabah	Ministry of Fisheries and Marine Resources	Ministry of Marine Affairs and Fisheries	National Fisheries Authority	Department of Agriculture	
MPA[298]	Sabah Parks	Climate Change, Disaster Management and Meteorology	Ministry of Environment and Forestry	Conservation and Environment Protection Authority	Department of Environment and Natural Resources	Ministry of Agriculture and Fisheries
CCA[299]	Ministry of Energy, Science, Technology, Environment and Climate Change	Disaster Management and Meteorology	Ministry of Environment and Forestry	Climate Change and Development Authority	Climate Change Commission	Secretary State for Environment
TS[300]	Department of Fisheries Sabah, Malaysia	Ministry of Fisheries and Marine Resources	Ministry of Marine Affairs and Fisheries	Conservation and Environment Protection Authority	Department of Environment and Natural Resources	Ministry of Agriculture and Fisheries

The involvement of different agencies in the CTI-CFF demonstrates the wide scope of issues that marine and coastal protection and conservation cooperation needs to manage. Coordination is therefore paramount. This is achieved through a National Coordinating Committee (NCC) represented by the following agencies: the Ministry of Marine Affairs and Fisheries of Indonesia, the Ministry of Environment and Water of Malaysia, the Conservation and Environment Protection Authority of Papua New Guinea, Department of Environment and Natural Resources of the Philippines, the Ministry of Environment,

[296] "Seascapes," Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security, accessed December 15, 2021, https://www.coraltriangleinitiative.org/index.php?q=seascapes

[297] "Ecosystems Approach to Fisheries Management (EAFM)," Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security, https://www.coraltriangleinitiative.org/index.php?q=eafm

[298] "Marine Protected Areas (MPA)," Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security, https://www.coraltriangleinitiative.org/index.php?q=eafm

[299] "Climate Change Adaptation (CCA)," Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security, https://www.coraltriangleinitiative.org/index.php?q=eafm

[300] "Threatened Species (TS)," Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security, https://www.coraltriangleinitiative.org/index.php?q=eafm

Climate, Disaster Management and Meteorology of Solomon Islands, and the Ministry of Agriculture and Fisheries of Timor Leste.[301]

In carrying out its work, the CTI-CFF establishes partnerships with institutions such as the USAID, the ADB, the WWF and the Nature Conservancy among others, and universities including the University of Queensland, James Cook University, the University of Papua New Guinea, among others. It likewise collaborates with entities such as GIZ (the German Government Development Agency) and South East Asian Fisheries Development Centre. This type of collaborations assists in lending funding and knowledge support to the CTI-CFF.

2. Progress and Achievements

Each of the working groups has its own goals and targets, and they have made significant achievements throughout the years.

The **Seascape working group**, for example, endeavours to set a certain number of priority seascapes that will be subject to investments and programmes designed under integrated coastal management model. Seascape is a large marine area that is defined based on ecological considerations, which is to be managed under certain practices. Seascapes will receive 'designated' title when they are recognised by national and/or international agreements.[302]

The Seascape working group has made progress by identifying three priority seascapes namely the Sulu Sulawesi Priority Seascape between Indonesia, Malaysia, and the Philippines, the Bismarck Solomon Sea Priority Seascape between Indonesia, Papua New Guinea and Solomon Islands, and the Lesser Sunda Priority Seascape between Indonesia and Timor Leste.[303]

Additionally, the Seascape working group has formulated a *Strategic Action Program for the Sustainable Fisheries Management of the Celebes Sea Large Marine Ecosystem* (SCS-LME). It establishes that fisheries in the shared sea territory between Indonesia, Malaysia, and the Philippines need to apply the Ecosystem Approach to Fisheries (EAF) principles.[304] This is in view of deteriorating fish stocks, diminishing coral reefs and mangroves, and climate change. The countries involved are to apply such principles in their respective marine areas and there is no mechanism for the direct enforcement of these recommendations. Using the

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[301] "About," Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security, https://coraltriangleinitiative.org/about

[302] "Seascape Working Group Goals, Targets and Indicators," Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security, https://www.coraltriangleinitiative.org/sites/default/files/resources/Seascape%20Working%20Group%20Goals,%20Targets%20and%20Indicators.pdf

[303] "Seascapes," Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security, https://www.coraltriangleinitiative.org/index.php?q=seascapes

[304] Sulu Sulawesi Marine Ecoregion Tri-National Committee, "Regional Strategic Action Program," 2013, https://www.coraltriangleinitiative.org/sites/default/files/resources/Sulu-SulawesiRSAP_final_12-17-2013.pdf

Transboundary Diagnostic Analysis (TDA), the Strategic Action Program establishes that the root causes of many transboundary marine problems including unsustainable exploitation of fish, habitat loss and community modification, climate change impacts, marine pollution, and alien and invasive species, stem from governance and socio-economic issues.[305]

The **Ecosystem Approach to Fisheries Management (EAFM) working group** has made progress by enhancing member states' capacity through the formulation of a guide, manual, implementation plan, framework, indicators, reference, trainings, and roadmap, and by conducting forum and workshop for information exchange. Examples include Sulu-Sulawesi Sub-Regional EAFM Implementation Plan, Towards Ecosystem based Coastal Area and Fisheries Management in the Coral Triangle: Integrated Strategies and Guidance, Incorporating Climate and Ocean Change into an Ecosystem Approach to Fisheries Management (EAFM) Plan, Integration Guide Brief – Toward Ecosystem-based Coastal Area and Fisheries Management in the Coral Triangle, and Integrated Strategies and Guidelines.[306]

The **Marine Protected Areas (MPA) working group** recorded 2,532 locally- and nationally managed MPAs in the six member states in 2019.[307] It has likewise contributed to capacity building through the formulation of assessment tool, guide, action plan, framework, good practices, and facilitated information exchanges among member states through events and forums.[308]

The **Climate Change Adaptation (CCA) working group** came up with Region-wide Early Action Plan (REAP) for Climate Change Adaptation in the Coral Triangle Region and the Local Early Action Plan (LEAP) for Climate Change Adaptation which have been implemented at the local levels with the help of civil society organisations and partners.[309] Like other working groups, it has also assisted capacity building through the organising of courses and the drafting of assessment tools, guide, and action plan, and experience exchanges through events.[310]

The CTI-CFF regional cooperation is effective in bringing member states together to define guidelines and action plan for the region, as well as in facilitating mutual learning experiences through forums and events. Some concrete achievements include successful negotiations that have led to the establishment of the different seascapes, the implementations of the various action plans at the national and local levels, improved

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[305] Ibid.
[306] "Ecosystems Approach to Fisheries Management (EAFM)," Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security, https://www.coraltriangleinitiative.org/index.php?q=eafm
[307] "Marine Protected Areas (MPA)," Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security, https://www.coraltriangleinitiative.org/index.php?q=mpa
[308] Ibid.
[309] "Climate Change Adaptation (CCA)," Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security, https://www.coraltriangleinitiative.org/index.php?q=cca
[310] Ibid.

national capacities particularly of the Pacific countries, and the establishment of a regional secretariat a few years after the founding of the CTI-CFF.

Th CTI-CFF is the first inter-regional partnership between Asian and Pacific countries. The regional cooperation is beneficial for the protection and conservation of the marine environment at the Coral Triangle area because it creates common goals for member states to work together towards, and common norms and standards for member states abide by. Having common objectives and principles facilitate interactions among the culturally different governments. The structure of the regional arrangement allows for all member states to express their voices. This mechanism helps to establish a communication channel that is critical to bridge cultural differences among the six member states.[311]

The cooperation likewise enables countries with less resources, particularly those in the Pacific region, to develop their national institutional and technical capacities. Exchanging learning experiences and documenting lessons learnt from different coastal communities are useful for capacity building. Furthermore, country visits help to strengthen mutual understanding and cooperation among member states because they give opportunities for officials involved to see and experience for themselves the ground situations and the types of challenges that confront each country.[312]

3. Challenges

Although the different working groups have built the base for best practices and actions, some challenges are observed. The first problem pertains to communication and coordination with other stakeholders. For example, a lack of ocean literacy among policymakers hinders them from making decisions most favourable to marine and coastal protection and conservation.[313] While officials involved in the CTI-CFF are well versed of specific issues and their potential fixes, support from their superiors may not be immediately forthcoming because the latter may not give the issues the same weight. Likewise, coordination with other government agencies can get hampered by the different priorities given to issues at hand. A manifestation of this problem can be seen in overlapping regulations and poor synergy among different stakeholders.

The second challenge relates to the complex and interconnected nature of marine diversity degradation and the CTI-CFF's limited scope to address the drivers of increasing pressures on marine and coastal diversity loss. These include, among others, population increase in coastal areas, higher demand on quality fish, illegal, unreported and unregulated (IUU)

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[311] Personal communication with a CTI-CFF representative

[312] Personal communication with a CTI-CFF representative

[313] "6th CTI-CFF Seascape Technical Working Group Meeting," Coral Triangle Initiative, 3-4 September 2019, Pasay City, Manila, the Philippines, https://coraltriangleinitiative.org/sites/default/files/resources/Final%20ACTIVITY%20REPORT%206th%20CTI%20CFF%20Seascape%20Working%20Group%20Meeting.pdf

fishing, blast fishing, turtle poaching, shark and giant ray fishing, and excessive and direct take.[314]

The third challenge concerns institutional capacity such as limited budget, a lack of experts and skilled manpower, a lack of technical knowledge and ability to perform climate risk analysis, monitoring, evaluation and innovation, and incomplete baseline data, inability to access remote sites, short-term projects which raise concerns over their long-term sustainability, among others.[315] Additionally, existing relevant policies and legislations are in need of improvement, and enforcement capacity remains weak.[316]

The fourth challenge relates to inadequate participation and involvement from local communities that may result from low public awareness especially in remote areas.[317]
At this junction, it is apparent that challenges to CTI-CFF cooperation come from within and without. From within, institutional capacity needs to be strengthened to enable better performance and outcomes of programs and action plans. External challenges relate to limited ability to establish well-functioning cooperation with and full participations from stakeholders, and limited influence to eliminate or reduce pressures causing problems to marine and coastal diversity.

In this regard, continuous capacity building through learning and sharing of best practices needs to be made an integral part of the CTI-CFF activities. Securing sufficient and sustainable funding is critical to enable periodical upgrades of institutional capacity both in terms of supporting infrastructure, skills and knowledge.

Furthermore, different engagement models may need to be formulated and implemented to elicit more meaningful participations and cooperation with external stakeholders. For example, the planetary health concept, that espouses a holistic approach to solving

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[314] "Implementation Workshop for the Sulu-Sulawesi Seascape Ecosystem Approach to Fisheries Management Plan," The USAID Oceans and Fisheries Partnership (USAID Oceans), 30 June 2020, https://www.coraltriangleinitiative.org/sites/default/files/resources/USAID_Oceans_CI_Sulu_Sulawesi_EAFM_Plan_Implementation_Workshop_APPROVED.pdf

[315] "6th CTI-CFF Seascape Technical Working Group Meeting," Coral Triangle Initiative, 3-4 September 2019, Pasay City, Manila, the Philippines, https://www.coraltriangleinitiative.org/sites/default/files/resources/Final%20Activity%20Report%206th%20CCA%20TWG%20Meeting.pdf

[316] "Annual Report 2018," Coral Triangle Initiative, (Manado: CTI-CFF Regional Secretariat, 2019), https://www.coraltriangleinitiative.org/sites/default/files/resources/CTI-CFF%20Annual%20Report%202018.pdf

[317] "Annual Report 2019," Coral Triangle Initiative, (Manado: CTI-CFF Regional Secretariat, 2020), https://www.coraltriangleinitiative.org/sites/default/files/resources/07September_2019%20CTI-CFF%20Annual%20Report_compressed.pdf

environmental problems, may serve as a good starting point to initiate synergised cross-sectoral efforts for the protection and conservation of marine and coastal environment.[318]

4. Lessons Learnt

The coral reefs in the Western Indian Ocean, from Seychelles to South Africa, are at risk of extinction due to rising sea temperature and overfishing.[319] The establishment of a regional mechanism to protect and conserve marine and coastal environment in the area is therefore imperative. The CTI-CFF demonstrates that countries can work together to protect and conserve the marine and coastal environment in a designated sea area. Firstly, country leaders need to collectively acknowledge the transboundary nature of marine and coastal problems and endorse the establishment of a dedicated regional cooperation to solve them. Securing the commitment from the top leadership will enable the provision of necessary support, such as basic funding, that keeps the organisation running. Leaders of Indian Ocean states may need to prioritise the issues in order to initiate dialogues on the protection and conservation of marine and coastal environment. NGOs may assist to catalyse actions through their studies and assessments of marine and coastal environment in the Indian Ocean area and subsequently lobby country leaders for collaborative responses.

In terms of institutional set-up, the formation of technical working groups has proven effective in formulating guidelines and action plans to address identified issues. They give shape to the kind of approaches and measures that can be implemented to solve them. These documents are important to inform and assist member states to conduct related measures at the national and local levels. It is important to note that the drafting of such documents involves consultations and negotiations among member states; therefore, much work needs to be afforded to building good communication and mutual understanding among member countries to enable them formulate such regional documents.[320]

While the CTI-CFF's working groups are working on seascapes, Ecosystem Approach to Fisheries Management, marine protected areas, climate change adaptation and threatened species, the countries of the Indian Ocean may need to examine and determine their own priorities. The five themes that the CTI-CFF's are working can serve as a model, but

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[318] Margareth Sembiring, "Planetary Health and Triple Planetary Crisis: Relevance for Multilateral Cooperation on Biodiversity Protection and Conservation in Southeast Asia," NTS Insight no. IN21-06, (Singapore: S. Rajaratnam School of International Studies, 2021), https://www.rsis.edu.sg/wp-content/uploads/2021/09/NTS-Insight-IN-21-06-Planetary-Health-and-Triple-Planetary-Crisis.pdf

[319] David Obura, Mishal Gudka, Melita Samoilys, Kennedy Osuka, James Mbugua, David A. Keith, Sean Porter, Ronan Roche, Ruben van Hooidonk, Said Ahamada, Armindo Araman, Juliet Karisa, John Komakoma, Mouchtadi Madi, Isabelle Ravinia, Haja Razafindrainibe, Saleh Yahya & Francisco Zivane, "Vulnerability to Collapse of Coral Reef Ecosystems in the Western Indian Ocean," *Nature Sustainability*, 2021, https://www.nature.com/articles/s41893-021-00817-0

[320] Personal communication with a CTI-CFF representative

countries in the Indian Ocean may need to assess the marine and coastal problems that are specific to the area and institute working groups accordingly.

Another important lesson from the CTI-CFF is their ability to manage the interactions among the culturally diverse member states. Navigating through differences is critical to enable member states stay focus on the shared objectives of protecting and conserving the marine and coastal environment. Different cultural practices can manifest themselves in various forms, for example, in the governance of coastal communities where member countries have specific systems, technologies, logistics, protocols, communication styles, and cultural practices to customarily deal with their respective coastal communities. The characters of coastal communities themselves differ across countries. The CTI-CFF cooperation needs to understand and respect these differences so as to enable the formulation of inclusive regional approaches, projects, and financing, that are equitable and can help countries strengthen their existing initiatives.[321]

The establishment of the Marine Protected Areas (MPAs) likewise requires some knowledge of local contexts and practices. The CTI-CFF encourages member states to designate a certain number of MPAs. However, the definition of MPAs normally follows certain international standards and are not always applicable to the specific contexts of a country. For example, the protection of marine areas in some countries are already carried out by the coastal communities. Therefore, the requirement for the areas to be legally gazetted for them to be called MPAs in conformance to the international standards does a disservice to the communities and the countries concerned. In such instances, technical negotiations ensued, and the CTI-CFF eventually came up with Coral Triangle MPA system module that caters for a wider range of MPAs.[322]

The key to bridging cultural gaps among member states is by forming, right at the early stage of the cooperation, mechanisms that will allow good communication and mutual understanding to be built and strengthened over time. These include giving all member states an equal voice in discussions, establishing a rotational mechanism for all member states to chair working groups, and country visits. Continuous dialogues are critical to get member states on the same page and strengthen understanding among them. Additionally, transboundary issues that already existed between two or more countries prior to the founding of the CTI-CFF are acknowledged and considered, but are not engaged. This enables member states to continue working on their shared objectives without pre-existing transboundary problems hampering their cooperation.[323]

Considering their cultural diversity, countries in the Indian Ocean may benefit from the experiences of the CTI-CFF in managing the differences among the member states. Agreeing on common objectives is a necessary step, and is critically enabled by good communication, mutual understanding and trust among member states. Proper mechanisms that allow all members to be heard, to learn about each other, and to be represented in various leadership positions need to be established early in the cooperation. Some flexibility on

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[321] Personal communication with a CTI-CFF representative
[322] Personal communication with a CTI-CFF representative
[323] Personal communication with a CTI-CFF representative

regional standards and definitions needs to be on the table to accommodate the various national and local contexts. Collaborations with external partners that include governments, NGOs, among others are important to strengthen technical capacity and financing.

Baseline Report 7

Marine Litter in The Bay of Bengal Region: Regional Cooperative Arrangements

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Executive Summary

Below are the key findings for inter-regional cooperation in marine litter in the Bay of Bengal region:

- ***Lack of data on marine litter***: The origin and flows of marine litter are diverse and are not well understood in the Bay of Bengal (BoB) region. There are no uniform methods to study and compare management of marine litter challenges, including removal and disposal.

- ***Separate regional mechanisms for South and Southeast Asia***: The BoB partially encompasses the South Asian Seas (SAS) and the East Asian Seas (EAS) regions. Those regions have separate regional intergovernmental mechanisms for the protection of the marine environment and coastal areas. There is little or no interaction between the two mechanisms and Myanmar does not figure in either arrangement. This creates significant problems for data and developing consensus within the BoB.

- ***Need for consensus on single-use plastics***: Countries in the BoB region are at different stages of banning single-use plastic, but there is insufficient data to assess the effectiveness of current measures. There is a need to create a regional consensus against single-use plastic to prevent plastic pollution and marine litter, as well as to create a market for biodegradable and recyclable products.

- ***Need for systemic solutions, including waste management***: The challenge of marine plastic pollution requires systemic solutions covering policy, technology, management, financing, research, awareness raising and behaviour change. Of particular importance is the establishment of adequate waste management systems on land.

- ***Need for binding regional agreement***: A new legally binding agreement that clearly stipulates the goal of zero discharge of plastic into the ocean is needed.

Marine litter is any persistent, manufactured or processed solid material discarded into the sea or rivers or on beaches; brought indirectly to the sea with rivers, sewage, storm water or winds; or discarded or lost at sea. Marine litter poses environmental, economic, health, aesthetic, and cultural threats, including degradation of marine and coastal habitats and ecosystems that incur socioeconomic losses in marine-based sectors.

Marine litter is a transboundary challenge that is rooted in unsustainable production and consumption patterns, poor solid waste management and lack of infrastructure, lack of adequate legal and policy frameworks and poor enforcement, including on interregional cross-border trade of plastic waste, and a lack of financial resources.

For this study, the Bay of Bengal region is delineated by the littoral countries, viz. Sri Lanka, India, Bangladesh, Myanmar, Thailand, Malaysia, and Indonesia.[324]

This Baseline Report #7 includes the following sections:

1. Defining the problem
2. Regional arrangements
3. Domestic arrangements
4. What is working well
5. Identified gaps
6. Fixing the gaps

Annexure: Marine litter circulation in the Bay of Bengal region

1. Defining the problem

The origin and routes of marine litter are diverse and exact quantities and pathways are not fully known in the Bay of Bengal (BoB) region that encompasses partially the South Asian Seas (SAS) region (Bangladesh, India, Maldives, Pakistan, and Sri Lanka) and the East Asian Seas (EAS) region (Cambodia, People's Republic of China, Indonesia, Republic of Korea, Malaysia, the Philippines, Thailand, Singapore, and Viet Nam). However, studies that simulate the motions of mismanaged plastic waste provide quantitative global estimates.[325] The overall distribution of the modelled marine litter is in agreement with the limited observations (Chassignet et al., 2021).

The SAS and EAS regions have separate regional intergovernmental mechanisms for the development and protection of the marine environment and coastal areas. The *Action Plan for the Protection and Development of the Marine Environment and Coastal Areas of the East Asian Region* (the East Asian Seas Action Plan) was adopted in April 1981 and revised in 1994. The Coordinating Body on the Seas of East Asia (COBSEA) oversees the implementation of the EAS Action Plan.

[324] Notes on the geographical definition of the Bay of Bengal used in this study are included in Annex 6 of the Preliminary Project Report dated January 2022.

[325] https://www.frontiersin.org/articles/10.3389/fmars.2021.667591/full; Hardesty, B. D., Lawson, T. J., van der Velde, T., Lansdell, M., and Wilcox, C. (2017). Estimating quantities and sources of marine debris at a continental scale. Front. Ecol. Environ. 15:18–25. Doi: 10.1002/fee.1447; van Sebille, E., Aliani, S., Law, K. L., Maximenko, N., Alsina, J. M., Bagaev, A., et al. (2020). The physical oceanography of the transport of floating marine debris. Env. Res. Lett. 15:023003. doi: 10.1088/1748-9326/ab6d7d

The *South Asian Seas Action Plan* was adopted in March 1995. The South Asia Cooperative Environment Programme (SACEP) based in Colombo serves as the SAS Action Plan secretariat.

Myanmar does not figure in either of the arrangements. The COBSEA is a UNEP-administered Regional Seas Convention and Action Plan (RSCAP) under the UNEP Regional Seas Programme, whereas SACEP is a non-UNEP administered RSCAP. There is little or no interregional interaction between the two mechanisms.

The Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC), which is the political grouping of most states on the Bay of Bengal, does not address the marine litter problem in the Bay of Bengal region although one of its seven sectors of cooperation and coordination is "Environment and Climate Change." According to the Director (Environment and Climate Change) at the BIMSTEC Secretariat, the organization has not been able to do much in this area since most of its attention has been on instituting the appropriate mechanisms and areas like trade, transport, and connectivity. "But going forth we hope to be able to work on this area substantively and toward this, a Joint Working Group has been constituted which will draw up a plan of action for the region. We hope that the JWG will be able to meet soon." The emphasis thus far has been on weather prediction and climate modelling in recognition of the adverse impact of climate change on the lives and livelihood of the people. Moreover, the grouping does not include Malaysia and Indonesia.

According to the United Nations Environment Programme (UNEP), 80% of the marine litter originates from land sources, and rivers potentially act as a major transport pathway (Chassignet et al. 2021). The 10 top-ranked rivers transport 88−95% of the global load into the sea, 8 are located in Asia and the Ganges, Brahmaputra and Meghna is 6th on the list delivering 72,845 tons per year (Schmidt et al. 2017). The amount of plastic waste eventually ending up in the ocean is determined as a percentage of mismanaged waste. The current marine litter and micro-plastic management strategies of the countries in the BoB region are either non-available or very weak and disjointed (see **Table 1** below).

There are no uniform or standard methods adapted to study and compare the micro-plastic for better management including marine litter removal and disposal in the BoB region. Very little data is available on floating or submerged marine litter in the open ocean as no systematic monitoring of such debris has so far been undertaken in the region. In approximate quantitative terms, the marine litter problem in the BoB region is as in the Table 1 below.

As can be seen from the table, India is the largest contributor of the seven countries of marine litter. Not all of it would make its way to the Bay of Bengal but about 42% of its mismanaged plastic waste ends up along the coast of the BoB countries. Indonesia would be the third largest but given that only the western most tip of Sumatra touches the Bay of Bengal, and according to estimates, only about 10% of its marine litter finds its way in the Bay of Bengal, it is not being considered any further in this document.

Table 1: The current marine litter and micro-plastic management status at a glance

	Sri Lanka	India	Bangladesh	Myanmar	Thailand	Malaysia	Indonesia
Municipal Solid Waste (MSW) per capita kg p.a.[326]	215.4	182.5	149.7	160.6	365	377.7	255
% Plastic waste as fraction of waste composition[3]	5.9	9.0	6.6	17.8	15.0	14.0	10.0
Approx plastic waste per capita kg p.a.	12.71	16.425	9.88	28.59	54.75	52.88	25.5
Unsound disposal %[3]	95	85	100	100	60	85	25
Possible leakage per capita kg/yr	12.07	13.96	9.88	28.59	32.85	44.95	6.37
Land-based plastic waste ending up in the ocean per capita kg p.a.[327]	10.02	11.59	8.2	23.73	27.26	37.3	5.29
Population (million)[328]	21	1380	164	54	69	32	273
Likely marine litter contribution million kg p.a.	223	15,994	1,350	1,291	1,902	1,207	1,446
Rank (by total contribution)	7	1	4	5	2	6	3

Source: Compiled by author. See notes.

2. Regional arrangements

The mechanisms that have a bearing on marine litter in the region are as follows.

- **Regional Marine Litter Action Plan for South Asian Seas Region:** This document focuses on the regional marine litter management strategies, challenges and opportunities and the way forward and is primarily based on the information shared by the SAS member countries (Sri Lanka, India, Bangladesh, Pakistan and Maldives) and the inputs of the consultative workshop held in Mumbai, India from 5 – 6 April 2018. The Action Plan contains programmes and measures for marine litter prevention and reduction, and timeframe for implementation based on the National Status Reports produced by the SAS Member States under the project. This document will act as an implementation and reference tool for future policy, planning, research and development of marine litter mitigation tools in areas related to marine environment as well as pollution from the land and sea-based sources. However, no quantifiable and scientific data and information is available in the SAS region to prepare a target-oriented management plan for the region to manage marine litter. Moreover, there are no dedicated legal instruments in place for the management of marine litter in the SAS region. Effectiveness of the management strategies can be monitored if accurate baseline data is available.

- **G20 Action Plan on Marine Litter 2017 and Implementation Framework for Actions on Marine Plastic Litter 2019:** The Implementation framework builds on the Action Plan. To implement the action plan, the G20 will promote a comprehensive life-cycle approach to

[326] http://www.atlas.d-waste.com/ country profiles
[327] http://www.sacep.org/pdf/Reports-Technical/2019.11.06-Regional-Marine-Litter-Action-Plan-for-South-Asian-Seas-Region.pdf p. 191
[328] https://data.worldbank.org/indicator/SP.POP.TOTL Population, total: All Countries and Economies

"urgently and effectively" prevent and reduce plastic litter discharge into the ocean. The approach will focus on land-based sources in particular, and pursue action including environmentally sound waste management, clean-up of marine plastic litter, prevention and reduction of plastic waste generation and littering. Since two of the G20 members (ranked 1st and 3rd in terms of marine litter contribution – India and Indonesia) are in the BoB region, it will likely have a positive impact in the region[329].

- **ASEAN Framework of Action on Marine Debris:** Recognising the urgent need to act, the ASEAN Framework of Action on Marine Debris was developed to act on the recommendations from the ASEAN Conference on Reducing Marine Debris in ASEAN Region in Phuket in November 2017. The Framework comprises four priority areas namely: (i) Policy Support and Planning; (ii) Research, Innovation, and Capacity Building; (iii) Public Awareness, Education, and Outreach; and (iv) Private Sector Engagement. Each priority area consists of actions and suggested activities for further collaboration in ASEAN region and among ASEAN and its partners in combating marine debris. The ASEAN Framework is discussed in detail in Baseline Report 4.

- **COBSEA Regional Action Plan on Marine Litter 2019:** Revision to the Coordinating Body on the Seas of East Asia (COBSEA) Regional Action Plan on Marine Litter (RAP MALI), originally adopted at the 19th Intergovernmental Meeting of COBSEA in Cambodia in 2008. It has been prepared pursuant to COBSEA Strategic Directions 2018-2022 and based on extensive desk review; information provided by participating countries including through national consultations; recommendations arising from meetings of the COBSEA Working Group on Marine Litter; and existing regional action plans for marine litter under implementation. The revised COBSEA Regional Action Plan on Marine Litter was adopted by the 24th Intergovernmental Meeting of COBSEA, in Bali, Indonesia, 19-20 June 2019. This is also discussed in Baseline Report 4.

3. Domestic arrangements

Predominantly, actions of the countries in the BOB region towards managing plastic waste have been two-fold, providing formal recognition to Extended Producer Responsibility (EPR), and banning or disincentivising the use of single-use plastic (SUP). Bangladesh, India and Indonesia recognise EPR. In India, EPR will be implemented from July 1 this year[330], the guidelines have been notified[331]. In Bangladesh, the new Solid Waste Management Rules of 2021 (with the provision of EPR) are in force. Countries in the Bay of Bengal Region are at different stages of banning SUP and enforcing such bans. Bangladesh was the first country to ban SUP bags in 2002.

Table 2 summarises the domestic arrangements in the BoB states to deal with plastic waste.

[329] https://g20mpl.org/reports
[330] https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1799170
[331] https://moef.gov.in/wp-content/uploads/2020/06/Final-Uniform-Framework-on-EPR-June2020-for-comments.pdf

Table 2: Waste management in BoB littorals

Country	Marine litter contribution Rank	Recycling rate %[3]	Member of regional seas	Domestic legal provisions for Plastic waste management	Status of SUP
India	1	NA	Y	Plastic Waste Management (Amendment) Rules, 2022[332] Guidelines on Extended Producers Responsibility on plastic packaging[333]	Ban from July 2022[334]
Thailand	2	11	Y	Pollution Control Department, 1992[335] National Action Plan on Plastic Waste Management in Thailand[336]	Ban of SUP bags at stores from January 2020[337]
Bangladesh	3	0[338]	Y	National 3R Strategy for Waste Management[339] Pilot project on EPR in Dhaka in collaboration with World Bank[340] Plastic Industry Development Policy, 2020[341] Multisectoral Plastic Action Plan 2022-2030; Solid Waste Management Rules (with provision for EPR), 2021[15]	First country in the world to ban plastic bags in 2002 but no reduction in production or use[342] 3-years plan of action on banning of Single Use Plastic (SUP) in coastal region of Bangladesh[15]

[332] https://egazette.nic.in/WriteReadData/2022/233568.pdf
[333] https://pib.gov.in/PressReleasePage.aspx?PRID=1799170
[334] https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1745433
[335] https://www.pcd.go.th/pcd_structure/472/
[336] https://www.iges.or.jp/sites/default/files/inline-files/S1-5_PPT_Thailand%20Plastic%20Action%20Plan.pdf
[337] https://www.oecd.org/ocean/topics/ocean-pollution/marine-plastics-pollution-Thailand.pdf
[338] According to a recent study, around 40% of plastic is being recycled vide communication received on 20 April 2022 from the Department of Environment, Ministry of Environment, Forest and Climate Change, Bangladesh
[339] http://old.doe.gov.bd/publication_images/4_national_3r_strategy.pdf
[340]https://thedocs.worldbank.org/en/doc/42712a1018d536bb86c35018b9600c530310062021/original/National-Action-Plan-for-plastic-management-Dec.pdf
[341]https://moind.portal.gov.bd/sites/default/files/files/moind.portal.gov.bd/notices/2fcda418_ec50_4075_888b_cb3fa59fef21/National%20Plastic%20Policy%202020.pdf
[342] https://www.aa.com.tr/en/asia-pacific/bangladesh-s-polybag-ban-falls-flat-in-stopping-production-use/2292293#

Country	Marine litter contribution Rank	Recycling rate %[3]	Member of regional seas	Domestic legal provisions for Plastic waste management	Status of SUP
Myanmar	4	0	N	The National Environmental Conservation Law, 2012[343 344] National Waste Management Strategy and Master Plan (2018-30)[345]	SUPs were charged but weak enforcement of the bans have allowed the plastic culture to remain intact[346]
Malaysia	5	0	Y	Environmental Quality (Scheduled Wastes) Regulations, 2005[347] Solid Waste and Public Cleansing Management Act, 2007[348]	A nationwide ban on the use of straws was set to be launched by 2020, but no enforcement has been made[349]
Sri Lanka	6	0	Y	Central Environmental Authority Act, 1980[350] Solid Waste Management Unit 2018[351] National Action Plan for Plastic Waste Management, 2021[352]	Ban from March 2021[353]

Source: Compiled by author. See notes.

[343] https://www.myanmar-law-library.org/law-library/laws-and-regulations/laws/myanmar-laws-1988-until-now/union-solidarity-and-development-party-laws-2012-2016/myanmar-laws-2012/pyidaungsu-hluttaw-law-no-9-2012-environmental-conservation-law-english.html
[344] https://g20mpl.org/partners/myanmar
[345] https://www.unep.org/ietc/resources/policy-and-strategy/national-waste-management-strategy-and-master-plan-myanmar-2018-2030
[346] https://g20mpl.org/partners/myanmar
[347] https://www.doe.gov.my/portalv1/wp-content/uploads/2015/01/Environmental_Quality_Scheduled_Wastes_Regulations_2005_-_P.U.A_294-2005.pdf
[348] https://www.ecolex.org/details/legislation/solid-waste-and-public-cleansing-management-act-2007-lex-faoc074261/
[349] Chen, H.L., Nath, T.K., Chong, S. et al. The plastic waste problem in Malaysia: management, recycling and disposal of local and global plastic waste. SN Appl. Sci. 3, 437 (2021). https://doi.org/10.1007/s42452-021-04234-y
[350] http://extwprlegs1.fao.org/docs/pdf/srl13492.pdf
[351] http://www.cea.lk/web/en/2013-05-07-07-51-07/waste-management-division-sin/solid-waste-management-unit
[352] https://www.unep.org/ietc/resources/report/national-action-plan-plastic-waste-management-2021-2030
[353] http://www.cea.lk/web/images/pdf/2021/regulations/2211-51_E.pdf

- **India (SAS, G20):** Quantification of marine litter including plastics in water columns, sediment and biota has been documented in certain areas of the Indian beaches, estuaries, coastal waters, and open sea. However, comparisons between studies or even systematic status and trend analyses are not available due to differences in in the collection and measurement methodologies used by researchers. There is a set of plastic waste management rules that includes extended producer responsibility (EPR). Several digital platforms for EPR Registration, Certification & Fulfilments are in operation. Due to poor enforcement, no more than a quarter of plastic waste is recycled.

- **Thailand (COBSEA, ASEAN):** According to a report by the Ocean Conservancy, Thailand is among the five countries in Southeast Asia responsible for 60 per cent of waste going into oceans along with China, the Philippines, Indonesia, and Vietnam. This is primarily due to the failure of the government and the retail industry to bring the national environmental consciousness in sync with the rest of the world. The Waste and Hazardous Substances Management Bureau, Pollution Control Department has now come up with a roadmap on Plastic Waste Management 2018-2030 to serve as a framework and direction for preventing and managing plastic waste in the country.

- **Bangladesh (SAS):** Most of the big cities and industries are located near major rivers. These rivers are repositories of most of the waste discharge from industries and municipal waste of the city. There is no maritime litter monitoring programme. However, the Solid Waste Management Regulations 2021 under the Bangladesh Environmental Protection Act, 1995, define the responsibilities of businesses involved in solid waste management, and impose collection, recycling, and disposal obligations according to Extended Producer Responsibility (EPR) on manufacturers of non-biodegradable products such as glass, plastic, and bottles. The Regulations also include provisions for the treatment of solid waste such as composting and energy recovery[354].

- **Myanmar (ASEAN):** The National Waste Management Strategy and Master Plan (2018-2030) was developed and it aims to build capacity for sustainable waste management and promote development of a conducive policy framework and strategies that transit from a conventional waste management paradigm to sustainable waste management based on waste hierarchy and the 3Rs (reduce, reuse and recycle), in linkage with other national environmental policies. Development of the National Plastic Action Plan is underway by the Environmental Conservation Department to reduce and prevent plastic pollution for a better ecosystem and human health, improve plastic waste management systems and develop laws, rules and regulations, and directives related to plastic.

- **Malaysia (COBSEA, ASEAN):** The concept of EPR is provided for in the Malaysia waste management system via the Environmental Quality Act 1974 and the Solid Waste and Public Cleansing Management Act 2007. However, these provisions in the policy are generic in nature without relevant regulations to enable its enforcement and as such the concept of EPR still remains on paper whereas the existing practice of EPR in Malaysia is limited through voluntary participation. Policy trends of EPR however, seem to indicate

[354] https://enviliance.com/regions/south-asia/bd/report_5658

that Malaysia may be embarking on the path towards EPR through the enactment of an EPR regulation.

- **Sri Lanka (SAS):** The country's first attempt to control plastics was made as far back as in 1994. However, this proposal to ban high density polyethylene bags was never implemented. Since then, there are some intermittent attempts made by successive Ministers, of which the most pressing once came from the former President Maithripla Sirisena who also acted as the Minister of Mahaweli Development and Environment. In September, 2017, the Ministry of Mahaweli Development and Environment introduced a wide-range of measures to curb plastic use including prohibiting the manufacture of polythene or any polythene product of twenty (20) microns or below in thickness for in country use or the sale, offer for sale, offer free of charge, exhibition or use of polythene or any polythene product which is twenty (20) microns or below in thickness within the country, prohibit the use of all forms of polyethylene, polypropylene, polyethylene products or polypropylene products as decoration in political, social, religious, national, cultural or any other event or occasion and ban the manufacture of food containers, plates, cups and spoons from expanded polystyrene for in country use ; and the sale, offer for sale, offer free of charge, exhibition or use of food containers, plates, cups and spoons manufactured from expanded polystyrene within the country. Further, an Extended Producer Responsibility (EPR) approach was proposed for plastics, initially starting with a pilot program for PET and Yogurt Packaging.

4. What is working well

Due to low recycling rates in the littoral countries and the presence of a floating garbage patch in the Bay of Bengal, there are early efforts to mitigate the problem within the regional seas programmes and domestically. Barring Myanmar, all the littoral countries are members of RSCAPs. This reflects a recognition of the transboundary challenge and cooperation arrangements among countries on the issue of marine debris and the domestic legislations that are in place. However, there is insufficient data to assess the effectiveness of the measures in place.

5. Identified gaps

The Bay of Bengal littorals are at various stages of designing and implementing strategies to deal with plastic waste. All the countries will have to take action individually and cooperatively. However, for the four countries that are net recipients of plastic waste from within the region and elsewhere, cooperation is of greater significance (See table 3 below). Marine plastic pollution is more than a regional problem but in the absence of an international treaty dedicated to fully tackling the issue, regional measures will have to be strengthened.

Table 3: Marine debris circulation among the BoB littorals

Country	Tonnes of received marine plastic waste originating from other BoB countries	Tonnes of sourced marine plastic waste that ends up in other BoB countries	Net result
Sri Lanka	59,083	28,720	Recipient

Malaysia	26,790	2,20,333	Exporter
Bangladesh	1,06,998	1,66,597	Exporter
India	1,17,836	4,07,470	Exporter
Myanmar	3,61,571	70,158	Recipient
Thailand	79,146	47,677	Recipient
Indonesia	2,52,084	62,553	Recipient

Source: Compiled by author[355]

The following gaps that need to be addressed on an urgent basis.

- Lack of research and surveys on marine litter and data
- Poor institutional system for management of marine litter
- Non-availability of a legal framework for marine litter management
- Poor and insufficient enforcement of international conventions, agreements, laws, regulations and treaties
- Limited implementation of direct development activities
- Weak formulation and enforcement of regulatory framework
- Lack of marine litter production and consumption policy and strategies
- Lack of education and awareness programme for marine litter management
- Lack of market and economic instruments for marine litter management
- Lack of an overarching regional arrangement for the Bay of Bengal region

6. Fixing the gaps

The problem of plastic pollution is transboundary and cross-cutting, and it requires systemic solutions covering policy, technology, management, financing, knowledge and research, awareness raising and behaviour change. The increased trend of marine litter can be limited only by establishing an adequate waste management system on land, as the mainstream of marine litter derives from human activities in the land area, which are not being collected, disposed or processed in efficient way.

There is a need for increasing coherence, coordination and synergies between existing mechanisms and to enhance cooperation and governance to better address marine litter and microplastic challenges at local, national, regional and global levels, including coordination across (sub)regional policy frameworks such as the COBSEA and SAS regions, besides ensuring an enabling environment for successful coordination and implementation of action plans.

Such an approach can take into account the net result of marine debris circulation: while some send out more than they receive, the opposite is true for other countries. A regional approach enables knowledge sharing, monitoring and assessing marine litter of land-based and sea-based sources, compiling scientific evidence and assessing policy pathways, to inform more effective policy and management responses.

[355]Derived from the modelled data of Chassignet et al. 2021. The data sheet can be accessed at https://www.frontiersin.org/articles/10.3389/fmars.2021.667591/full#supplementary-material

Harmonised definitions, data and research for marine plastics and microplastics are also required. Harmonised global methodologies will allow consistent national and regional baselines on marine plastics and plastic wastes to be developed, necessary for the monitoring and evaluation of interventions.

As of now, the approach is to try to mitigate the problem. Removal to the extent possible of already existing marine litter by using environmentally acceptable methods has to be undertaken. But the overall approach should be to create regional consensus against single-use plastic to prevent plastic pollution in general, and marine litter in particular, as well as market generation for biodegradable and recyclable products.

Given that about 2.5 million tonnes of marine plastic waste in the BoB is sourced from the littoral countries while the rest is from elsewhere in the world, a new legally binding agreement akin to UNFCCC/CBD is needed[356] that clearly stipulates the goal of zero discharge of plastic into the ocean, and the ambition of strict national reduction targets, as well as the required means and measures for getting there, essentially a comprehensive review system and implementation support architecture[357].

[356] Since preparation of this draft report in February 2022, UNEA 5.2 constituted an Intergovernmental Negotiating Committee (INC) to draft an international legally binding instrument by the end of 2024 that will guide international action to end plastic pollution.
[357] Elsewhere it has been argued that the INC should desist from suggesting financial assistance for meeting the objectives of the new instrument covering the entire gamut from production through disposal and reduction of the leakage of existing plastic currently in circulation. https://www.orfonline.org/expert-speak/international-law-to-end-plastic-pollution/

Baseline Report 7 – Annex 1: Marine litter circulation in the Bay of Bengal region

These tables provide indicative data on circulation of marine plastic waste among Bay of Bengal littoral states, including tonnes of marine plastic waste contributed and received by Bay of Bengal states. It is based on a world-wide model on the circulation of marine plastic waste developed by Chassignet, Xu and Zavala-Romero at the Center for Ocean-Atmospheric Prediction Studies, Florida State University.[358] The purpose of this indicative data is to demonstrate the level of circulation of marine plastic waste among Bay of Bengal littoral states.

Sri Lanka

Annually, 75,154 tonnes of plastic pollution are released from Sri Lanka of which some 37,567 tonnes ends up on the coast of BoB littoral countries.

Destination of marine plastic waste sourced from Sri Lanka (to coast of BoB countries)	**Tonnes**	**Origin (from BoB countries) of marine plastic waste received on Sri Lanka coast**	**Tonnes**
To Sri Lanka	8,847	From India	43,689
To India	8,704	From Sri Lanka	8,847
To Indonesia	8,282	From Indonesia	4,937
To Myanmar	7,479	From Malaysia	4,852
To Bangladesh	2,487	From Myanmar	2,713
To Thailand	1,526	From Bangladesh	2,392
To Malaysia	242	From Thailand	500
Total sent by Sri Lanka	37,567	**Total received by Sri Lanka**	67,930

India

Annually, 1,521,591 tonnes of plastic pollution are released from India of which some 931,378 tonnes ends up on the coast of BoB littoral countries.

Destination of marine plastic waste sourced from India (to coast of BoB countries)	**Tonnes**	**Origin (from BoB countries) of marine plastic waste received on Indian coast**	**Tonnes**
To India	523,908	From India	523,908
To Myanmar	180,443	From Bangladesh	35,304
To Indonesia	81,421	From Myanmar	29,171
Tonnes to Bangladesh	74,689	From Malaysia	22,380
Tonnes to Sri Lanka	43,689	From Indonesia	19,308
Tonnes to Thailand	24,192	From Sri Lanka	8,704
Tonnes to Malaysia	3,036	From Thailand	2,969
Total sent by India	931,378	**Total received by India**	641,744

[358] Chassignet et al., 2021 https://www.frontiersin.org/articles/10.3389/fmars.2021.667591/full#supplementary-material

Bangladesh
Annually, 452,158 tonnes of plastic pollution are released from Bangladesh of which some 313,931 tonnes ends up on the coast of BoB littoral countries.

Destination of marine plastic waste sourced from Bangladesh (to coast of BoB countries)	Tonnes	Origin (from BoB countries) of marine plastic waste received on Bangladesh coast	Tonnes
To Bangladesh	147,334	From Bangladesh	147,334
To Myanmar	108,913	From India	74,689
To India	35,304	From Myanmar	13,583
To Indonesia	9,957	From Malaysia	11,144
To Thailand	9,454	From Indonesia	3,824
To Sri Lanka	2,392	From Sri Lanka	2,487
To Malaysia	577	From Thailand	1,271
Total sent by Bangladesh	313,931	**Total received by Bangladesh**	254,332

Myanmar
Annually, 325,359 tonnes of plastic pollution are released from Myanmar of which some 206,805 tonnes ends up on the coast of BoB littoral countries.

Destination of marine plastic waste sourced from Myanmar (to coast of BoB countries)	Tonnes	Origin (from BoB countries) of marine plastic waste received on Myanmar coast	Tonnes
To Myanmar	136,647	Tonnes from India	180,443
To India	29,171	Tonnes from Myanmar	136,647
To Bangladesh	13,583	Tonnes from Bangladesh	108,913
To Thailand	12,031	Tonnes from Malaysia	36,986
To Indonesia	11,940	Tonnes from Thailand	14,169
To Sri Lanka	2,713	Tonnes from Indonesia	13,581
To Malaysia	720	Tonnes from Sri Lanka	7,479
Total sent by Myanmar	206,805	**Total received by Myanmar**	498,218

Thailand
Annually, 425,141 tonnes of plastic pollution are released from Thailand of which some 272,291 tonnes ends up on the coast of BoB littoral countries.

Destination of marine plastic waste sourced from Thailand (to coast of BoB countries)	Tonnes	Origin (from BoB countries) of marine plastic waste received on Thailand coast	Tonnes
To Thailand	224,614	From Thailand	224,614
To Indonesia	20,505	From Malaysia	24,992
To Myanmar	14,169	From India	24,192

To Malaysia	8,263	From Myanmar	12,031
To India	2,969	From Bangladesh	9,454
To Bangladesh	1,271	From Indonesia	6,951
To Sri Lanka	500	From Sri Lanka	1,526
Total sent by Thailand	272,291	**Total received by Thailand**	303,760

Malaysia

Annually, 546,318 tonnes of plastic pollution are released from Malaysia of which some 296,666 tonnes ends up on the coast of BoB littoral countries.

Destination of marine plastic waste sourced from Malaysia (to coast of BoB countries)	**Tonnes**	**Origin (from BoB countries) of marine plastic waste received on Malaysia coast**	**Tonnes**
To Indonesia	119,979	From Malaysia	76,333
To Malaysia	76,333	From Indonesia	13,952
To Myanmar	36,986	From Thailand	8,263
To Thailand	24,992	From India	3,036
To India	22,380	From Myanmar	720
To Bangladesh	11,144	From Bangladesh	577
To Sri Lanka	4,852	From Sri Lanka	242
Total sent by Malaysia	296,666	**Total received by Malaysia**	103,123

Indonesia

Annually, 926,209 tonnes of plastic pollution are released from Indonesia of which some 472,969 tonnes ends up on the coast of BoB littoral countries.

Destination of marine plastic waste sourced from Indonesia (to coast of BoB countries)	**Tonnes**	**Origin (from BoB countries) of marine plastic waste received on Indonesia coast**	**Tonnes**
Tonnes to Indonesia	410,416	Tonnes from Indonesia	410,416
Tonnes to India	19,308	Tonnes from Malaysia	119,979
Tonnes to Malaysia	13,952	Tonnes from India	81,421
Tonnes to Myanmar	13,581	Tonnes from Thailand	20,505
Tonnes to Thailand	6,951	Tonnes from Myanmar	11,940
Tonnes to Sri Lanka	4,937	Tonnes from Bangladesh	9,957
Tonnes to Bangladesh	3,824	Tonnes from Sri Lanka	8,282
Total sent by Indonesia	472,969	**Total received by Indonesia**	662,500

Baseline Report 8

Illegal, Unreported and Unregulated (IUU) Fishing in the Bay of Bengal: Regional Arrangements

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Executive Summary

Below are the key findings for inter-regional cooperation in combatting IUU fishing in the Bay of Bengal:

- ***Prevalence of EEZs requires co-management of marine resources***: Around 80% of the Bay of Bengal Large Marine Ecosystem is comprised of EEZs of littoral states. This may require co-management of marine resources as littoral states pursue future opportunities in the Blue Economy.

- ***Existence of large anoxic zone***: The BoB region contains a large Oxygen Minimum Zone (OMZ), where depleted oxygen concentration in the ocean contributes to the creation of biological deserts. This needs to be better factored into regional planning.

- ***Use of technology for MCS***: Indonesia and Thailand have experience in integrating technology for undertaking monitoring, control and surveillance (MCS) and can share that experience with other littorals. Policy-makers will need to take into account challenges from the number of landing sites.

- ***Need for data on IUU***: There is a need for consistent and robust data on IUU catch, which also differentiates between domestic and foreign vessels. The current IUU catch estimates does not provide a reliable basis for effective policy formulation.

- ***Regional collaboration on stock estimation***: There is a need for regional collaboration for stock estimation, particularly for species that straddle two or more EEZs. Such collaboration is a necessary condition for initiating an Ecosystems Approach to Fisheries Management (EAFM) along with the estimation of Total Allowable Catch (TAC).

- ***Role of NGOs/local communities***: Non-state actors can play an enabling role given the resources required to monitor and regulate fisheries across such large spaces. The active devolution of powers to civil society organizations and co-management frameworks would help curb IUU fishing and empower local communities.

- ***Need for regional data-sharing platform***: A regional data-sharing platform with digital and cellular communication should be established to facilitate monitoring of suspicious vessels and sharing of intelligence to intercept dark vessels at sea or regional ports.

- ***Market-state and port-state measures***: Market-state measures have been effective in the past and port-state measures also hold promise in mitigating IUU fishing. All BOBLME countries are parties to the Port State Measures Agreement, except India and Malaysia which have concerns regarding the costs of implementation.

The Bay of Bengal (BoB)[359] is the largest bay in the world and is bordered by seven countries – India, Bangladesh, Sri Lanka, Myanmar, Thailand, Malaysia and Indonesia (in clockwise order from west to east). These are all developing countries with more than 130 million people living along the coasts in 2020[360] and largely dependent on living resources extracted from the sea.[361]

The Bay of Bengal Large Marine Ecosystem (BOBMLE)[362] has an area of 3,585,440 sq. km of which 18.3 % comprises of the shelf area that has a significant species diversity.[363] The total combined area of Exclusive Economic Zones (EEZs)[364] is around 3 million sq. km - which is about 80 per cent of the total BOBLME. Thus, most of the expanse of sea constituting BOBLME is under national jurisdictions. Many of the species straddle more than one EEZ, and some of these like the tuna and the herring hold high commercial value. This creates a case for concerted action through strong national laws in each of the BOBLME countries.

To that end, all the BOBLME countries, except Malaysia and Myanmar, are signatories to the UN Fish Stocks Agreement. The two primary objectives of this agreement are to set up enforcement mechanisms for conservation and management of straddling fish stocks and highly migratory fish stocks through precautionary and ecosystem-based approaches and to establish mechanisms for international cooperation regarding such species of fish. The latter requires the active support of RFMOs as the provider of primary mechanism through which nations cooperate to achieve the conservation and management of straddling fish stocks and highly migratory fish stocks.[365]

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[359] Notes on the geographical definition of the Bay of Bengal used in this study are included in Annex 6 of the Preliminary Project Report dated January 2022.
[360]SEDAC Population Estimating Service, accessed January 12, 2022 https://sedac.ciesin.columbia.edu/mapping/popest/pes-v3/
[361] Large Marine Ecosystems Hub, accessed January 15, 2022 https://www.lmehub.net/#bay-of-bengal
[362] Large Marine Ecosystems (LME) are wide areas of ocean space along continental margins and spanning 200,000 sq. kilometres or more. These are some of the most productive marine areas catering to about 90% of the world's fish catch and provide other ecosystem services. BOBLME has been identified as one among sixty-six existing LMEs globally.
[363]Seas Around Us http://www.seaaroundus.org/data/#/lme/34?chart=catch-chart&dimension=taxon&measure=tonnage&limit=10, accessed January 10, 2022
[364] Estimated using data from Seas Around Us Project (SAUP) and BOBLME Project (BOBLME-P)
[365] "United Nations Fish Stock Agreement," UN Atlas of the Oceans, accessed January 30, 2022, http://www.oceansatlas.org/subtopic/en/c/1402/

Another distinct characteristic of BOBLME is the prevalence of anoxic conditions over a vast stretch known as the Oxygen Minimum Zone (OMZ).[366] Also known as 'Dead Zones', depleted oxygen concentration contributes to the conversion of habitats teeming with life into biological deserts. The BoB Dead Zone extends to an area of about 60,000 sq. km which is nearly half the size of Bangladesh (Bristow 2017).[367] The extent of this zone is not fixed and its location is not fully ascertained. According to a map published in the *Science* journal, much of the sea off the coasts of Myanmar and extending well into the high seas indicate hypoxic conditions (Breitburg et al. 2018).[368] The reason for its formation include global warming as well as the supply of nutrient-rich water that drain into the ocean from agriculture and aquaculture fields. This is not as intense as the neighbouring Arabian sea and the other such OMZs in the Pacific in terms of the availability of dissolved oxygen. However, research does indicate that the system is at a certain tipping point (Johnson 2019).[369] It can jeopardise the ecology of the bay and lead to a decline in productivity of the ecosystem and the availability of fish for all the BOBLME countries.

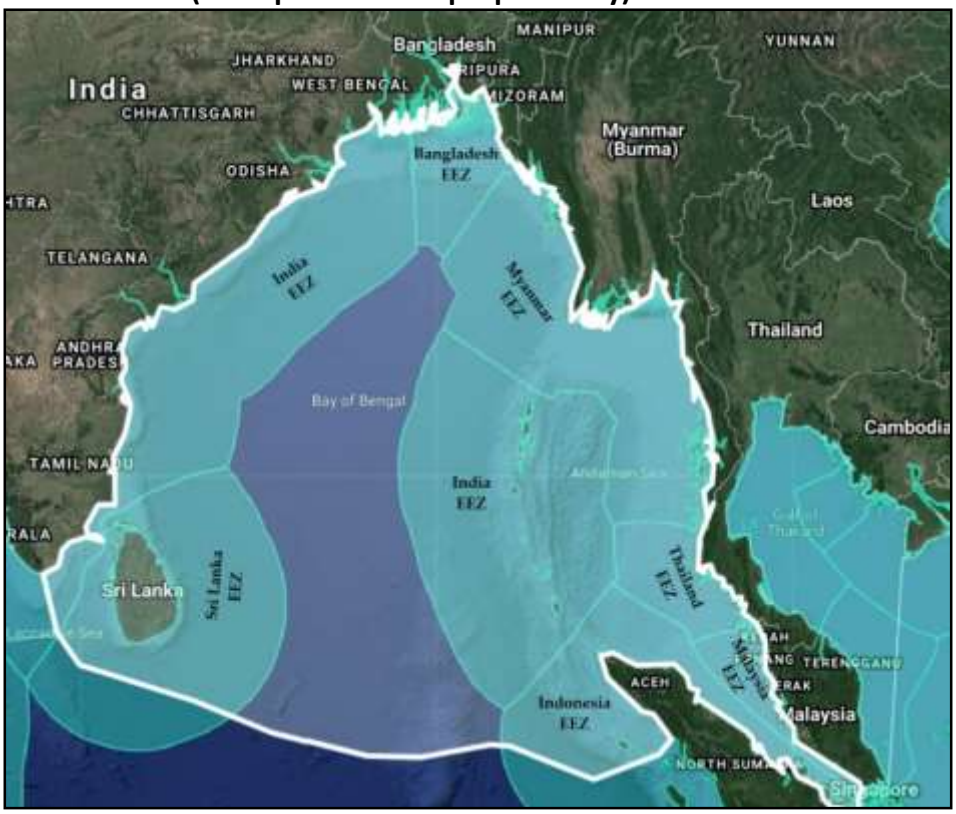
[366] The societal consequence of the presence of OMZs is the adverse effect on living resources and biodiversity. Published research is scarce and only indicative but instances of fish kills, decline in demersal fish landing etc. may have been linked with the prevalence of anoxic conditions (Naqvi 2019).

[367]Bristow, Laura A., Cameron M. Callbeck, Morten Larsen, Mark A. Altabet, Julien Dekaezemacker, Michael Forth, M. Gauns et al. "N2 production rates limited by nitrite availability in the Bay of Bengal oxygen minimum zone." *Nature Geoscience* 10, no. 1 (2017): 24-29.

[368] Breitburg, Denise, Lisa A. Levin, Andreas Oschlies, Marilaure Grégoire, Francisco P. Chavez, Daniel J. Conley, Véronique Garçon et al. "Declining oxygen in the global ocean and coastal waters." *Science* 359, no. 6371 (2018).

[369]Johnson, Kenneth S., Stephen C. Riser, and M. Ravichandran. "Oxygen variability controls denitrification in the Bay of Bengal oxygen minimum zone." *Geophysical Research Letters* 46, no. 2 (2019): 804-811.

Map 1: Map of Bay of Bengal Large Marine Ecosystem (BOBLME) with EEZs of riparian nations (for representative purpose only).



Source: Large Marine Ecosystems Hub, https://www.lmehub.net/ (Modified by the author)

According to the Seas Around Us Project, the total estimated catch from the Bay of Bengal in 2018 was 6,564,000 tons (Industrial 58%, Artisanal 32%, Subsistence 9% and recreational 0.4%). This is about US$9,623 million or 6% of the value of marine catch globally (adjusted according USD values in 2010). A wide range of marine species is harvested for their commercial value like sardines, anchovies, scads, shads, mackerels, tunas, sharks and others. The geographical reach of these species primarily determines which country harvests what species.[370]

With the exception of Myanmar, capture fisheries only make a modest contribution to the GDP of BOBLME-bordering nations. Nonetheless, capture fisheries remain an important source of employment and local revenue for many of the coastal communities of the BOBLME countries. Fishing in the BOBLME is small-scale in nature and according to the BOBLME Project (BOBLME-P) an estimated 42 per cent of the vessels are non-motorised.[371] However, there has been a significant increase in the number of trawlers that target shrimp

[370] Seas Around Us http://www.seaaroundus.org/data/#/lme/34?chart=catch-chart&dimension=taxon&measure=tonnage&limit=10. For instance, tuna fishing is dominant in Sri Lanka and the eastern coast of India – countries that have a proximate access to the open waters of Indian Ocean. Similarly, Hilsa Shad holds both commercial and cultural value in the waters of Northern BoB, like India and Bangladesh. In the eastern coast of BoB comprising of Indonesia, Malaysia and Thailand, Indian Mackerels and Indian Scad are the dominant harvest.

[371] https://www.boblme.org/

and demersal species as well as purse seiners targeting pelagic fish. According to the BOBLME-P, two million fishers, many of whom are artisanal, operate in the highly productive coastal and inshore waters of the BoB. Further, the industry around marine capture fisheries employs an estimated 5 million people involved in various ancillary works including post-harvest activities.

The fish and other marine catch in the BoB is mostly consumed domestically. It is often a cheap source of high-value protein and a wide range of essential micronutrients, minerals and fatty acids in the BOBLME countries. The high-value marine products derived from the BOBLME include shrimp and tuna. Overexploitation of certain specific shrimp species such as the Tiger Prawn (Penaeus monodon) in India (Bhattacharya 2003) and Bangladesh, (Khan 2010) for both direct consumption and as seeds for aquaculture farms, is a cause for concern.[372] Offshore fisheries are particularly lucrative for export-quality Tuna. Indonesian longline fleets, Thai purse seine fleets and Sri Lankan gill-nets are all employed to exploit the offshore waters.

It must also be noted that most of the players in the BOBLME fisheries, be it in the high seas or in the EEZs, are regional ones and extra-regional fishing is almost non-existent in the BOBLME. As detailed in Annexure 2, in 2018, BoB countries accounted for around 99% of the catch in the BOBLME.

This report contains the following sections:

1. The nature of IUU fishing in the Bay of Bengal
2. Outstanding problems
3. What's working well
4. Fixing the gaps
5. Bringing the Oceans together

1. The Nature of IUU Fishing in the Bay of Bengal

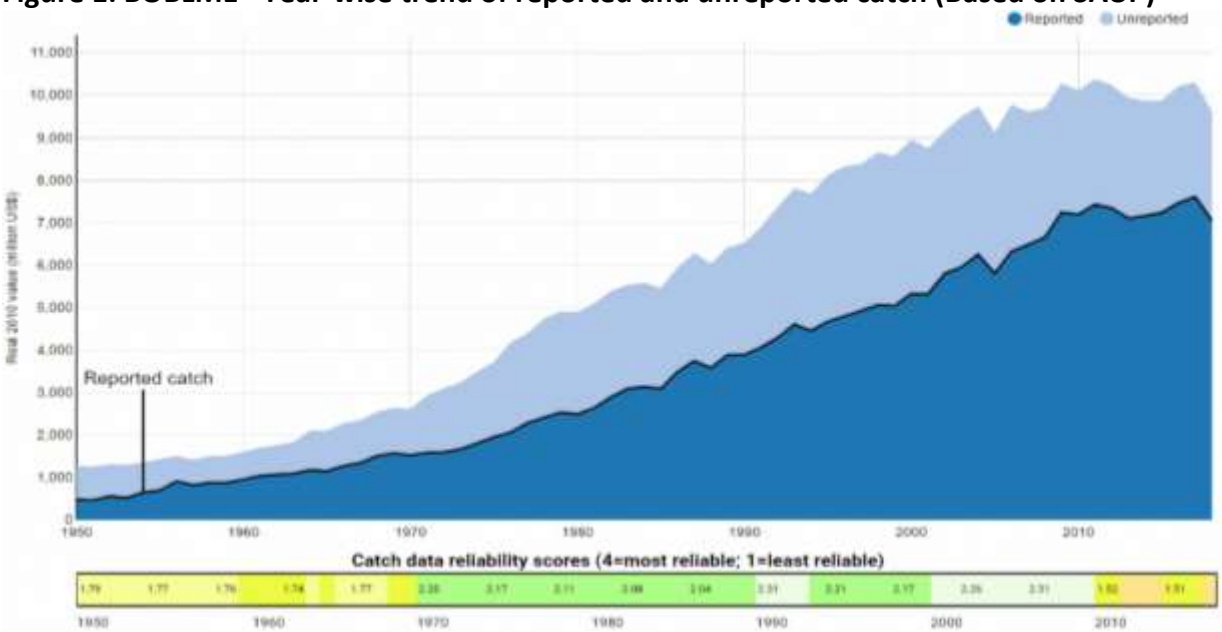
According to the Seas Around Us Project, out of the total estimated catch of 2018, 27% of it was unreported. The share of unreported catches has steadily kept pace with the increase in catch from BOBLME in the last several decades (See Figure 1). It is important to note that the quantum of IUU fishing occurring in these waters could be far greater since estimates for unreported fishing are drawn from multiple data sources with varying reliability.[373] IUU fishing has thus emerged as a menace in the Bay of Bengal, propelled by the use of

[372]Bhattacharya, Asokkumar, and Santosh Kumar Sarkar. "Impact of overexploitation of shellfish: Northeastern coast of India." *Ambio* (2003): 70-75; Khan, Md Giasuddin. "Bangladesh coastal and marine fisheries, and environment." Sustainable Management of Fisheries Resources of the Bay of Bengal 1 (2010).

[373] The *Sea Around Us* Project estimates unreported catches from a broad range of sources including peer-reviewed academic and grey literature, industrial fishing statistics, local fisheries experts, fisheries law enforcement, institutional reports, household and/or nutritional surveys, and other records such as documentation of fish catches by tourists.

mechanised boats and commercial fishing activities. If not adequately addressed, IUU fishing can cheat the large number of artisanal fishers in the BoB who engage in the activity for meeting much of their subsistence needs.

Figure 1: BOBLME - Year-wise trend of reported and unreported catch (Based on SAUP)



Source: Sea Around Us Project, https://www.seaaroundus.org/

It is important to understand what would constitute IUU fishing. Seafaring fishing vessels are issued licenses by flag states of the BOB to engage in fishing within national waters. Even within the extended EEZs, a certain stretch may be reserved for one category of fisherfolks – for instance artisanal fishermen in India have exclusive right to the marine living resources within the territorial sea (up to 12 nautical miles).

National laws restrict foreign fishing vessels from engaging in fishing within national waters without a license (noting that at various instances wherein Thai fishing vessels were allowed to catch fish in Myanmar's EEZ under a lease agreement).

Vessels fishing in the high seas are also bound by certain rules, in theory. For instance, Part VII of the United Nations Convention on the Law of the Sea (UNCLOS) comprising of four articles (116 to 120) lists the obligation of states to cooperate in conservation and management of living resources of the high seas. It is the responsibility of the flag state to ensure that a vessel flying its flag is compliant to the rules.

Iit is useful to look at IUU fishing in three categories because of the regulatory and enforcement regimes that apply to these situations –

1. National vessels in national waters
2. Foreign vessels in national waters
3. Regional and extra-regional vessels in the high seas

BOBLME-P engaged MRAG Ltd as consultants to estimate the quantum of IUU fishing for the period 1990-2013. [374] The study estimates IUU fishing for seventeen countries and territories in South and Southeast Asia and excludes the IUU catch from the high seas. Unless specified, most information for this report is derived from this study. According to that assessment, IUU fishing is a common occurrence in the region. Except for Thailand, all the other six BOBLME countries show a rising trend in illegal and unreported fishing in monetary terms as they do for the total value of catch obtained from each of the country's EEZs. (For each individual country details see **Annex 1**).

Based on a range of regulatory and enforcement regimes, all the three types of IUU fishing - national vessels in national waters, foreign vessels in national waters and fishing on the high seas, are prevalent in the BOBLME:

- ***National vessels in territorial waters/EEZs***: In this category, the primary concern is the absence of law or the lack of enforcement with regards to vessel registration and licensing system. For instance, licensed domestic vessels in India do not have any restrictions for fishing in India's EEZ beyond territorial waters. Hence, this zone has an open-access regime for all domestic vessels. Considering the fact that India's EEZ comprises close to 50 per cent of the BOBLME – the absence of law enhances the vulnerability of the entire BOBLME. Thus, estimating fishing effort and fishing capacity and creating regulatory frameworks based on the determination of allowable catch and establishing optimum utilisation for the management of fisheries becomes a challenge.

- ***Foreign vessels in territorial waters/EEZs***: IUU fishing in the national waters by foreign vessels (mostly from within the BoB region) is also a growing concern, particularly on the borders between India and Sri Lanka, Myanmar and Thailand and Thailand and Malaysia. This may lead to violent confrontations with law enforcement agencies within the territorial sea and EEZs.

- ***High seas:*** Fishing in the high seas within the BoB is governed by the rules laid out by the Indian Ocean Tuna Commission (IOTC) with its species-specific focus and mandate. The IOTC has passed a number of resolutions in the past for restricting IUU fishing for tuna and tuna-like species. This include resolution 21/02 (on establishing a programme for transhipment by large-scale fishing vessel), 19/04 (concerning the IOTC record of vessels authorised to operate in the IOTC area of competence, 19/07 (on vessel chartering in the IOTC area of competence), 18/03 (on establishing a list of vessels presumed to have carried out IUU fishing in the IOTC area of competence).[375] The IOTC has established a compliance committee to review and report the contracting parties and cooperating

[374] Bay of Bengal Large Marine Ecosystem Project, *Transboundary Diagnostic Analysis Volume 2 (Background and Environmental Assessment)* (Phuket: Thailand, 2014), accessed January 1, 2022 https://www.boblme.org/transboundary_diagnostic_analysis.html

[375] IOTC, Compendium of Active Conservation and Management Measures for the Indian Ocean Tuna Commission, December 2021, Victoria, Mahe, Seychelles, IOTC, 2021, https://www.iotc.org/sites/default/files/documents/compliance/cmm/IOTC_-_Compendium_of_ACTIVE_CMMs_17_December_2021.pdf

non-contracting parties (CPCs) compliance with the IOTC conservation and management measures arrived at through the resolutions. Due to the currently evolving status of national laws of BOBLME countries governing vessels that fish in the high seas, the governance for species other than tuna is often poor and unregulated. The FAO Compliance Agreement mandates signatory states to ensure that none of their vessels are fishing on the high seas unless authorized; and ensure their vessels comply with international measures. The signatory flag state is also mandated to keep records of fishing vessels, and a record of international cooperation and enforcements. Amongst the BOBLME countries, only Myanmar is a signatory to this agreement.

2. Outstanding Problems

2.1 Regulatory tools

Fishery resources in the BOBLME are maintained through the use of various regulatory tools in the seven bordering nations that are intended to in theory limit the rate of extraction and ensure a sustainable stock. The regulatory measures need to be ideally built around the concept of maximum sustainable yield. According to FAO, the Maximum Sustainable Yield (MSY) is the highest theoretical equilibrium that can be continuously taken (on average) from a stock under existing (average) environmental conditions without significantly affecting the reproduction process.[376]

However, the accuracy of both stock assessment exercises and the data to ascertain the rate of extraction is low. Moreover, the selectivity of stock assessments in terms of species that are commercially important vis-à-vis their ecological importance means that an ecosystems approach to fisheries management is largely absent in policy and practice. Thus, the regulatory tools, their design and their implementation are quite arbitrary in all the nations sharing the BOBLME. Even amongst them, some countries have been more proactive than others. For instance, the Fisheries and Aquatic Resources Act was promulgated by Sri Lanka in 1996 following substantial evidence of coastal fishing exceeding sustainable limits.[377] In recent times, Thailand has initiated a series of measures post-2015 to restrict the number and size of fishing vessels and fishing efforts following MSY as the reference point (Kulanujaree 2020).[378]

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[376] "FAO Term Portal," Food and Agricultural Organization of the United Nations, accessed January 15, 2022,https://www.fao.org/faoterm/viewentry/en/?entryId=98610#:~:text=Definition,to%20sometimes%20as%20Potential%20yield%20. .

[377] "Sri Lanka" Bay of Bengal Programme Inter-Governmental Organisation, accessed January 16, 2022, https://bobpigo.org/html_site/bobp_sri.htm

[378] Kulanujaree, Nipa, Krishna R. Salin, Pavarot Noranarttragoon, and Amararatne Yakupitiyage. "The transition from unregulated to regulated fishing in Thailand." *Sustainability* 12, no. 14 (2020): 5841.

Table 1: Regulatory tools by the BOBLME nations.

Type of fishing regulation	Sri Lanka	India	Bangladesh	Myanmar	Thailand	Malaysia	Indonesia
Access-control based	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Output/Catch based	No	No	Partially	No	Yes	No	No
Input/effort based	Partially	Yes	Yes	Yes	Yes	Yes	Yes
Temporal (mainly seasonal bans)	No	Yes	Yes	Partially	Yes	No	No
Spatial (locational restriction)	No	Yes	Yes	Partially	No	No	Yes

2.1.1 National Licensing, restrictions and reporting requirements

Licensing/reporting of foreign vessels

All the BOBLME nations have some licensing and reporting requirement in place for foreign fishing vessels for fishing within their respective EEZs.

India: For fishing within India's EEZ, foreign fishing vessels acquired by Indian citizens, or foreign-owned and operated vessels need to acquire licenses. Fishing operations in nearshore waters (up to 12 nautical miles) are controlled by state legislations with slight variations across different states. Primarily there exist spatial demarcations between the small-scale fisheries (artisanal, and smaller motorized vessels) and the mechanized fisheries (larger boats) sector, which is followed by most of the states. This spatial demarcation of fisheries is expected to minimise overlaps and conflicts between the small scale and mechanised fishing sectors.

Aside from that, there are concerns such as unreported, indiscriminate deep-sea fishing. While deep-sea fishing by Indian fishing vessels is minimal, issuing permits to foreign vessels to fish in Indian territorial waters, specifically in areas where resources are high has gained some attention over the years.

On registrations of vessels, the fishing vessels are registered under different states, there are challenges for fisheries management since there is strong spatial overlap of fishing

grounds between states. Clearly, there is a rationale to spatially allocate fishing grounds and limit the open-access nature of fisheries.[379]

Bangladesh: Rules for licensing foreign fishing vessels are in Part V of the Marine Fisheries Ordinance of 1983 that require foreign vessels to obtain a fishing license to fish, tranship the load or load/unload any fuel supplies within Bangladeshi waters.

Sri Lanka: For foreign fishing vessels, a license needs to be obtained as under Section 6(1) of FARA and the Fishing Operations License Regulations of 1996 (Gazette, No. 948/25 of 07 November 1996).

Myanmar: Foreign fishing vessels are allowed licenses and they can also apply for joint fishing ventures with companies based in Myanmar. The Law relating to the Fishing Rights of Foreign Fishing Vessels 1989 (amended in 1993) allow foreign vessels to apply for licenses to fish in the EEZ beyond the territorial sea. The reporting requirements are elaborate. The vessels are obligated to maintain logbooks detailing routes, arrival times, cargo, gear and crew. Further, these vessels are also required to undergo inspections at a specified port before and after fishing.

At present, it is commonly assumed that the military regime poses a huge risk to this rules-based order and fisheries management in Myanmar. Therefore, despite these and many other laws in place, the realisation of effective governance might be an irreconcilable reality.[380]

Thailand: Foreign fishing vessels can operate in Thai waters only if seventy percent of the capital is owned by Thai nationals apart from partners and director having a Thai nationality. Further, such vessels can only operate within Thailand's EEZ if fishing agreements exists with the vessel's flag state. These stringent conditions greatly restrict the entry of foreign fishing fleet.

Indonesia: Foreign fishing vessels and foreign actors are banned from engaging in fishing within Indonesia's EEZ since November, 2014.[381]

Malaysia: Foreign vessels are only permitted to fish within Malaysian waters if an international fisheries agreement exists. A broad suite of conditions related to transshipment, landing catch, entry into Malaysian ports and the placement of observers also require compliance from foreign vessels for engaging in fishing within Malaysian EEZ.

Licensing/reporting of domestic vessels

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[379] Based on inputs from Dr. Naveen Namboothri, founder trustee of Dakshin Foundation in India

[380] Based on interaction with Frank Van Der Valk, WWF Myanmar

[381] "Sharp decline in foreign fishing boats in Indonesian waters – Global Fishing Watch analysis," Global Fishing Watch, accessed January 30, 2022, https://globalfishingwatch.org/press-release/sharp-decline-in-foreign-fishing-boats-in-indonesian-waters-global-fishing-watch-analysis/

For the BOBLME countries, there are licensing and reporting protocols for domestic-flagged vessels to varying extents. But often, there are gaps that effectively turn a certain stretch of the sea to an open-access regime.

India: Domestic vessels in India need to apply for licenses as required by each coastal provinces (states) to catch fish within the territorial waters. However, these vessels do not require a license for fishing in India's EEZ and, therefore, also have no allowable catch limits.

Bangladesh: Rules for licensing domestic fishing vessels are in Part III of the Marine Fisheries Ordinance of 1983. The trawl vessels are granted fishing licenses on a yearly basis. Further, the licensing system are not just limited to mechanised boats but were extended to non-mechanised boats in 2001.

Sri Lanka: The legal provision for licensing is laid out through the Registration of Fishing Boats Regulations, 1980 (Gazette No. 109 of 3 October 1980). Duplication of fishing licenses by domestic vessel owners has been a pre-existing concern. Further, the MRAG study notes that there is no legal requirement for Sri Lankan flagged vessels to maintain a fisheries logbook.

Myanmar: A Fisheries Law of 1990 governs the licensing regime for national vessels and makes a distinction between inshore and offshore fishing. The law also prioritises inshore fishing zone for national citizens. With reporting, the law mandates that the master of the fishing vessel is responsible for the maintenance of logbook but it does not make a distinction between artisanal and industrial vessels or between inshore and offshore fishing vessels. Further, there is no provision for carrying VMS equipment.

Thailand: Thailand's fisheries management structure was reformed in 2015. Under the current system, the Marine Department prepares and issues new vessel permits and the Department of Fisheries screens the applications. The fishing areas, the fishing gear types and their quantity for deployment in particular fishing operations, maximum allowable catch etc. is governed by the the Royal Ordinance on Fisheries (2015) and its amendments of 2017.

Indonesia: The country employs an elaborate system of licenses for vessels greater than 5 GT. The vessels are required to have Fisheries Business License, a Catch License and/or a Fish Carrier Vessel License. These are based on business planning, potential fisheries resources and allowable catch. Each vessel is further required to maintain a vessel logbook containing data on location, fishing practices and catch of each fishing trip.

Malaysia: All fishing vessels and gears are required to be licensed under an annual system as laid out by the Fisheries Act. MRAG reports that a potential loophole exists with regards to the 'informal policy' of allowing low-income, traditional fishers to fish without licenses. Further, there is no legislation that mandates national vessels to report catch, keep logbooks or install VMS.

With reporting, the process remains largely weak in most of the BOBLME countries. This also translates to the availability of fisheries data for countries like Sri Lanka and Myanmar, which are often found to be sparse, sporadic and patchy. By far, Indonesia has the best system in place for licensing and reporting that is also accompanied by an allowable catch. The issue of licenses is based on considerations of, *inter alia*, business planning, potential fisheries resources and allowable catch. Similarly, for reporting, not just the weight of catch but also the location and fishing practices are mandatory for each fishing trip.

2.1.2 Restrictions on equipment/species/location

The restrictions imposed are mainly of three types – restrictions on destructive gear, restrictions on small mesh size and spatial-temporal restrictions on fishing. These restrictions are necessary for the indiscriminate exploitation of living resources, many of which end up as bycatch only to be discarded later or used as feed for farm animals. Moreover, spatial and temporal fishing bans allow for the replenishment of fish stocks.

All the BOBLME countries have in place some form of restrictions. Some countries such as India and Bangladesh have specific zones near the shore and until a specific depth or distance from the shore are reserved for small-scale fisheries. Species-specific restrictions are also quite frequent and may involve a spatial-temporal dimension. For instance, Sri Lanka has elaborate laws for not just the usual three restrictions but also bans, sometimes conditional ones, in the capture, retention, transshipment, landing, storage, sale or offer of sale of various marine organisms like shark species, rays, lobsters, chanks turtles and marine mammals. Similarly, through wildlife and forest-related acts[382], Bangladesh prohibits the harvest of various species of sharks and marine turtles. Some countries, such as India, also restricts significant discarding by foreign vessels but enforcement of this provision has remained weak.

With Myanmar, apart from some usual restrictions on 'illegal fishing' through penalties and confiscation of vessels, gear and catch, the country had also been leasing offshore fishing rights at various stages to Thailand, Malaysia, Singapore and the Republic of Korea.[383] There are accounts of irregularities and non-compliance of the law of Thai fishing vessels within Myanmar's EEZ in unauthorised areas and the continuation of fishing despite the cessation of the agreement.[384] While separate licensing of foreign fishing vessels from near and distant maritime nations to catch fish in its EEZ outside territorial sea could have been

[382] Wildlife (Conservation & Protection) Act 2012, Bangladesh Forest Act 1927, Bangladesh Wildlife (Preservation) (Amendment) Act of 1974

[383] Booth, S., and D. Pauly. "Myanmar's Marine Capture Fisheries 1950–2008: Expansion from the Coast to Deep Waters." *Fisheries Catches from the Bay of Bengal Large Marine Ecosystem since* (1950): 101-134.

[384] Wanchana, Worawit, Magnus Torell, Somboon Siriraksophon, and Virgilia T. Sulit. "Addressing trans-boundary issues and consolidating bilateral arrangements to combat IUU fishing." *Fish for the People* 14, no. 2 (2016): 48-53.

lucrative for the government, it doesn't continue because the fish landing yield has depleted and it is no longer economical to pay so much for the licenses when the returns are low.[385]

In Myanmar, a Danida (Danish International Development Agency)-funded coastal fisheries project was initiated in 2018 and closed in 2021. It aimed at promoting community-based fisheries management as a vehicle to improve governance. There are currently around 3,200 licensed industrial vessels operating in Myanmar waters. By the data collected from the VMS, one can tell multiple things such as the fishing method, if they're encroaching into coastal waters and whether they are transshipping catch at sea based on the pace and movement of the vessels. However, the large unregistered fleet masquerading as artisanal boats are the main contributors to IUU fishing. These big, powerful boats use light for fishing at night and the generators and light intensity is far beyond anything that might be considered legal (photograph below). [386]

Figure 2: An illegal 'light boat' in Myanmar.[387]

Fisheries laws are outdated, (1990 amended in 1993) and at that time there was no mention of sustainable fishing. There was an impetus to update fishery laws under the Danida funded project, however this was curtailed after the events of February 1, 2021. The government in Myanmar tried a policy of 'naming and shaming' in 2019 where they put up names of the people and the company/boat owners in the newspapers and publicly shamed

[385] Based on inputs received from Mr. Michael Joseph Akester, Regional Director, South-East Asia and the Pacific, WorldFish

[386] Based on inputs received from Mr. Michael Joseph Akester, Regional Director, South-East Asia and the Pacific, WorldFish

[387] Photograph received from Mr. Michael Joseph Akester, Regional Director, South-East Asia and the Pacific, WorldFish

them for illegal fishing. The tactic worked for the registered boats. However, it had little effect on the smaller boats like the ones that fall in the grey category.[388]

Transhipment-related rules might also be expressed explicitly in some cases. For instance, in Malaysia, transhipment with a foreign vessel without authorisation is an offence along with various other usual restrictions. The country has also tried innovative ways to control fishing efforts such as a moratorium on all coastal fishing licenses that have been issued since 1982 and a buy-back scheme for zone B license holders.[389]

As it would be evident from the analysis above, not all countries are on the same page as far as restrictions are concerned. Some have enacted strong laws while others often fall short to employ all forms of restrictions. Moreover, legally enforceable restrictions would achieve little if they are not effectively enforced. Thus, a robust system of MCS needs to be in place to enforce these restrictions as and when applicable. Furthermore, corruption in the ranks of law enforcement agencies may often provide a leeway to escape punitive actions, particularly for owners of large fishing vessels. The case of Bangladesh in Northern BoB underscores this.[390] Another prevalent lacuna is the lack of uniformity or even complementarity of the preventive and restrictive regimes in each riparian nation. The integrated governance of the single Large Marine Ecosystem can be realised if laws to restrict the exploitation of resources also reflect this principle in policy and practice.

2.2 Monitoring, Control and Surveillance (MCS)

The International Plan of Action to Prevent, Deter, and Eliminate IUU Fishing (IPOA-IUU) of 2001 is the first international instrument that encouraged all States to use available measures in an integrated manner for preventing IUU Fishing. Globally, the impetus to bolster MCS systems for marine fisheries by flag states can be traced to this landmark instrument. MCS measures in the BOBLME countries include vessel tracking (mainly for domestic fishing vessels), visual surveillance (especially patrol at sea for both domestic and foreign vessels), onboard observers (for domestic vessels), and PSM (for foreign vessels). PSM has been dealt with exclusively in the subsequent section.

The compliance aspect of licensing and reporting rules is different for each category of fishing – industrial or larger-scale fishing activity and small-scale artisanal fishing, is often tied to effective monitoring, control and surveillance (MCS). For large-scale fisheries, adequate enforcement capacity or the availability of trained personnel is often a limiting factor. Along with that, an 'informal economy' around bribes and other incentives allows culpable actors to circumvent the law. For small-scale fisheries, the sheer size and scattered nature of fishers and fishing vessels make the logistics quite challenging. Often, the act of enforcement may create conflict with local fishers and deter government officials who may

[388] Based on inputs received from Mr. Michael Joseph Akester, Regional Director, South-East Asia and the Pacific, WorldFish
[389] Curtis, Rita, and Dale Squires. *Fisheries buybacks*. John Wiley & Sons, 2008.
[390] Islam, Mohammad Mahmudul, Amany Begum, Syed Mohammad Aminur Rahman, and Hadayet Ullah. "Seasonal Fishery Closure in the Northern Bay of Bengal Causes Immediate but Contrasting Ecological and Socioeconomic Impacts." *Mar. Sci* 8 (2021): 1-13.

fear an act of violence or physical harm or loss of political support. Often, fishers are also unaware of the rules and regulations regarding licensing and reporting requirements.[391] With MCS, a core issue in the region has always been that MCS systems for small-scale fisheries are largely inadequate: governments have adopted MCS systems which are essentially designed for industrial fisheries of developed countries.[392]

Bangladesh: Bangladesh lacks adequate capabilities to monitor its vessels as well as foreign ones. It has to rely on port state controls as it has no at-sea boarding and inspection capabilities .[393] It is trying to overhaul this with the new Marine Fisheries act 2020 that necessitate industrial vessels such as trawlers to install both Vessel Monitoring System (VMS) as well as Automatic Identification System (AIS).[394]

Sri Lanka: Sri Lanka has largely focussed on bolstering legislative as well as administrative capacities of MCS fishing in high seas including the installation of Vessel Monitoring Systems (VMS) and maintenance of a logbook for multi-day vessels. For vessels fishing within the EEZ, only the maintenance of a logbook is necessary.[395]

Myanmar: Mostly, the national navy and the coastguard carry out patrolling and enforcement. However, they lack the capacity to monitor the entire EEZ and therefore compliance with legislation is often lacking. The Department of Fisheries (DoF) only has the capacity to manage the approximately 3,200 industrial vessels fitted with Vessel Monitoring System (VMS) transponders. There is an equally large or perhaps much bigger 'artisanal' fleet with the same capacity as the industrial boats which operate inshore as unregistered vessels. The genuine artisanal fleet amounts to possibly 300,000 vessels, most of which are without engines or compliant with the <25hp rule for powered vessels. The DoF doesn't have the ability to manage the illegal vessels, and there are many examples of rent-seeking at the local level 'management' system. Similarly, the Myanmar Navy lacks the capacity to patrol and monitor either inshore or offshore waters.
Danida commissioned two inshore fisheries support vessels under a donation to the DoF. It is uncertain if these have now been fully commissioned and are in service. Fuel costs have

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[391]Bay of Bengal Large Marine Ecosystem Project, *Transboundary Diagnostic Analysis Volume 1 (Issues, Proximate and Root Cause)* (Phuket: Thailand, 2014), accessed January 10, 2022 https://www.boblme.org/transboundary_diagnostic_analysis.html
[392]BOBPIGO, "Regional Workshop on Monitoring Control and Surveillance Adopts the Chittagong Resolution", https://www.bobpigo.org/img/uploaded/bbn/march-june08/March-June2008-Pages38-42.pdf
[393]Pramod, Ganapathiraju, Tony J. Pitcher, and Chiara Piroddi. "An Estimation of Compliance of the Fisheries of Italy with Article 7 (Fisheries Management) of the UN Code of Conduct for Responsible Fishing." (2006).
[394]The World Bank. Bangladesh Sustainable Coastal and Marine Fisheries, accessed December 31, 2021https://projects.worldbank.org/en/projects-operations/project-detail/P161568.
[395]Indian Ocean Tuna Commission. Electronic Data Verification Module with Vessel Tracking Facility to Combat IUU Fishing, accessed January 12, 2022 https://www.iotc.org/documents/electronic-data-verification-module-vessel-tracking-facility-combat-iuu-fishing.

doubled in the last 6-months.[396] The MRAG report also notes that national authorities allegedly collude with foreign IUU vessels by disclosing patrol areas and reducing the risk of inspection by enforcement vessels.

Thailand:[397] In order to complement the advancement in stronger regulations, Thailand has also changed its MCS system. Port-in and port-out centres are created along the coastline to control fishing activity including fishing days. The inspection at these centres cover documentation, fishing gear, crew approval, fishing license apart from taking stock of the number of fishing days. The vessels that exceed fishing days are prohibited to port-out. Moreover, installation of VMS and associated equipment has been made mandatory. Inspections at sea is undertaken by the Fishing control and Surveillance Division of Department of fisheries along with Marine Police Division, the Thai Maritime Enforcement Command Centre and the Royal Thai Navy.[398]

Indonesia: The country was of the first in the region to initiate a VMS system in 2003. All vessels over 60 GT with the Indonesian flag are required to have functional VMS equipment. For vessels in the range of 30-60 GT, offline VMS is in place that uploads the tracked data upon the vessels return to the harbour. Indonesia employs a well-coordinated MCS program that involves Ministry of Marine Affairs and Fisheries, Indonesian Navy, Marine Police, Maritime Security Coordinating Board and Director General of Sea Transportation. Surveillance is mostly done by MMAF patrol vessels and occasionally under joint operations with Navy and Marine Police. Indonesia has also been successful in initiating community-based surveillance operations. [399]

2.3 Port state measures

Port states measures originate from the UN-sponsored international Port State Measures Agreement (PSMA) that mandates the signatory flag states to incorporate four specific provisions to curb the offloading of fish captured through IUU fishing.
These involve:

(i) designating specific ports in which foreign-flagged vessels may land or trans-ship fish
(ii) reviewing standard vessel information before allowing a vessel's entrance into the port
(iii) carrying out risk assessments to determine whether vessels may have participated in IUU fishing

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[396] Based on inputs received from Mr. Michael Joseph Akester, Regional Director, South-East Asia and the Pacific, WorldFish
[397] Department of Fisheries, Thailand. The National Plan of Action to Prevent, Stop, and Eliminate IUU Fishing, accessed January 5, 2022 http://www.fao.org/faolex/results/details/en/c/LEX-FAOC169693/
[398] Kulanujaree, Nipa, Krishna R. Salin, Pavarot Noranarttragoon, and Amararatne Yakupitiyage. "The transition from unregulated to regulated fishing in Thailand." *Sustainability* 12, no. 14 (2020): 5841.
[399]Ikrami, Hadyu. "Indonesia's Reform of Its Fisheries Law and Policy & Cooperation with ASEAN in Combating IUU Fishing." *Asia-Pacific Journal of Ocean Law and Policy* 2, no. 2 (2017): 318-330.

(iv) denying any of the vessels entry into their ports and otherwise prevent them from offloading fish in their ports and exchanging vessel information with other states and international entities.

All BOBLME countries (i.e. Bangladesh, Sri Lanka, Myanmar, Thailand and Indonesia) except India and Malaysia are parties to this agreement. Port State Measures (PSM) stand as the last line of defence against the entry of marine products procured through IUU fishing into the global marketplace.

Amongst the BOBLME countries that are parties to PSMA, Bangladesh is the most recent, having ratified it in 2019. Section 47 and 48 of Maritime Zones Act, 2020 mandates Port Authorities to take requisite measures to prevent 'IUU-Catch products" from entering national and international markets. However, there is no protocol in place that lays out how law enforcement agencies, maritime administrations and port authorities would coordinate to enforce the law.[400]

Sri Lanka has been a success story in the region after trade restrictions were put on it by the European Union in 2015 for failing to properly monitor its fishing fleet, punish vessels guilty of illegal fishing and develop robust laws to deter IUU fishing.[401] It undertook several new measures including the installation of VMS systems and the documentation of information from each returning fishing vessel and clearing them of IUU stocks through PSM.[402]

For Myanmar and Thailand, constraints that hinder the implementation of PSM include inadequate facilities and officers, insufficient infrastructure to support PSM, lack of awareness among concerned agencies and others.[403] On paper, port-state measures in Myanmar appear to be effective, as there is monitoring and inspection at ports. However, in practice, there are fish in the market that shouldn't be there during the closed season, May-July, which points to IUU fishing. There is a 40% gap between the DoF reported figures and the FAO estimates which are closer to reality i.e., 40% lower. It has to be said that the 'hidden harvest' figures are also large but even so the fish production is 40% lower than reported. Capture fisheries (inland, inshore and offshore) are all in decline while aquaculture production is increasing.[404]

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[400]Rahman, M.R. "Illegal fishing and laws of Bangladesh," The Daily Star, 6 October 2020, https://www.thedailystar.net/law-our-rights/news/illegal-fishing-and-laws-bangladesh-1973365

[401]Madina, Marta. 2015. "EU to ban fish imports from Sri Lanka for illegal fishing,"Comunicados De Prensa, Oceana Protegiendo los Oceanos del Mundo, (posted January 26, 2015). https://europe.oceana.org/es/prensa-e-informes/comunicados-de-prensa/eu-ban-fish-imports-sri-lanka-illegal-fishing

[402]Stepping-Up Against IUU Fishing. The Sri Lankan Intervention by Food and Agricultural Organization of the United Nations https://www.youtube.com/watch?v=oO2TT1BgW-g

[403]Suthipol, Yanida, Kongpathai Saraphaivanich, and NamfonImsamrarn. "Situation on Port State Measures in Myanmar, Thailand, and Viet Nam." In *SEAFDEC Technical Seminar 2018*, pp. 4-9. Training Department, Southeast Asian Fisheries Development Center, 2018.

[404] Based on inputs received from Mr. Michael Joseph Akester, Regional Director, South-East Asia and the Pacific, WorldFish

Indonesia has declared that owing to the limited number and capacity of the personnel, limited facilities and network and budgetary constraints, implementation of PSM faces a challenge. As with other countries, some other challenges for implementing PSM in Indonesia include lack of interagency cooperation and standard operating procedure along with lack of awareness among stakeholders.[405]

3. What's working well

In the BOBLME fishing theatre, some countries have taken proactive steps for deterring, preventing and eliminating IUU fishing within their EEZ. Of these, Indonesia has certainly emerged as the regional frontrunner. Indonesia has demonstrated the use of technology in improving over existing MCS measures. It currently mobilizes two satellite missions at the Bali Radar Ground Receiving Station to capture real-time images of fishing vessels at sea. These images are overlaid with data received via VMS and AIS to verify the location of vessels at sea.[406] Coordinated action between law-enforcement agencies is quite effective in carrying out MCS seamlessly. Indonesia has also established the Indonesian Maritime Information Centre (IMIC) in 2020 for enhancing coordination among MCS-relevant agencies in Indonesia. It maintains a hard and zero-tolerance policy towards vessels engaging in IUU fishing.

Thailand has also improved its capacity to undertake MCS activities with the establishment of the Thai Maritime Enforcement Command Center (THAI-MECC) that brings together various agencies like the Navy, Department of Fisheries and others under one roof. It has also established the Port In-Port Out (PIPO) Control Centers in 2015 that regulates fishing vessels by issuing a permit for fishing trips and validates the accuracy of fishing logbooks through port inspection and the VMS.

Another positive development in the region has been the settlement of maritime boundaries between different BOBLME littorals. At present, all the disputes regarding maritime boundaries, including trijunctions, stand resolved with the last dispute being the long-standing one between India-Bangladesh in 2014. This clears the deck of any ambiguities or contentions that can undermine bilateral or multi-lateral initiatives to fight IUU fishing.

Some countries have also begun engaging at a bilateral level for data exchange and capacity building to curb IUU fishing (See Table 1 and 2). In recent times, market state measure has

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[405]Ministry of Marine Affairs and Fisheries, Republic of Indonesia, "Current and Progress Situation on Port State Measures Implementation in Indonesia", Presentation at the Regional Training on Port State Measures Implementation for Inspector 22-26 July 2019, Bangkok-Thailand, accessed January 3, 2022 http://www.seafdec.or.th/home/file-events/category/47-psm-2019-presentations?download=305:indonesia-current-situation-on-inspection-psm

[406]Puspitawati, Dhiana, Shinta Hadiyantina, FransiscaAyulistya Susanto, and Nurul Aprianti. "Law Enforcement at Indonesian Waters: Bakamla vs. Sea and Coast Guard." *Indonesian Journal of International Law* 17 (2019): 495.

also been found to be effective in creating an incentive for a nation to bolster its domestic regulatory infrastructure and legislation.

The EU ban on Sri Lanka in 2015 for 'failing to properly monitor its fishing fleet, punish vessels guilty of illegal fishing, or develop robust fisheries laws to deter IUU fishing' is a good example. Since then, Sri Lanka has made a dramatic comeback and it took little more than a year for the EU red card to be rescinded.

In the case of Myanmar, a distinction is made between inshore and offshore fishing. Ten nautical miles from the coast is considered as the exclusive artisanal fisher zone. However, there is also a grey area for bigger boats with powerful engines and length, which ideally should be counted in industrial boats but owing to the fact that they have open decks or are simply unregistered, they do not form a part of the industrial fleet. The responsibility of inland fisheries used to be with the States and Regions while the inshore and offshore control lies at the central union level. Under the current military government, it seems that total control now rests with the *de facto* central government. At the State/Region level local fisheries laws allowed community-based fisheries management and fisheries co-management. It seems that the relevant community-based clauses have been rescinded. Although in some cases this is still possible, for example community-based management was already in place for Hilsa fisheries where artisanal fisherfolk monitored the fishing activities for IUU fishing and reported to the law enforcement agencies upon detection.[407]

The Department of Fisheries in Myanmar has recently approved hilsa sanctuaries in the Ayeyarwady Delta River systems. Co-management laws were about to be passed in February 2021 but the process has now been stalled because of the coup. Power is now concentrated in the centre and exerted through command-and-control modes, but it does seem possible to convince the *de facto* government for sustainable fisheries management e.g., the hilsa fishery, and economic arguments will work there.[408]

4. Fixing the gaps

In the absence of effective regional arrangements, the management of capture fisheries in the BOBLME can be best described as 'fractured' and 'incoherent'. Moreover, the existing loopholes in the domestic legal frameworks and law enforcement allow for IUU fishing to continue largely unabated. Based on this assessment, some priority areas of intervention for plugging the gaps based on this are set out below.

4.1 Need for robust data management

Presently, data on the IUU catch is woefully lacking. All the estimates have been done by external agencies based on the best available evidence (for instance BOBLME-P). Further,

[407] Based on inputs received from Mr. Michael Joseph Akester, Regional Director, South-East Asia and the Pacific, WorldFish

[408] Based on inputs received from Mr. Michael Joseph Akester, Regional Director, South-East Asia and the Pacific, WorldFish

the data does not differentiate between domestic fishing vessels and foreign fishing vessels. Without consistent and robust data, the formulation and effective deployment of any management plan would be largely limited. There is ample opportunity to share resources between countries of south-east Asia for stock assessment and sharing technology between the countries for joint assessment of the stocks - possibly under ASEAN.[409]

4.2 Initiating Ecosystems Approach to Fisheries Management (EAFM)

Despite a global consensus on the need for EAFM[410], there is inadequate reflection of EAFM in the domestic frameworks of BOBLME nations for the governance of marine capture fisheries. One of the key cornerstones of EAFM is a stock estimation and arriving at a Total Allowable Catch (TAC) limit. This can then be tied to the licensing regime, thereby allowing capture fisheries to operate at a level that allows for regeneration of stock and prevent their overharvest.

4.3 The enabling role of non-state actors

From fisher communities to fisheries scientists to conservation organisations, everyone would agree that fisheries in India desperately needs scientific management and sustainable development. There is a strong role for non-state actors in creating and implementing such a sustainable, equitable development vision. This holds particularly true for India considering the high diversity, the dissipated nature and the dependence of millions. Fisheries management in India needs to be inclusive, transparent, iterative and adaptive. It is not an awareness creation challenge but a challenge of ensuring compliance, participation and support of fishers and other workers engaged in this industry. Non-state actors can play a critical role of acting as a bridge between the communities and the government and facilitate making better, more inclusive and well accepted policies.

Non-state actors can also play a strong role in implementation. Since the coastline is huge, the resources required to monitor and regulate fisheries, across such large temporal and spatial scales are humungous. An effective way of ensuring better reporting, compliance and minimizing resource use is be developing participatory frameworks for fisheries management and by empowering fisheries based non-state actors in India such as the NFF (National Fishworkers Forum), Dakshin Foundation, and the ICSF (International Collective in support of Small Scale Fisheries) to be active participants and contributors in the creation and implementation of an equitable and sustainable fisheries development vision for the

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[409] Based on inputs received from Mr. Michael Joseph Akester, Regional Director, South-East Asia and the Pacific, WorldFish

[410] For instance, the Convention on Biological Diversity (CBD) and the Aichi Biodiversity Targets provides guidance on the use of Fisheries and other marine Living resources sustainably. All the BOBLME nations are signatories to the CBD. CBD calls for stricter control over access by foreign vessels, creating “exclusive use zones” for artisanal fishers, put limits on access to fisheries based on Total Allowable Catches (TACs). Aichi Biodiversity Target 6 lays out that by 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem-based approaches

nation. Active decentralization and devolving powers to these civil society organizations and a co-management kind of frameworks would help a lot in implementation.[411]

4.4 Improving the MCS capacities and capabilities

A low priority for investments in fishing enforcement, with a greater emphasis on revenue generation through licensing of industrial vessels has been a key obstacle in the BOBLME countries for realising robust MCS systems. In Asia, private companies dominate the fisheries sector, with government intervention limited to providing fuel subsidies and low-cost fishing licences for domestic industrial fishing trawlers.

The lack of an organised system of fisheries inspection plans by each port at central and regional levels, as well as lower transparency in reporting IUU infractions using MCS benchmarks, frequently acts as a veil on understanding the true extent of IUU crimes on the ground. The central government mindset in most BoB countries is centred on generating foreign exchange revenue through seafood exports (processing plants, and storage cold stores, etc.) and the sale of fishing licences to distant water fishing fleets. Since 2010, export-oriented trade sanctions for IUU fishing practices have also compelled the federal fisheries ministry to conceal illegal practises for fear of trade sanctions (EU – yellow cards) and the subsequent economic consequences.[412]

Further, the opportunity for effective regional governance, due to four-fifth of the BOBLME featuring as EEZs, has remained largely a challenge due to poor MCS of these waters by coastal states due to lack of manpower within fisheries departments at both the federal and provincial levels in BoB countries.[413] As a result, any other initiative to curb IUU fishing such as a strong licensing regime or port state measures is largely undermined. Large and consistent investments are required to bolster the capacities and capabilities. Poor MCS and, consequently, prolonged IUU fishing can result in a fatal blow to artisanal fishing in the territorial seas and EEZs where industrial fishing fleets often outcompete the artisanal fishing fleets.

Lastly, small-scale fish landing sites that are widely dispersed receive few inspections. The presence of numerous landing sites along rivers, estuaries, and coastal beaches that receive infrequent inspections complicates understanding of systemic threats. Remote landing beaches in BoB are frequently used as fronts for other illegal activities like fuel trafficking, illegal contraband trade, narcotics trafficking, and piracy.[414]

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[411] Based on inputs from Dr. Naveen Namboothri, founder trustee of Dakshin Foundation in India

[412] Based on inputs from Dr. Pramod Ganapathiraju, MCS and Fisheries Consultant, Founder IUU Risk Intelligence

[413] Based on inputs from Dr. Pramod Ganapathiraju, MCS and Fisheries Consultant, Founder IUU Risk Intelligence

[414] Based on inputs from Dr. Pramod Ganapathiraju, MCS and Fisheries Consultant, Founder IUU Risk Intelligence

4.5 Reducing acrimony and enhancing cooperation

Despite the settlement of national disputes over maritime boundaries, the transgression of fishers from neighbouring coastal states has been a recurrent reason for acrimony between Sri Lanka – India, India – Bangladesh, Bangladesh – Myanmar and Myanmar – Thailand. This is the dominant form of IUU fishing by foreign fishing vessels in national waters and has resulted in violent responses from law-enforcement agencies. In the short-term, this issue can be resolved through the installation of VMS systems or some other radio/satellite-based alert system. Further, joint patrolling of waters and easy repatriation of jailed fishers can also reduce tensions.

Further, cooperation also needs to be enhanced at local levels. For instance, the spatial spread of small-scale fisheries in India (a fishing village or hamlet every 3-4 kms on average) and the number of fishing boats and fishers involved makes it impossible for a single monitoring agency to monitor fish landings and the scales of operations. As a result, most of the operations by small scale fisheries would fall into unreported fishing. Unless a proper mechanism is built for reporting fish catch, implementation of any form of regulation, particularly measures such as confiscation of boats or restriction of fishing would be extremely unfair.

Currently, the only way reporting is done is by the fisheries department sending their enumerators to collect data, and through a multi-stage stratified random sampling framework that the CMFRI has developed. Unless these systems are in place, only more chaos and haphazard regulations will be created which will have no positive outcomes for both the environment or the communities. Instead it could act as tools for further bullying/restricting the already marginalised small scale fisheries sector. Instruments to curb IUU fishing should also be used as a tool to ensure small-scale fisheries have a right over their fishing grounds and have their livelihood interests protected.[415]

4.6 Establishing PSMs

All countries should participate in this global effort to delink the IUU fishing supplies to markets. The UN Port State Measures Agreement (PSMA) outlines this in detail. The signatories to this agreement are required to ensure the following -

- Designate specific ports in which foreign-flagged vessels may land or trans-ship fish.
- Require and review standard vessel information before allowing a vessel's entrance into the port.
- Carry out risk assessments to determine whether vessels may have participated in IUU fishing.
- Deny any of these vessels entry into their ports and otherwise prevent them from offloading fish in their ports.
- Exchange vessel information with other states and international entities.

[415] Based on inputs from Dr. Naveen Namboothri, founder trustee of Dakshin Foundation in India

All the seven BOBLME countries are parties to the PSMA except India and Malaysia. India, which has the largest share of EEZ in the region, should be taken onboard and its reservations will have to be addressed, particularly those involving the high costs that India is likely to incur in implementing port state of measures.[416]

5. Bringing the oceans together

The key learning from the BoB region for the rest of the Indian Ocean Region (IOR) and elsewhere is that regional cooperative arrangements, so far, have not been the used as the vehicle for deterring, preventing and eliminating IUU fishing. The countries have largely taken unilateral measures as has been elaborated in this report.

This is counterintuitive as globally regional cooperative arrangements have allowed for force multiplication for various purposes like carrying out MCS. Perhaps, this is because around 80% of the BOBLME is comprised of EEZs. Moreover, these EEZs belong to relatively large-sized economies whose dependence on marine resources have been relatively low. It is only now that these countries are waking up to the potential of their blue economy, particularly the living marine resources. Hence, the sector remains largely informal and disorganised and the regulatory frameworks that are in place are also nascent. Another reason for the lack of proactiveness could be that this region does not currently face any considerable threat from extra-regional actors (See Annexure 2).

However, this is not to say that regional cooperative arrangements would not be useful or they are not present at all. A single regional fishery monitoring centre manned and operated by one country is required for the BOBP region. Once the physical infrastructure is in place, a regional data sharing platform with both digital and cellular communication can be established, with experts from tuna-RFMOs, Interpol, and other regional forums (BIMSTEC, APFIC) contributing expertise to monitor suspicious vessels and sharing intelligence to intercept dark vessels at sea or regional ports within the EEZ waters or ports at BOBP member countries. As part of this Regional Fisheries Surveillance Centre (RFSC) mechanism, a regional memorandum of understanding (MOU) or bilateral agreements on how data will be securely shared between countries via digital computer networks can be drafted. The Indian Navy's IFC-IOR (Information Fusion Centre – Indian Ocean Region) can serve as base model for such IUU tracking initiatives in the fisheries sector.

Currently, there is a loss of valuable intelligence data on dark vessels and IUU visits of fishing vessels at ports because most RFSCs in the Arabian Sea region do not make such data public or share it with other countries. It is often difficult to determine who the true beneficiaries of the massive data collected by private regional initiatives, which are frequently funded by NGOs (e.g., Stop Illegal Fishing, Fish-I Africa) based in the United States, Europe, and Norway. NGOs based in Europe and North America should not oversee data collection or analysis, and IUU control or enforcement measures should be managed or

[416]Kirtika Suneja, "India, Sri Lanka cautious of EU proposal against illegal fishing" The Economic Times, 21 November 2019 https://economictimes.indiatimes.com/news/economy/foreign-trade/india-sri-lanka-cautious-of-eu-proposal-against-illegal-fishing/articleshow/72152081.cms?from=mdr

enforced in Asian countries by officials working within BOBP countries. The Pacific Islands Forum Fisheries Agency (FFA) serves as an excellent model in this regard. Key management officials at FFA are held by Pacific Island nationals and all key data elements are shared among member states (technology and training).[417]

Table 2 lists some of the bilateral arrangements and multilateral formations and initiatives that will shape the process of mutual trust and regional cooperation. As an immediate starting point, it is worthwhile to note that the demarcation of EEZ boundaries along with trijunctions stand settled with the last one being the delimitation of maritime boundary between India and Bangladesh in 2014. With this out of the way, a higher order partnership can be initiated bilaterally or multilaterally as has been the case with regards to data and knowledge sharing. Going forward, some other key areas of cooperation could be joint scientific exercises. For instance, fish stocks can be highly migratory and might straddle EEZs of more than two coastal states. In that case, collective stock assessment could be a key area of intervention at a regional scale. Some of these collective or joint exercises are already being initiated under the aegis of BOBP-IGO for the countries in the western rim and SEAFDEC for the ones in the eastern rim. In recent times, regional groupings of maritime states such as the BIMSTEC and the IORA have also been active in exploring the potential of sustainable marine fisheries as a pivot for greater regional collaboration.

Table 2: Bilateral and Multilateral initiatives for marine fisheries in BOBLME (particularly those for preventing IUU fishing).

Bilateral Initiatives	Sustainable coastal and/or marine fisheries management	Data and Knowledge sharing (primarily for MCS related activities)	Transgression of fishers and repatriation	Remarks
1. MoU between India and Bangladesh in the field of Blue Economy and Maritime Co-operation in the Bay of Bengal and the Indian Ocean Region.	No	Yes, in the high seas.	Yes	Broad-brushed with a primary focus on Blue Economy.
2. MoU between the Indian Coast Guard and Bangladesh Coast Guard for the establishment of collaborative relationships to combat transnational illegal activities at sea and develop regional cooperation between the two. (2015)	Not relevant.	Yes	Yes	Focussed on curbing all illegal activities with no specific mention of IUU fishing.
3. Indonesia – Bangladesh Joint Communique on Cooperation to Combat IUU Fishing and to Promote Sustainable Fisheries Governance. (2018)	**Yes** Promoting responsible fishing practices, reducing	**Yes** Information exchange and capacity building.	**No**	Focussed on curbing IUU Fishing – Open-ended clause suggesting 'every possible joint initiative to combat IUU fishing'.

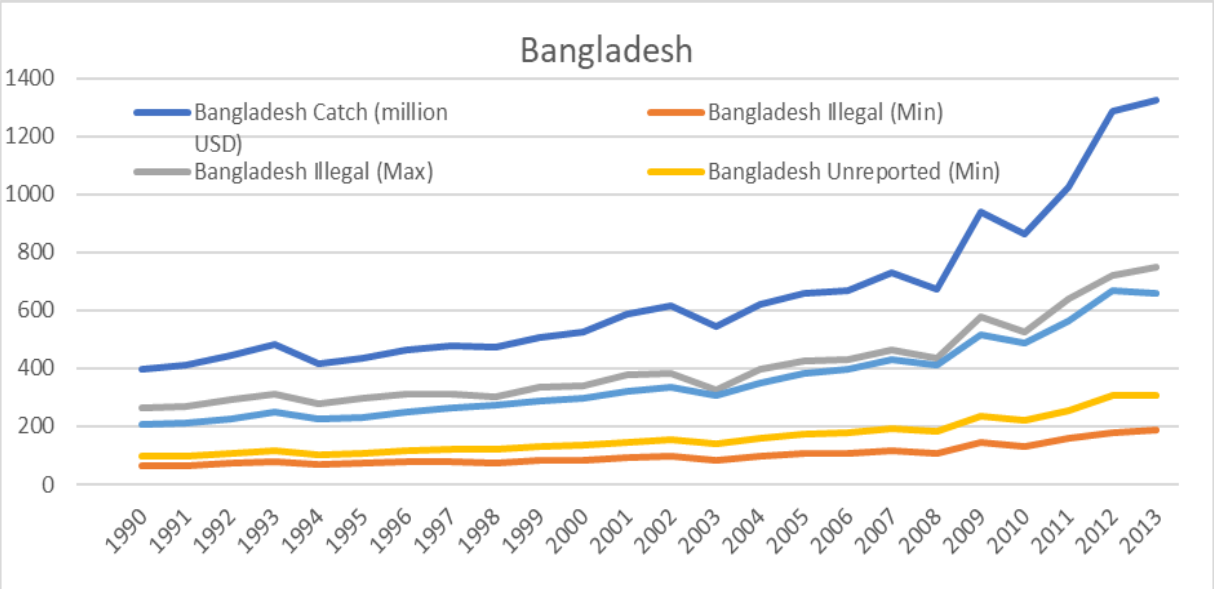
[417] Based on inputs from Dr. Pramod Ganapathiraju, MCS and Fisheries Consultant, Founder IUU Risk Intelligence. See also Baseline Report 2.

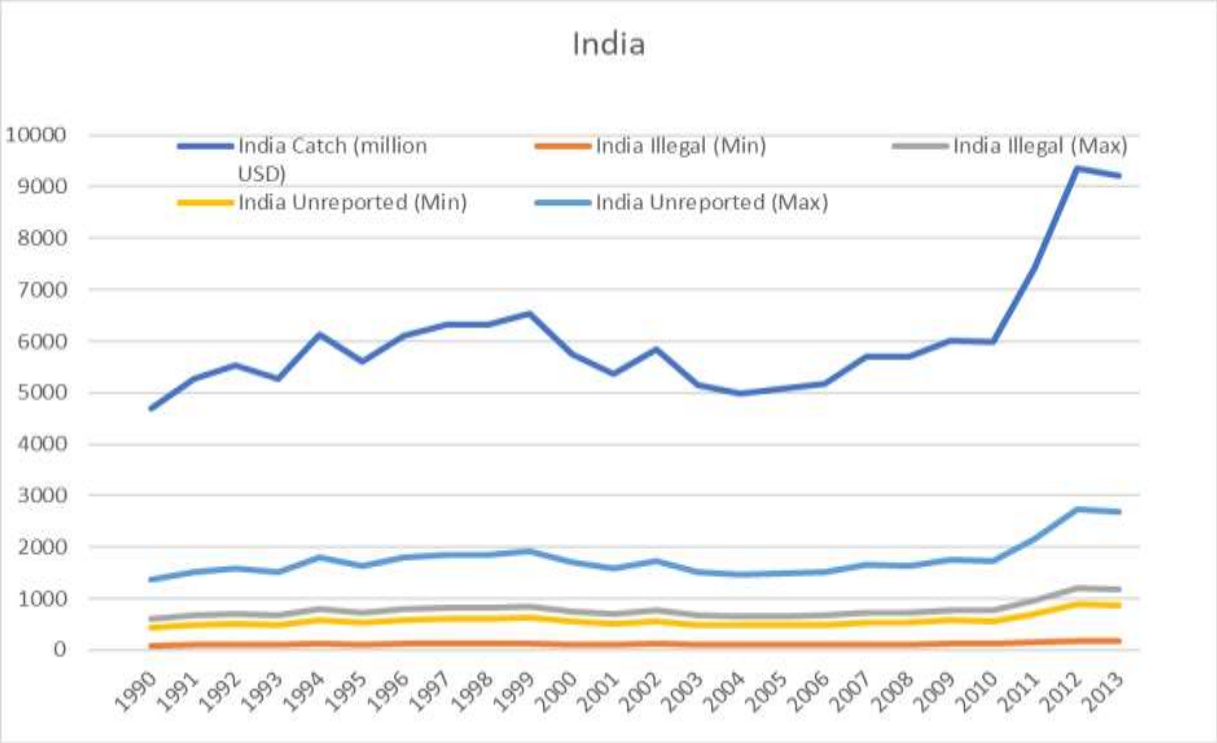
	fishing efforts, marine fisheries co-management plans, management of MPAs, sustainable mariculture.			
4. MoU between ministry of marine affairs and fisheries, Indonesia and Ministry of Agriculture, India on Marine and Fisheries Cooperation. (2006)	**Yes,** broadly.	**Yes**	**No**	Broad-brushed with provision for separate subsidiary agreements; prevention, combat and elimination of IUU fishing mentioned as one amongst eight areas of cooperation.
5. Joint Communique between Indonesia and India on voluntary international cooperation to combat IUU fishing and to promote sustainable fisheries governance. (2016)	**Yes,** through the promotion of responsible fishing practices, exercising precautionary principles, taking action to reduce fishing effort	**Yes,** carrying out information sharing and capacity building exercises.	**No**	Draws from the MOU of 2006, open-ended clause suggesting 'every possible joint initiative to combat IUU fishing'.
6. Joint Communique between Indonesia and Sri Lanka on voluntary international cooperation to combat IUU fishing and to promote sustainable fisheries governance. (2017)	**Yes,** exercising precautionary principle, taking action to reduce fishing effort	**Yes,** carrying out information sharing and capacity building exercises.	**No**	Same as joint communiques of Indonesia with India and Bangladesh except for the notable omission of promoting responsible fishing practices.

Multilateral Initiatives
1. Southeast Asian Fisheries Development Center (SEAFDEC): *To promote and facilitate concerted actions among the Member Countries to ensure the sustainability of fisheries and aquaculture in Southeast Asia.* (Indonesia, Malaysia, Thailand and Myanmar are members) **2. Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO):** *To enhance cooperation among member countries, other countries and organisations in the region and provide technical and management advisory services for sustainable coastal fisheries development and management in the BoB region.* (Sri Lanka, India, Bangladesh are members) **3. Indian Ocean Tuna Commission (IOTC):** *To promote cooperation among the Contracting Parties (Members) and Cooperating Non-Contracting Parties of the IOTC with a view to ensuring, through appropriate management, the conservation and optimum utilization of stocks covered by the organization's establishing Agreement and encouraging sustainable development of fisheries based on such stocks*.

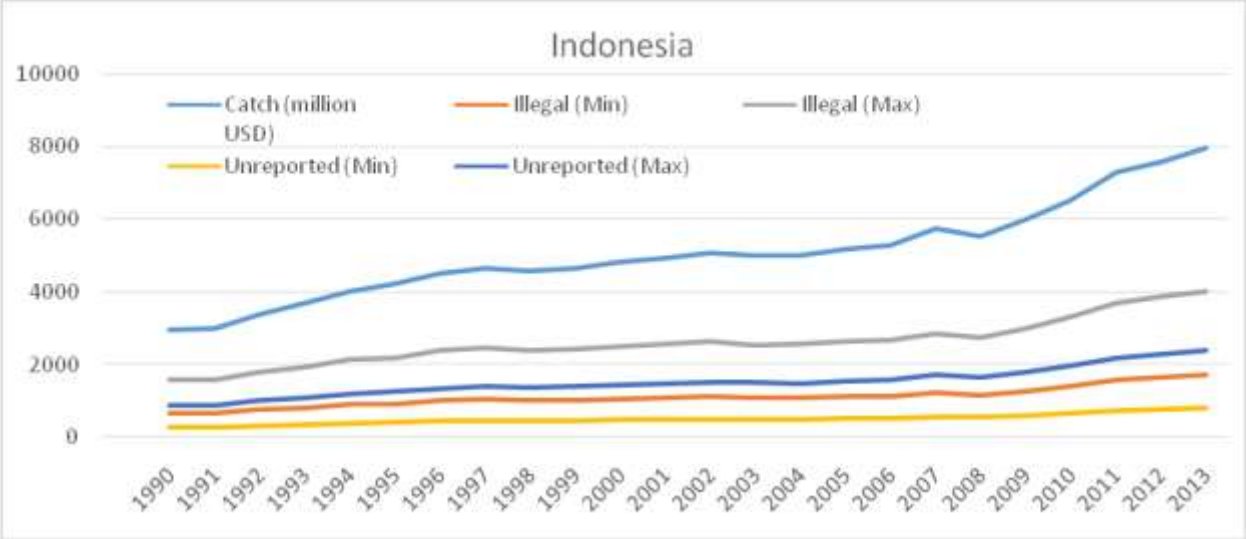
(Except Myanmar, all BOBLME countries are members)
4. Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC): *Fisheries as a sub-sector within Agriculture and Food Security. In 2021, at the 17th BIMSTEC Ministerial Meeting, it was decided to establish an Expert Group on Fisheries and Livestock.*
(All BOBLME nations are members except Malaysia and Indonesia.)
5. Indian Ocean Rim Association (IORA): *IORA is attributing high importance in strengthening cooperation in both the Fisheries Management Sector, as well as the Blue Economy, as reflected in the IORA Action Plan 2017-2021, which was adopted at the IORA Leaders' Summit in March 2017 in Indonesia. Themes relevant to the prevention of IUU fishing include themes like seafood handling; banking and artisanal fisheries; sustainable management and development of fisheries resources; fish trade.*
(All BOBLME countries except Myanmar)

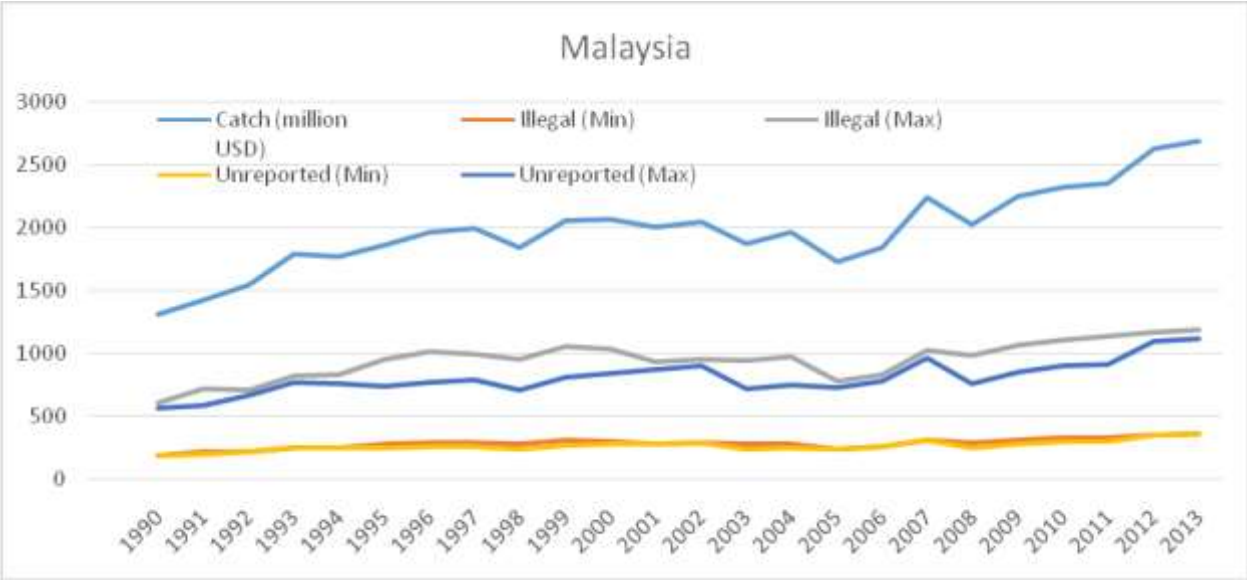
Baseline Report 8 - Annex 1: Summary of the estimated value of IUU fishing (USD) by year in the BOBLME countries (1990 – 2013). [418]





[418] Bay of Bengal Large Marine Ecosystem Project, *Transboundary Diagnostic Analysis Volume 2 (Background and Environmental Assessment)* (Phuket: Thailand, 2014), https://www.boblme.org/transboundary_diagnostic_analysis.html


Indonesia
Catch (million USD)
Illegal (Min)
Illegal (Max)
Unreported (Min)
Unreported (Max)
10000
8000
6000
4000
2000
0
1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013


Malaysia
Catch (million USD)
Illegal (Min)
Illegal (Max)
Unreported (Min)
Unreported (Max)
3000
2500
2000
1500
1000
500
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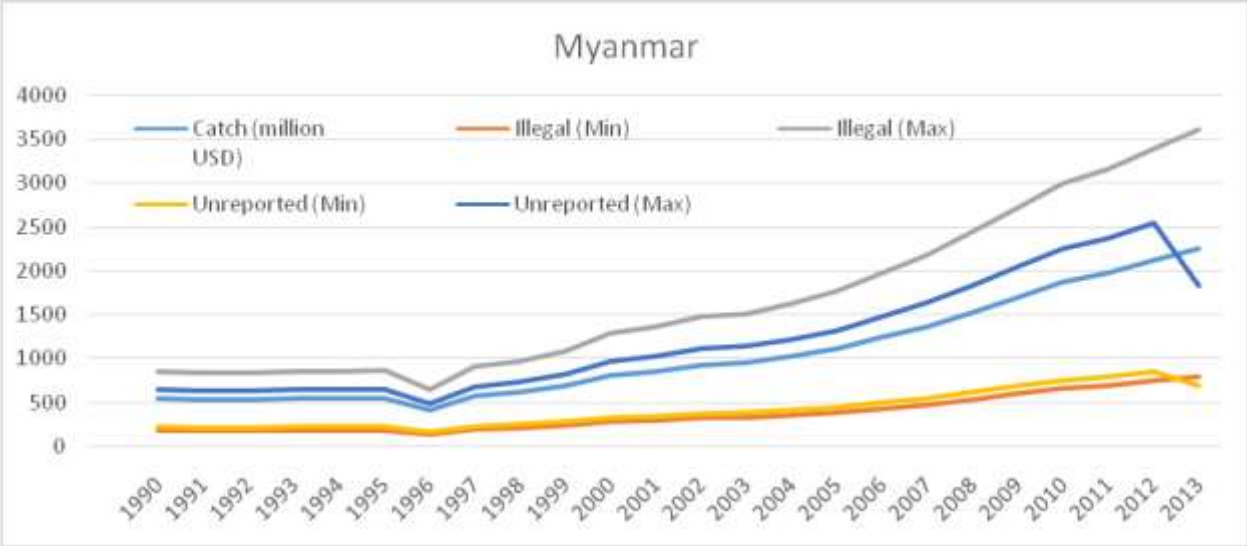
1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013


Myanmar
Catch (million USD)
Illegal (Min)
Illegal (Max)
Unreported (Min)
Unreported (Max)
4000
3500
3000
2500
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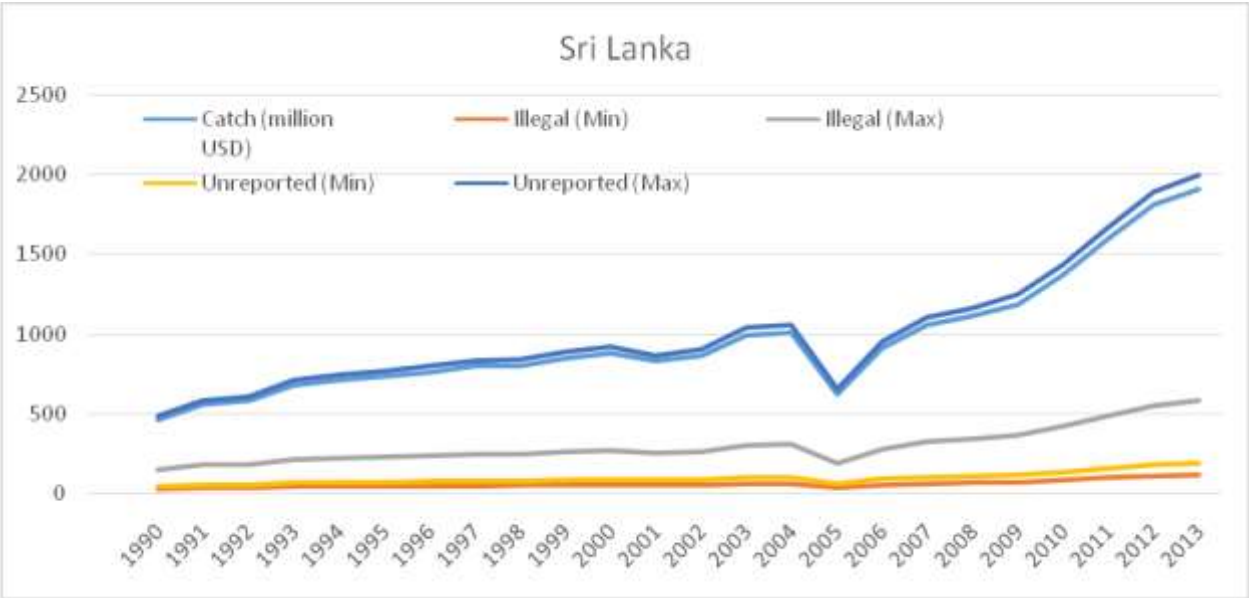

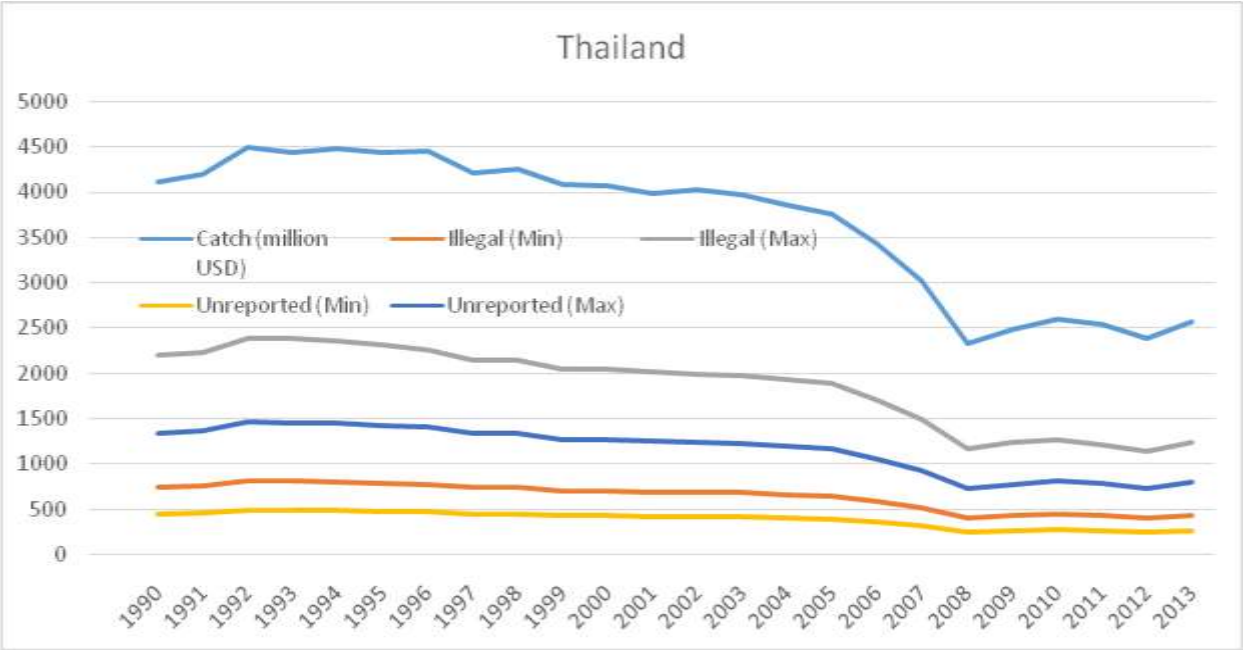

Source: All the graphs prepared by the Author; data from 'Bay of Bengal Large Marine Ecosystem Project, Review of Impacts of Illegal, Unreported and Unregulated fishing on developing countries in Asia', Phuket, BOBLME, 2015, https://www.boblme.org/documentRepository/BOBLME-2015-Governance-15.pdf

Baseline Report 8 - Annex 2: Country-wise share of marine living resources from the BOBLME for representative years – 1998, 2008, 2018

Top Ten Countries fishing in BOBLME (1998)	**Percentage of total (1998)**	**Top Ten Countries fishing in BOBLME (2008)**	**Percentage of total (2008)**	**Top Ten Countries fishing in BOBLME (2018)**	**Percentage of total (2018)**
Thailand	32.19	Myanmar	20.25	India	20.34
Malaysia	13.97	India	19.50	Myanmar	19.96
India	15.68	Malaysia	14.79	Bangladesh	16.84
Myanmar	13.78	Thailand	21.00	Malaysia	14.55
Bangladesh	11.60	Bangladesh	13.50	Thailand	13.78
Indonesia	6.23	Indonesia	5.55	Indonesia	7.13
Sri Lanka	5.32	Sri Lanka	4.61	Sri Lanka	6.21
Total for BoB countries	**98.77**		**99.2**		**98.81**
Taiwan	0.66	Unknown Country	0.24	Iran	0.81
Japan	0.35	Japan	0.22	Taiwan	0.32
Iran	0.04	Taiwan	0.18	Seychelles	0.02
Others	0.17	Others	0.17	Others	0.03

Source: The Table is prepared by the Author

Baseline Report 9

Regional Collaboration in Marine Natural Disaster Management: A Study of the Bay of Bengal

Sohini Bose, Junior Fellow
and
Anasua Basu Ray Chaudhury, Senior Fellow,
ORF Kolkata

Executive Summary

Below are the key findings for inter-regional cooperation in marine disaster management in the Bay of Bengal:

- ***Incidence of natural disasters in BoB:*** The BoB is one of the most turbulent maritime spaces of the world, where natural hazards such as cyclones and tsunamis regularly wreak havoc on the littoral states.

- ***Bilateral cooperation is dominant paradigm:*** Bilateral cooperation is the dominant paradigm in the region for disaster response despite lack of formal agreements between littorals.

- ***Need for confidence building to overcome sovereignty concerns***: Littorals have a strong 'sensitivity to sovereignty' in accepting disaster aid, indicating the need for more confidence building for multilateral approaches to be effective.

- ***Multistakeholder engagement:*** Participation in disaster management at the regional level is largely limited to the governments and armed forces. Multistakeholder involvement including the private sector is necessary for a more holistic approach. Community participation in disaster management is an effective way of strengthening national capacity.

- ***Strengthening BIMSTEC***: BIMSTEC's efforts at disaster management are nascent. There is a need to strengthen the institutional structure and funding of BIMSTEC for the organisation to make concrete progress. BIMSTEC needs to follow up the recent adoption of a charter with standard operating procedures in areas such as disaster management.

- ***Potential for BIMSTEC Plus approach:*** The ambit of BIMSTEC may be broadened to form "BIMSTEC Plus" by including Malaysia, Singapore and Indonesia as a way of sharing expertise and resources of these countries.

- ***Broaden role of BIMSTEC Climate Centre***: Based on lessons from the ASEAN AHA Centre, the BIMSTEC Centre of Weather and Climate can undertake a periodic review of vulnerabilities of littoral states.

- ***Regional pool of experts and resources***: BIMSTEC should create a regional pool of expertise and resources, including Expert Groups on disaster management. A flexible arrangement where countries can choose to engage in issue-based cooperation will improve functionality and practicality of a regional approach.

- ***Information sharing platform***: There is need for more digital support within BIMSTEC to help in early warning alerts and coordination in preparedness and response as regards disaster management.

The name 'Kalapani' is not unknown to those who are familiar with the Indian subcontinent's colonial history. Most commonly understood as a sentence of imprisonment in the remote Andaman Islands, that was inflicted by the British upon native rebels; its verbatim English translation is 'Dark Waters'. This refers to the Bay of Bengal which has to be crossed to reach the islands.[419] The meaning of 'Kalapani' is both figurative and literal, as it not only symbolized the trauma of those exiled, which was enhanced by the fear of earning sin through seafaring,[420] but most importantly it emphasised the tempestuousness of the sea itself.

Indeed, the Bay of Bengal, together with its auxiliary the Andaman Sea, is one of the most turbulent maritime spaces of the world, as natural hazards such as cyclones and tsunamis recurrently originate in its waters.[421] When these hazards strike land, wreaking havoc on the lives of people who inhabit the coast of the Bay's littoral countries, these translate into disasters. Sri Lanka, India, Bangladesh, Myanmar and Thailand are the littoral countries of this maritime space (See Map 1). Indonesia, Malaysia and Singapore can also be considered as littorals of the 'extended Bay' as they outline this maritime space as it merges into the Strait of Malacca via the Andaman Sea.

According to the United Nations, a disaster "is a serious disruption of the functioning of a community or society, which involve widespread human, material, economic or environmental impacts that exceed the ability of the affected community or society to cope using its own resources."[422] From 1996 to 2015, the region experienced some 317,000

[419] Sunil S. Amrith, *Crossing the Bay of Bengal: The Furies of Nature and the Fortunes of Migrants*, Cambridge, Massachusetts, London, England: Harvard University Press,2013, pp. 24-26

[420]ShamsadMortuza, "On Black Water and the Bengali Fear of Seafaring," *The Daily Star*, 21 January 2019, https://www.thedailystar.net/in-focus/news/black-water-and-the-bengali-fear-seafaring-1690288

[421]Soutik Biswas, "Amphan: Why Bay of Bengal is the world's hotbed of tropical cyclones," *BBC*, 19 May 2020, https://www.bbc.com/news/world-asia-india-52718531

[422]"Disaster Management", United Nations Office for Outer Space Affairs, https://www.unoosa.org/oosa/en/ourwork/topics/disaster-management.html#:~:text=Photo%3A%20UN%20Photo%20A%20disaster,losses%20of%20life%20and%20property.

deaths to disasters; damage to homes of 16 million people, and massive economic losses.[423] The risk of more frequent and intense natural calamities increases further with climate change. The challenge of natural disasters is therefore greater than ever before as is the need for disaster management- which as defined by the UN, "aims to lessen the impacts of disasters, minimizing losses of life and property."[424] It essentially consists of three phases: disaster preparedness, disaster response, and disaster recovery.[425] As disaster recovery involving relocation of citizens and their rehabilitation is essentially a matter of national jurisdiction, it does not provide much opportunity for regional collaboration. Hence this report will confine itself to discussion on disaster preparedness and response.

Map 1: The Bay of Bengal

Source: BIMSTEC[426]

As disasters are generally transnational threats in nature, disaster management therefore needs cross border understanding and cooperation. For the sake of understanding the collaborative disaster management initiatives in the Bay of Bengal region this report will focus on disasters such as cyclones and tsunamis[427] that originate from the marine space.

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[423] "Shri Rajnath Singh inaugurates the First BIMSTEC Disaster Management Exercise," Press Information Bureau, Ministry of Home Affairs, Government of India, 10 October 2017, https://pib.gov.in/newsite/printrelease.aspx?relid=171556

[424]"Disaster Management", United Nations Office for Outer Space Affairs, https://www.unoosa.org/oosa/en/ourwork/topics/disaster-management.html#:~:text=Photo%3A%20UN%20Photo%20A%20disaster,losses%20of%20life%20and%20property.

[425]Sohini Bose, "Disaster Management and Regional Cooperation in the Bay of Bengal," Interview by Thomas Lutken, *The National Bureau of Asian Research*, 25 March 2021, https://www.nbr.org/publication/disaster-management-and-regional-cooperation-in-the-bay-of-bengal/

[426] "Setting", BIMSTEC, https://bimstec.org/?page_id=189

[427] Like cyclones and tsunamis, sea level rise is also a marine natural disaster requiring regional cooperation for its mitigation. However, the extent of regional collaboration in this matter is limited as it involves preventive relocation and rehabilitation of citizens and hence

The study has five objectives:

- to understand the disaster vulnerabilities of the region
- to comprehend the Bay's regional arrangements in terms of disaster management (BIMSTEC)
- to evaluate what is working well for the region
- to discern existing lacunas which need to be overcome and
- to propose some recommendations which may pave the way for a more secured future in the Bay.

Consequently, this report contains the following sections:

1. Hazards at Sea – Disasters on Land
2. Regional Arrangements
3. What is working well
4. Fixing the Gaps
5. Bringing the Oceans Together

1. Hazards at sea - Disasters on land

The Bay of Bengal as a northeastern offshoot of the Indian Ocean has often been referred to as the epicenter of the 'World Hazard Belt'.[428] Its triangular shape, the low flat coastal terrain which frames its shores, its shallow depth[429] and the presence of 'easterly waves'[430] lends the Bay its unique stormy character.[431] Apart from the cyclones which are formed in the Bay itself, cyclonic winds are also drawn in from the neighbouring Pacific Ocean, in the absence of any solid landmass between. Although Indonesia is situated at the intersection of the two seas, being an archipelago, it does not serve as an effective physical buffer.

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largely falls within national jurisdiction. Furthermore, as it is a gradual risk, it is also not the subject of transnational HADR operations or joint disaster preparedness/ response initiatives. Hence it has not been dealt with in this report.

[428]The Indian Ocean is often referred to as the 'World Hazard Belt' as it is the most disaster-prone region of the world, making one-third of the global population vulnerable to its impacts. and Disaster Risk Management," Indian Ocean Rim Association, https://www.iora.int/en/priorities-focus-areas/disaster-risk-management

[429] Md. Mahbub Alam, Md. Arif Hossain and Sultana Shafee, "Short Communication: Frequency of Bay of Bengal Cyclonic Storms and Depressions crossing different coastal zones", *International Journal of Climatology*, Volume 23, 2003, p.1119, https://doi.org/10.1002/joc.927

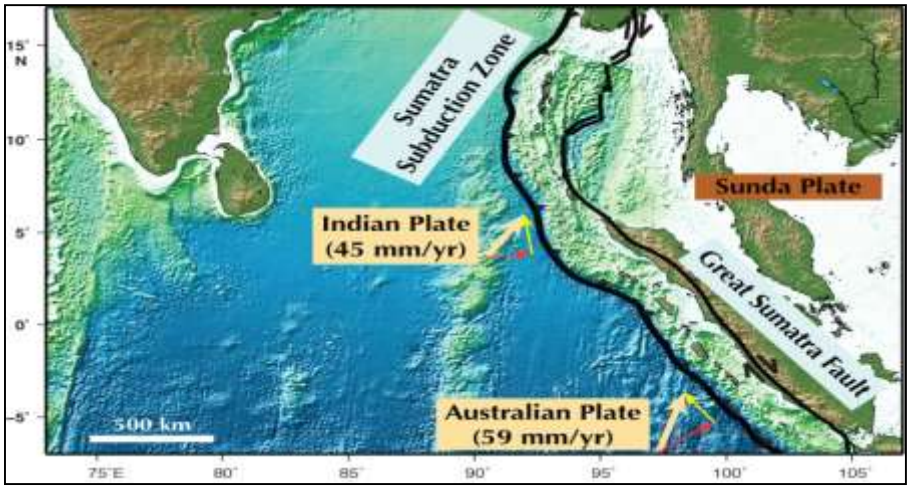
[430] Easterly waves are small travelling circulations which have the potential to develop into larger tropical cyclones.

[431] "Frequently Asked Questions on Tropical Cyclones", Regional Specialized Meteorological Centre for Tropical Cyclones over North Indian Ocean, Indian Meteorological Department, Ministry of Earth Sciences, Government of India, p.12, https://rsmcnewdelhi.imd.gov.in/images/pdf/faq.pdf

Between 1891 and 2018, the Bay of Bengal region was struck by 41 severe cyclonic storms and 21 cyclonic storms.[432]

Tsunamis, which are not as frequent as cyclones, also originate in these waters as southeast of the Bay, and almost parallel to the Andaman and Nicobar Islands (ANI) lies the Andaman-Sumatra Subduction zone (Map 2). Here the jostling of the Sunda plate with the Indian and Australian tectonic plates generates tremors giving rise to tsunamis, the worst of which was experienced on 24 December 2004.

Map 2: The Andaman-Sumatra Subduction Zone



Source: "Incoming! Oblique Subduction at the Sunda subduction zone."[433]

Naturally the littoral countries outlining this semi-enclosed sea are exposed to the risk of natural disasters, although their range of susceptibility differs depending on their geographic position. Bangladesh located at the peak of the Bay (giving it a funnel shaped exposure) is frequently affected by cyclones as is Myanmar. The Indian east coast, forming the western shore of the Bay, experiences an average of three cyclones every year. Further south, Sri Lanka witnesses frequent cyclones and even tsunamis due to its proximity to the sub-duction zone. The vulnerability is worse for India's Andaman and Nicobar Islands, which is not only buffeted by cyclones but faces high intensity tsunamis as well because it lies almost parallel to the sub-duction zone. Thailand and Indonesia, located in proximity, are thus prone to tsunamis too. Indonesia is also vulnerable to cyclones, but not Thailand as the Andaman and Nicobar Islands act as a physical buffer for it.[434] Similarly, the Sumatra

[432]Jayanta Basu, "Bengal most vulnerable to climate risk, flags India's first assessment report," *Down To Earth*, 3 July 2020, https://www.downtoearth.org.in/news/climate-change/bengal-most-vulnerable-to-climate-risk-flags-india-s-first-assessment-report-72117
[433]"Incoming! Oblique Subduction at the Sunda subduction zone," https://joidesresolution.org/incoming-oblique-subduction-at-the-sunda-subduction-zone/
[434]Pratnashree Basu, Sohini Bose and Anasua Basu Ray Chaudhury, "Andaman and Nicobar Islands: facilitating India's connectivity in the Bay of Bengal," *Journal of the Indian Ocean Region*, Volume 15, Issue no. 3, June 2019, p. 299, https://doi.org/10.1080/19480881.2019.1637553

province of Indonesia geographically protects Malaysia[435] and Singapore[436] from the onslaught of cyclones. Malaysia is further insulated as it lies south of major typhoon paths. Consequently, the more vulnerable littorals will be the focus of discussion in this report with necessary reference to these two countries. Figure 1 provides an account of the impact of the 2004 tsunami and major cyclones have had on Bay littorals in the last 5 years.

Figure 1: Impact of cyclones and tsunamis on Bay littorals[437]

Year	Disasters	Impact
2004	Indian Ocean Tsunami	Sri Lanka suffered 30,000 fatalities and loss of 1.5 billion USD. In India 10,273 people died, and 22750 hectares of agricultural land was damaged. Myanmar officially pegged the death toll at 86. Thailand witnessed thousands of deaths and a loss of 508 million USD. Bangladesh endured two deaths but no major economic loss. Banda Aceh in Indonesia endured the worst impact as 100,000 people were killed and the city was left in shambles. [438]
2017	Cyclone Ockhi	In India 350 people died and coastal fisheries suffered a loss of 821 crores. In Sri Lanka 414 were killed and 32,000 houses were damaged.
	Cyclone Mora	In Bangladesh 200,000 people were displaced and 6 were killed. In Sri Lanka 150 people died. Damage was inflicted on Rakhine, Myanmar.
2018	Cyclone Titli	In India 8 lives were lost and almost 2000 electric poles were uprooted.
	Cyclone Gaja	In India, 45 lives were lost. Damage to houses was estimated at 3.4 lakh. 1000 homes damaged in Sri Lanka.
2019	Cyclone Fani	In Odisha, India 64 people died and over 10 million people were affected. In Bangladesh 12 people were killed.
	Cyclone Bulbul	12 people killed in India and another 12 in Bangladesh. The latter evacuated 2.1 million people to cyclone shelters.

[435] *Malaysia Disaster Management Reference Handbook*,Centre for Excellence in Disaster Management and Humanitarian Assistance, June 2019, p.9, https://reliefweb.int/sites/reliefweb.int/files/resources/Malaysia%20Disaster%20Management%20Reference%20Handbook%202019.pdf

[436] *Singapore (Assisting State) Disaster Management Reference Handbook,* Centre for Excellence in Disaster Management and Humanitarian Assistance, September 2021, p.8, https://reliefweb.int/sites/reliefweb.int/files/resources/CFEDM_Singapore2021DMRH_Pub2021SEP13.pdf

[437] In this span of 5 years, Indonesia has been hit by 3 cyclones and 2 tsunamis, but their impact has not been included in the chart as these disasters did not originate in the Bay.

[438] Authors are indebted to officials from The National Bureau of Asian Research, Washington D.C., for their comments on this point (8 February 2022).

2020	Cyclone Amphan	In India 98 people were killed and thousands of 'kutcha' houses were destroyed. Economic damage stood at almost 13 billion USD. Bangladesh suffered a loss of 130 million USD.
2021	Cyclone Yaas	In India, 4 lives were lost, 1 crore people were affected and 3 lakh houses damaged. 2 deaths were reported in Bangladesh.

Source: The chart has been compiled by the authors. Sources of information are listed in Appendix 1.

Transnational disaster management and mitigation require collective endeavours and enterprise. Across border regional collaboration in disaster management is thus a necessity in the Bay of Bengal region, and thus has been identified as an area of cooperation under The Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) - the only regional organisation exclusive to the Bay.

2. Regional arrangements

BIMSTEC, which is the principal political grouping of littoral Bay of Bengal states, is also the focal point for regional arrangements relating to disaster preparedness focused on the Bay of Bengal.[439] Its Charter records BIMSTEC's legal personality as an inter-governmental organisation. It reposes its faith in multilateralism with the United Nations at the center, and the rule based international trading system.[440]

BIMSTEC was formed in 1997 and its members comprise all Bay littorals except Indonesia, Malaysia and Singapore. (Though Nepal and Bhutan are the members of BIMSTEC the present study does not include these two Himalayan countries as it is focused on marine natural disasters). Until April 2021, BIMSTEC engaged in a diverse range of 14 sectors of cooperation, including 'Environment and Disaster Management'. Presently, following the 5th Summit Meeting held on 30 March 2022, the number of 'areas of cooperation' has been reduced from 14 to 7. Disaster Management is now placed under the gamut of 'Security' which is led by India, while 'Environment and Climate Change' have been grouped together under Bhutan's tutelage.[441] BIMSTEC's approach towards disaster management so far during its more than 24 years as an organisation, can be categorized under four heads:

- **Phase of inertia (1997-2004):** Initially devoted to economic and technical cooperation, BIMSTEC at its inception, despite the Bay's chronic vulnerability, did not concern itself with the management of disasters, barring some speculations for future engagement.[442]

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[439] ASEAN members such as Myanmar, Thailand, Malaysia, Indonesia and Singapore are also members of ASEAN-centred arrangements. India, Bangladesh and Sri Lanka are also members of SAARC, although that organization currently has little utility. However, the purview of BIMSTEC alone is exclusive to the Bay of Bengal.

[440] BIMSTEC Charter, BIMSTEC, 30 March 2022, https://bimstec.org/?page_id=4866

[441] "Sectors of Cooperation," BIMSTEC, https://bimstec.org/?page_id=3919

[442] "First BIMST-EC Summit Declaration", BIMSTEC, July 31, 2004, https://drive.google.com/file/d/0B8Fv9wDGJqx2SFVVS1FIVGEtdUE/view?resourcekey=0-AHC_NJ3QVGX5q0YXWGncig

- **Phase of reaction (2005-2006):** Breaking the passivity, the overwhelming impact of the Indian Ocean tsunami of 2004 roused the region to the urgency of cooperating in disaster management. Within a year, a dedicated sector was added to the organisation's curriculum, under India's lead considering its extensive Humanitarian Assistance and Disaster Relief (HADR) to tsunami affected Bay littorals.[443]A short phase of vibrant engagement followed with workshops and training programmes hosted and talks initiated for a Center on Weather and Climate, for disaster forecasts.[444]

- **Phase of dormancy (2007-2014):** As the memories of the tsunami began to fade, along with the absence of any strong financial commitment, the vitality transitioned into a stupor.[445] The next eight years was a period of lull, with no new ventures undertaken. BIMSTEC remained preoccupied with its organizational affairs and activities in disaster management were thus limited to discussions on the creation of the Centre on Weather and Climate, which was finally established in 2014 at the National Centre for Medium Range Weather Forecasting in Noida, India.[446]It promotes research and capacity building in weather prediction and hence contributes to early warning.[447]A series of changes which occurred since then soon ended this stupor, opening the gates for further collaboration in disaster management within BIMSTEC.

- **Phase of strategic reawakening (2015-present):** For a long time the Bay had been viewed as an isolated strategic backwater of the Indian Ocean. However, attention returned to it, as China's assertive presence rose in region. Over shared apprehensions about ensuring uninterrupted trade flow, along with a desire to partake of Bay's wealth hydrocarbon reserves, the littorals were convinced that their economic and security interests would be best protected through regional cooperation. Consequently, BIMSTEC gained significance as the Bay littorals began reorienting their foreign policies towards closer engagement with their neighbourhood.[448] Disaster management came to the

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[443]"Joint Statement of the Eighth BIMSTEC Ministerial Meeting", BIMSTEC, 18-19 December 2005, p.4, https://drive.google.com/file/d/0B8Fv9wDGJqx2YlBZRXVWdnZtSjQ/view?resourcekey=0-PjHCr2XtEmTx_ZytW-1FFw

[444] Sohini Bose, "BIMSTEC and Disaster Management: Future Prospects for Regional Cooperation," *ORF Issue Brief*, Issue No. 383, 20 July 2020, p.5, https://www.orfonline.org/wp-content/uploads/2020/07/ORF_IssueBrief_383_BIMSTEC-Disasters.pdf

[445]Sohini Bose, "BIMSTEC and Disaster Management: Future Prospects for Regional Cooperation," *ORF Issue Brief*, Issue No. 383, 20 July 2020, p.5, https://www.orfonline.org/wp-content/uploads/2020/07/ORF_IssueBrief_383_BIMSTEC-Disasters.pdf

[446] "Joint Statement of the Thirteenth BIMSTEC Ministerial Meeting", BIMSTEC, 22 January 2011, https://drive.google.com/file/d/0B8Fv9wDGJqx2emhYU1NhNHRIMmM/view?resourcekey=0-B6anTVTGoN5gQiiU4ODROw

[447]"BIMSTEC Centres", 6 August 2018.

[448]Constantion Xavier, "Bridging the Bay of Bengal: Toward a Stronger BIMSTEC", *Carnegie India*, 22 February 2018,

forefront for India since 2014 when the newly elected government under Prime Minister Narendra Modi, sought to engage in disaster diplomacy to strengthen ties with its eastern neighbourhood. Consequently, the Act East Policy prompted cooperation in mitigation of non-traditional security threats one of which was to manage the disaster risk the Bay presented. A "five-fold framework for India's maritime engagement" was also devised necessitating cooperation in disaster management.[449] The Indian government's Vision of Security and Growth for All in the Region (SAGAR) in the Indian Ocean region launched in 2016, provided additional impetus for collaboration. The recent Indian Indo-Pacific Oceans Initiative (IPOI) launched in 2019, has only strengthened it further.

Subsequently HADR emerged as a primary means of extending India's outreach in the region. Its reflection was found in BIMSTEC, which had climbed a rung in India's priority list following the country's disillusionment with the South Asian Association for Regional Cooperation (SAARC) over the failed 19th Summit held in 2016. The other BIMSTEC members welcomed India's initiatives as an avenue for forging deeper engagements particularly in an area where they stood to gain from India's expertise. Hence recent years saw several disaster management initiatives under BIMSTEC (see **Figure 2)**.

Figure 2: Recent developments in Disaster Management under BIMSTEC

Year	Event	Agenda
2016	BIMSTEC Goa Retreat	Discussions begun on closer cooperation in disaster management through joint exercises, information sharing, capacity building, shared early warning system, disaster preparedness, joint action on relief and rehabilitation.[450]
2017	Senior Officials Meeting	India was tasked to organise the first BIMSTEC Disaster Management Exercise.[451]
	First Annual Disaster Management Exercise	Comprised of Table Top Exercise, Field Training Exercises on Earthquake and Flood and an After-Action Review.[452]

https://carnegieindia.org/2018/02/22/bridging-bay-of-bengal-toward-stronger-bimstec-pub-75610

[449]C. Raja Mohan, "Modi and the Indian Ocean: Restoring India's Sphere of Influence", Institute of South Asian Studies, no. 277, 20 March 2015, p. 4, https://www.files.ethz.ch/isn/189804/ISAS_Insights_No._277_-_Modi_and_the_Indian_Ocean_20032015163047.pdf

[450] BIMSTEC Leaders' Retreat 2016 Outcome Document", Goa, India, 16 October 2016, p. 3, https://drive.google.com/file/d/0B8Fv9wDGJqx2UGxPT2RfVTVLX3M/view?resourcekey=0-8I94w9eiO_r9oNle324LeA

[451] "17th BIMSTEC Senior Officials Meeting (SOM), Kathmandu," Media Center, Ministry of External Affairs, Government of India, 7 February 2017, https://mea.gov.in/press-releases.htm?dtl/28011/17th_BIMSTEC_Senior_Officials_Meeting_SOM_Kathmandu_February_07_2017

[452]"4-day-long BIMSTEC Disaster Management Exercise – 2017 concludes," Press Information Bureau, Ministry of External Affairs, Government of India, 13 October 2017, https://pib.gov.in/newsite/printrelease.aspx?relid=171695

Year	Event	Agenda
	15th Ministerial Meeting	Agreed to establish an Expert Group on Disaster Management.[453]
2018	Inaugural Governing Board and Scientific Advisory Council Meeting of the Centre for Weather and Climate	Held four years after the establishment of the Centre in 2014. Subsequently a Workshop entitled 'Severe Weather/Climate Disaster warning for BIMSTEC Region' was held in New Delhi.[454]
	16th Ministerial Meeting	Decided to establish an Inter-governmental Expert Group to develop a plan of action on improving preparedness and coordination for responding to natural disasters.[455]
	Fourth Summit Declaration	Noted specific areas requiring development within disaster management such as adoption of preventive measures, rehabilitation and capacity building.[456]
	BIMSTEC think tank dialogue on regional security	Deliberations were held on activation of inter-governmental mechanisms to utilise regional resources, and institutionalise cooperation in disaster management.[457]
2020	Second Disaster Management Exercise	Aimed to evaluate existing capabilities, strengthen regional response mechanism and conduct risk assessment of cultural heritage sites in the context of flood disaster due to cyclones.[458]
2021	17 Ministerial Meeting	Recommended cooperation in 7 broad sectors rather than the previous 13. Disaster Management for so long linked with 'Environment' and considered an independent sector, is now housed under the bracket of Security led by India.[459]

[453]"Joint Statement of the Fifteenth Ministerial Meeting,"BIMSTEC, 11 August 2017, 7, https://drive.google.com/file/d/0B8Fv9wDGJqx2TzhoRHZyc1FhN0U/view
[454]BIMSTEC Centres, BIMSTEC, 16 April 2018, https://bimstec.org/?page_id=1292
[455]"Report of the Sixteenth BIMSTEC Ministerial Meeting,"BIMSTEC, 29 August 2018, 40, https://drive.google.com/file/d/1gNzcfzLOq_sSJvcriCA2p0k0SlMzMV7j/view
[456]"Fourth BIMSTEC Summit Declaration," BIMSTEC, 30-31 August 2018, 6-7, https://drive.google.com/file/d/0Bw5iVdDDVNCRTko2ek02Y1F0T3hQemM1NTdjUy1icGZUOGMw/view
[457] BIMSTEC Think Tank Dialogue on Regional Security," Conference Proceedings, *Vivekananda India Foundation*, 13-14 November 2018, 16, https://www.vifindia.org/sites/default/files/bimstec-think-tank-dialogue-on-regional-security.pdf
[458]Bimstec disaster management exercise -2020: MoS for Home Affairs, Shri Nityanand Rai Inaugurates Field Training Exercise (Ftx) on Flood Rescue at Ramachandi Beach, Puri, Odisha," Press Information Bureau, Ministry of External Affairs, Government of India, 12 February 2020, https://pib.gov.in/newsite/PrintRelease.aspx?relid=199287
[459]"Security", BIMSTEC, https://bimstec.org/?page_id=6113

Year	Event	Agenda
		Noted that the BIMSTEC Centre for Weather and Climate is fully functional with the state-of-the-art facilities to provide early warnings of impending disasters.[460]
	Third Disaster Management Exercise	The agenda was to enhance planning and preparedness to institutionalise regional cooperation and inter-governmental efforts among BIMSTEC member countries to respond more effectively to natural disasters against the backdrop of a pandemic.[461]
2022	Fifth Summit Meeting	BIMSTEC Charter and the reorganised sectors of cooperation were formally adopted. There was a collective resolve to strengthen resilience against natural disasters.[462]

Source*:* Sohini Bose, "BIMSTEC and Disaster Management: Future Prospects for Regional Cooperation"[463], as updated by authors.

It is to be noted that the relocation of the sector on Disaster Management from an independent sector to a sub-sector under 'Security' (see Figure 2), is not necessarily a reflection of its diminishing significance for BIMSTEC. The idea of reprioritization of sectors had been first proposed by Thailand at the 16th BIMSTEC Ministerial Meeting in 2018 to enhance the efficiency and responsiveness of the organisation.[464] Therefore, the shift is a move to give regional cooperation in disaster management more impetus. Furthermore, as a sub-sector under Security, natural disaster joins the cohort of non-traditional security threats that BIMSTEC seeks to curb in the Bay. This emphasises its security orientation and the need for urgent measures to combat it involving the armed forces. The stress is thus on disaster preparedness and response, justifying its separation from 'Environment' which requires collaboration in different dimensions with a more long-term approach.[465]

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[460]"17th BIMSTEC Ministerial Meeting," Media Center, Ministry of External Affairs, Government of India, April 01, 2021, https://www.mea.gov.in/press-releases.htm?dtl/33763/17th_BIMSTEC_Ministerial_Meeting_April_01_2021#:~:text=The%20External%20Affairs%20Minister%20of,of%20all%20BIMSTEC%20Member%20States.

[461] "Tri-services Humanitarian Aid and Disaster Relief Exercise: PANEX-21 for BIMSTEC Member States held in Pune," BIMSTEC, December 2021, https://bimstec.org/?event=tri-services-humanitarian-aid-and-disaster-relief-exercise-panex-21-for-bimstec-member-states-held-in-pune#:~:text=The%20objective%20of%20this%203,backdrop%20of%20a%20viral%20pandemic.

[462] "Fifth BIMSTEC Summit Declaration," BIMSTEC, March 30, 2022, https://bimstec.org/?page_id=3812

[463] ORF Issue Brief, Issue No. 383, 20 July 2020, p.8, https://www.orfonline.org/wp-content/uploads/2020/07/ORF_IssueBrief_383_BIMSTEC-Disasters.pdf

[464]Report of the Sixteenth BIMSTEC Ministerial Meeting, BIMSTEC, 29 August 2018, p.4, https://bimstec.org/?page_id=5700

[465] Authors are indebted to officials from the Nanyang Technological University, Singapore for their comments on this point, 1 February 2022.

In view of how BIMSTEC has approached disaster management in all the years of its existence, it may be argued that it has either taken a natural disaster of overwhelming magnitude or the incentive of strategic interest to spur developments within the organisation. BIMSTEC's efforts at disaster management are as yet nascent and it is still too early to delineate its best practices. For example, BIMSTEC disaster management exercises were initially designed to be held annually, but as this could not be realised, the term 'Annual' has been dropped from its name since the second edition.[466] Nonetheless, practices in disaster management outside BIMSTEC which have been engaged in by littorals of this region, can well be determined and are discussed subsequently.

3. What is working well in the Bay of Bengal region

In a region as turbulent as the Bay of Bengal, several initiatives have been undertaken and practices evolved for the littorals to have survived the onslaught of natural disasters. These endeavours may be grouped under disaster preparedness and response. While, not all these mechanisms span the entire region, others involve extra-regional stakeholders as well. Venturing forth with disaster preparedness, foremost is the Sendai Framework, which has not only rekindled efforts within the regional institution of BIMSTEC but is also planting its seed within all the Bay littoral countries individually (those which are members of BIMSTEC and also those which are not). This section will first discuss the arrangements for disaster preparedness and then the arrangements for disaster response that have developed organically in the region.

3.1 Disaster Preparedness

The Sendai Framework: Strengthening regional cooperation from within

In 2015, all the Bay littoral countries signed the Sendai Framework on Disaster Risk Reduction 2015-2030 that prioritised strengthening disaster risk governance at the global/regional level and the national/local level (Figure 3). Towards this goal, at the regional level it envisions the formulation of regional strategies and mechanisms to promote efficient planning, creation of common information systems, and exchange of good practices in capacity building.[467]

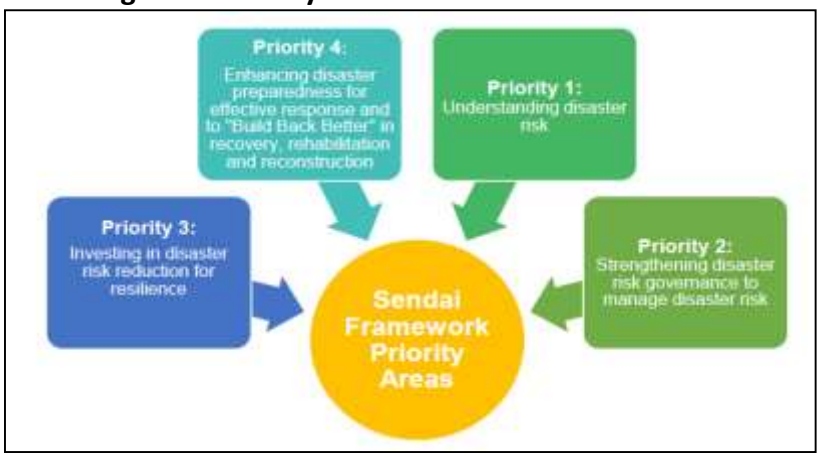
Consequently, the Bay littorals have invested in rejuvenating the collective mechanism of disaster management through BIMSTEC, as has been discussed before. In this effort, the institution would also benefit by inviting littorals of the extended Bay to be its

[466]Sohini Bose, "BIMSTEC and Disaster Management: Future Prospects for Regional Cooperation," *ORF Issue Brief*, Issue No. 383, 20 July 2020, p.9, https://www.orfonline.org/wp-content/uploads/2020/07/ORF_IssueBrief_383_BIMSTEC-Disasters.pdf

[467]"Sendai Framework for Disaster Risk Reduction 2015–2030," Resolution adopted by the General Assembly on 3 June 2015, https://www.preventionweb.net/files/resolutions/N1516716.pdf

'Observers'.[468] Malaysia and Singapore are both seasoned providers of HADR, while Indonesia is also increasingly strengthening its disaster management mechanism and collaborations in this regard with India. These countries thus offer valuable lessons and having them on board would therefore help BIMSTEC improve its prowess in disaster management. It would also bring the organisation closer to ASEAN, especially as BIMSTEC is hoping to adopt the model of ASEAN Coordinating Centre for Humanitarian Assistance (AHA) on disaster management. In time BIMSTEC can also invite ASEAN to be one of its Observers.[469] [470] Article 7 of the recently adopted BIMSTEC Charter provides for the admission of 'Observers' to BIMSTEC.[471] Interestingly suggestions of giving Indonesia observer status to BIMSTEC has already been flagged by Bangladesh.[472]

Figure 3: Priority areas of the Sendai Framework



Source: "Sendai Framework for Disaster Risk Reduction 2015-2030"[473]

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[468] Sohini Bose and Sohini Nayak, "BIMSTEC Plus: Towards a Bay of Bengal Community," in Rakhahari Chatterji and Anasua Basu Ray Chaudhury (eds.), *Reimagining BIMSTEC: Strengthening Regional Solidarity Across the Bay of Bengal*, Observer Research Foundation: New Delhi, 2020, p. 490, https://www.orfonline.org/wp-content/uploads/2021/02/BIMSTEC-digital-9-04-2021.pdf

[469] Dinakar Peri, " BIMSTEC to boost connectivity, " *The Hindu*, November 18, 2018, https://www.thehindu.com/news/national/bimstec-to-boost-connectivity/article25532597.ece

[470] At present it is unlikely that such partnerships whether with littorals of the extended Bay or with ASEAN will extend beyond according 'Observer' status. This is because although these players are interested in better engagement with South Asia, BIMSTEC is yet to prove its credibility and emerge as a key conduit between South and Southeast Asia. It is therefore unlikely that they will seek to be full fledged members of BIMSTEC and a middle ground the 'Observer' status is thus indicated.

[471] BIMSTEC Charter, BIMSTEC, March 30, 2022, https://bimstec.org/?page_id=4866

[472]Shakhawat Hussain, "BIMSTEC- Establishing effective mechanism for information and intelligence Sharing (IIS)," (presentation at International Conference on "BIMSTEC at its 20: Towards a Bay of Bengal Community," Dhaka, 20 March 2018), https://drive.google.com/file/d/1AvJ8guGY06wuq3Hgykxrsu8-AXhnjc0J/view.

[473]"Sendai Framework for Disaster Risk Reduction 2015-2030," NDRMF, https://www.ndrmf.pk/sendai-framework/

While the Sendai Framework has rejuvenated regional ties in disaster management, it has also amplified the need for disaster preparedness in the region. For a long time, the focus has been on disaster response, but by embracing the concept of Disaster Risk Reduction the Sendai Framework indicated the need for cultivating disaster risk preparedness and hence ushered in a paradigm shift in how disaster management is viewed in the region; from a reactive to a proactive approach. This is manifest in the BIMSTEC Exercises on Disaster Management that have been held in 2017, 2020 and 2021.

While these exercises were made possible with the littorals' incorporation of the Framework into their national disaster management policies, the Framework's terms also percolated to the community level. The Sendai Framework thus triggered the formulation of Community Based Disaster Risk Management (CBDRM) plans in these countries. These plans are designed to effectively decentralize the system of disaster management so that the vulnerable communities are involved in developing their own disaster prevention, mitigation, response and rehabilitation mechanisms. The importance of CBDRM plans lies in the fact that the communities living in disaster prone areas are usually the worst sufferers and the first responder in any disaster situation. CBDRM also caters to women as it has often been found that disasters take a heavier toll on their lives compared to men, especially in developing countries, the reasons for which are multifaceted. For example, 70 per cent of the 250,000 fatalities recorded during the Indian Ocean tsunami of 2004, were women.[474]

All the Bay littorals countries record the particular vulnerability of women, along with children and the elderly, within their vulnerable communities in their disaster management plans.[475] Enhancing their disaster management capacities through a combination of their indigenous tactics and more modern methods, is cardinal to the development of disaster management in any country. For example, India is formalising a community-based disaster risk reduction plan and ran the Apada Mitra Scheme[476] from 2016-2020, to train nearly 6000 volunteers in disaster response in 30 selected flood prone districts.[477] Myanmar devised a CBDRM plan in 2017 and the International Organisation for Migration has also formulated a CBDRM handbook for Indonesia. Plans are yet to be created in Sri Lanka and Thailand, but the national disaster management plans of both countries, underline the importance of CBDRM. Community involvement is also gaining ground in disaster management activities of Malaysia and Singapore.

Bangladesh deserves a special mention as the community centric approach is much more ingrained in its disaster management structure. This is due to its experience of Cyclone

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[474] Nicola Howe, "More Women Die in Natural Disasters—Why? And What Can Be Done?," *Brink*, 25 November 2019, https://www.brinknews.com/gender-and-disasters/

[475] Sohini Bose and Anasua Basu Ray Chaudhury, "In Search of Community-based Disaster Risk Management in BIMSTEC," in Sreeradha Dutta (ed.) *BIMSTEC: The Journey and the Way Ahead*, Vivekananda International Foundation: New Delhi, 2021, p. 122.

[476] Authors are indebted to officials from the National Disaster Management Authority, Government of India, for their comments on this point, 27 January 2022.

[477] "Aapda Mitra," National Disaster Management Authority, Government of India, https://ndma.gov.in/Capacity_Building/Admin_Coordination/Aapda-Mitra

Bhola, one of the deadliest tropical cyclones in history, which struck its coast in 1970, killing almost 300,00-500,000 people.[478] In its aftermath, the Bangladesh Red Crescent Society initiated a Cyclone Preparedness Programme (CPP) focusing on early warning systems involving active community participation. Coinciding with Bangladesh's independence in 1971, this programme initiated a paradigm shift from the relief-based reactive approach to the preparatory and risk-reducing pro-active approach of the early 70's. Taking the societal approach in humanitarian aid and all disaster management activities, it generated disaster governance backed by legal and policy frameworks, increasing investment and significant infrastructural and non-infrastructural development.[479] It thus created an alternative of providing disaster relief through trained civilian or paramilitary forces, rather than relying completely on the military.[480] CPP was taken up by the Government of Bangladesh in 1973 and now it is jointly run by the Ministry of Disaster Management and Relief and the Bangladesh Red Crescent Society. Its uniqueness lies in it being linked to national disaster risk management system while incorporating elements of local knowledge, making it a global best practice.

Similarly, Thailand's 'last mile connectivity of Tsunami Early Warning system' featuring significant community involvement is also considered a global best practice. BIMSTEC recognises these practices, as it encourages its members to learn from each other.[481] Sharing the know-how, best practices and experience of bad practices will strengthen the institution. It is to be noted herein that BIMSTEC hosts seminars on technology sharing in disaster management[482] and at the recently held 5th Summit Meeting, a Memorandum of Association on the Establishment of BIMSTEC Technology Transfer Facility, was signed in Colombo, Sri Lanka.[483]

Interestingly global/regional initiatives are now also being undertaken to develop better CBDRM. A major success story in this regard is the case of the two coastal villages in Odisha, India; Venkatraipur and Noliasahi which earned the recognition of being 'Tsunami Ready' from the UNESCO-Intergovernmental Oceanographic Commission. It made India the first

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[478] "1970- The Great Bhola Cyclone," *Hurricanes: Science and Society,* http://www.hurricanescience.org/history/storms/1970s/greatbhola/

[479] Authors are indebted to officials from the Cyclone Preparedness Programme, Ministry of Disaster Management & Relief, Government of Bangladesh, for their comments on this point, 25 April 2022.

[480] Authors are indebted to scholars from the Australian National University for their comments on this point, 24 February 2022.

[481] "Shri Rajnath Singh inaugurates the First BIMSTEC Disaster Management Exercise," Press Information Bureau, Ministry of Home Affairs, Government of India, 10 October 2017, https://pib.gov.in/newsite/printrelease.aspx?relid=171556

[482] Authors in conversation with officials from the BIMSTEC Secretariat, 17 February 2022.

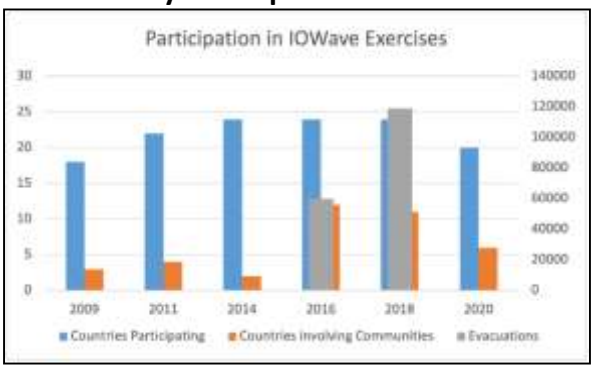
[483] "Fifth BIMSTEC Summit Declaration," BIMSTEC, March 30, 2022, https://bimstec.org/?page_id=3812

[483] ORF Issue Brief, Issue No. 383, 20 July 2020, p.8, https://www.orfonline.org/wp-content/uploads/2020/07/ORF_IssueBrief_383_BIMSTEC-Disasters.pdf

country in the Indian Ocean Region to establish such high levels of disaster preparedness at the community level.[484]

Another interesting case is the IOWave initiative, once again organised by the UN and Intergovernmental Oceanographic Commission wherein member countries participate at the community level for an Indian Ocean wide tsunami warning biennial exercise. **Figure 4** indicates how community participation has risen in IOWave (except in 2020, which is understandable owing to the pandemic. All Bay littorals participate in it).[485] Such initiatives are geared for steady capacity building in disaster management at the local level, which in turn paves the way for a more robust regional mechanism, as envisioned by the Sendai Framework. BIMSTEC in its efforts to cultivate disaster preparedness in the region stands to gain by investing in the CBDRM efforts of its member countries through sharing of information, technical know-how, best practices, avoidance of bad practices and organizing capacity building workshops and seminars.[486]

Figure 4: Community Participation in IOWave



Source: "Evolution of Ocean Wide Exercises in the Indian Ocean"[487]

However, the extent to which the practices of CBDRM has been successfully implemented is difficult to measure as firstly, CBDRM has a very broad and at the same time very nuanced purview. There are numerous vulnerable communities, each different from the other. Hence there are no set parameters against which the progress of CBDRM can be measured. Secondly, in the Bay littorals, there are few reviews as to how much the risk of disasters has

[484]Sohini Bose, "Following the Odisha example for developing community based disaster management in India," *Observer Research Foundation*, 4 September 2020, https://www.orfonline.org/expert-speak/following-the-odisha-example-for-developing-community-based-disaster-management-in-india/

[485] IOWave Tsunami Exercise, https://iowave.org/

[486] In this purview by strengthening CBDRM, BIMSTEC can also help mitigate sea level rise as a part of its disaster management initiatives.

[487]Nora Gale, Ardito M Kodijat, Weniza, Ali Khoshkholgh, Ajay Kumar Bandela, and Simon Allen"Evolution of Ocean Wide Exercises in the Indian Ocean," *ECO*, 6 July 2021, https://www.ecomagazine.com/in-depth/featured-stories/evolution-of-ocean-wide-exercises-in-the-indian-ocean

been reduced at the community level. Fund allocation is also erratic.[488] Nonetheless it is a work in progress and is aimed to benefit the region in the long run.

Beyond the community level, joint disaster management exercises are commonly held between nations, represented by their armed forces. While three of these have been coordinated by BIMSTEC (as has been discussed earlier), others date back further.

Periodic multilateral exercises

The Bay of Bengal littoral countries participate in several joint naval exercises not connected with BIMSTEC, which are sometimes hosted by a specific country as an expression of their soft power diplomacy, at times on a bilateral basis and at other times multilaterally; wherein the countries involved host the exercise in rotation. In most cases these involve a dimension on HADR cooperation. These exercises are as follows:

MILAN multilateral naval exercises

India hosts this multilateral naval exercise every two years, and it is the largest of its kind conducted in the Andaman Sea. A key focus of it is search and rescue operations which is intrinsic to disaster management.[489] The Bay littoral countries have been participating in it since its initial years - 1995-96, and its latest and largest edition was held in 2018 on the theme of "Friendship across the Seas," with an involvement of sixteen countries (Figure 5).[490] Its 2020 edition was rescheduled to 2022[491] because of the pandemic and 42 countries participated.[492] The experience gained from an exposure to the best practices of so many nations help in strengthening the individual capacities of involved navies and in turn benefits the region.[493]

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[488]Sohini Bose and Anasua Basu Ray Chaudhury, "In Search of Community-based Disaster Risk Management in BIMSTEC," in Sreeradha Dutta (ed.) *BIMSTEC: The Journey and the Way Ahead*, Vivekananda International Foundation: New Delhi, 2021, p. 120.

[489] "MILES-18: First ever multi-nation naval exercise at sea held in Andaman," *GKToday*, 12 March 2018, https://currentaffairs.gktoday.in/miles-18-multi-nation-naval-exercise-sea-held-andaman-03201853333. html

[490] Prashanth Parameswaran, "The Real Significance of India's MILAN Navy Exercise," *The Diplomat*, 28 February 2018, https://thediplomat.com/2018/02/the-real-significance-of-indias-milannavy-exercise/

[491]Dinakar Peri, "Navy to host its largest exercise, Ex Milan, next February," *The Hindu*, 4 October 2021, https://www.thehindu.com/news/national/navy-to-host-its-largest-exercise-ex-milan-next-february/article36828648.ece

[492]MILAN 2022, https://www.in-milan.in/index.aspx

[493]Anasua Basu Ray Chaudhury, Pratnashree Basu and Sohini Bose, *Exploring Maritime Connectivity in the extended Bay of Bengal*, New Delhi: Observer Research Foundation, 8 November 2019, p. 48, https://www.orfonline.org/wp-content/uploads/2019/11/ORF_Report_India-ExtendedBOB.pdf

Figure 5: MILAN 2018

Source: "Andaman & Nicobar Command to Host Milan 2018"[494]

Bilateral naval exercises

Coordinated Patrols or the CORPAT exercises are often undertaken by Bay littorals on a bilateral basis. Very often these involve search and rescue operation drills. India particularly as the largest regional provider of disaster aid has these exercises with the other littorals; Myanmar, Thailand and Indonesia. It also hosts joint naval exercises such as SIMBEX with Singapore, Samudra Shakti with Indonesia, EX Siam-Bharat with Thailand.[495] Most recently a disaster management exercise was also held with Bangladesh-Sampriti, although it was restricted to aid civil authorities for disaster management in jungles and semi-urban terrain amongst other issues.[496] It is hoped that such exercises will soon be extended to the maritime domain. Although held at a bilateral level, such exercises by strengthening the capacities of the individual countries, enhance the region's capability of mitigating the impact of disasters.

Indian Ocean Naval Symposium

Commonly known as the IONS, it is a voluntary forum bringing together navies of Indian Ocean Region littoral states to increase maritime co-operation and improve regional security. It also serves as a platform to develop effective disaster response mechanisms. Inaugurated in 2008 by India, IONS has grown significantly. All Bay littorals are its members and its chairmanship changes on a rotational basis.[497] In terms of focus on disaster management, the IONS Maritime Search And Rescue Exercise led by Bangladesh in 2017,

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[494] "Andaman & Nicobar Command to Host Milan 2018", Press Information Bureau, Ministry of Defence, Government of India, 25 February 2018, https://pib.gov.in/Pressreleaseshare.aspx?PRID=1521660

[495] Anasua Basu Ray Chaudhury, Pratnashree Basu and Sohini Bose, *Exploring Maritime Connectivity in the extended Bay of Bengal*, New Delhi: Observer Research Foundation, 8 November 2019, pp. 46-47, https://www.orfonline.org/wp-content/uploads/2019/11/ORF_Report_India-ExtendedBOB.pdf

[496] "Joint India, Bangladesh military drill concludes," The Statesman, 5 May 2020, https://www.thestatesman.com/bengal/joint-india-bangladesh-military-drill-concludes-1502856859

[497] Indian Ocean Naval Symposium, Navy Australia, https://www.navy.gov.au/ions

deserves particular mention.[498] The 2020 edition of IONS, also featured a virtual meeting of the Working Group on Humanitarian Assistance and Disaster Relief.[499] Its latest edition held in 2022 was particularly oriented towards enhancing the interoperability of the navies of member nations in Humanitarian Assistance and Disaster Relief (HADR) operations.[500] This edition was held in the Arabian Sea while in 2017 it was organised in the Bay of Bengal.

3.2 Disaster Response

Having undertaken an overview of the disaster preparedness initiatives, it is important to understand the practices of disaster management which are operationalised at the hour of crisis in the Bay of Bengal region.

There are currently no multilateral regional arrangements which has effectively operationalized coordination of disaster response in the Bay of Bengal region. Indeed, SAARC has an "Agreement on Rapid Response to Natural Disasters,"[501] and IORA has held a Cluster Group Meeting[502] to strengthen cooperation in disaster response. However, in the event of disasters these groupings have not undertaken any relief initiatives in the Bay. BIMSTEC is much more nascent and has not ventured in disaster response either.

Instead, the absence of effective regional mechanisms for disaster response has reposed the faith of the littoral countries on bilateral HADR. Indeed, regional coordination is required given the extreme magnitude natural disasters can attain in the Bay, which might overwhelm bilateral supports. Also, an effective regional platform involving multiple members, offers a more guaranteed assurance of assistance rather than informal dependence on any single country for help. However, as such a regional cooperation mechanism is yet to be operationalised in the region, the dependence continues to be on bilateralism which has its own benefits. Bilateralism offers ease of negotiation and in most cases a simple alignment of interests based on mutual understanding. Thereby, the process of negotiation may be less complicated unlike multilateralism where there is a vast array of varied interests to be considered. Naturally bilateral negotiations are also less time consuming.[503]

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[498]IMMSAREX, Indian Navy, https://www.indiannavy.nic.in/content/immsarex

[499]"Indian Ocean Naval Symposium (Ions) working group meeting on humanitarian assistance and disaster relief," Press Information Bureau, Ministry of Defence, Government of India, 16 December 2020, https://pib.gov".in/Pressreleaseshare.aspx?PRID=1681319

[500] Sumit Arora, "IONS Maritime Exercise 2022 (IMEX-22) concludes in Arabian Sea," Adda24x7, March 31, 2022, https://currentaffairs.adda247.com/ions-maritime-exercise-2022-imex-22-concludes-in-arabian-sea/

[501]SAARC Agreement on Rapid Response to Natural Disasters, 25-26 May 2011, https://www.ifrc.org/docs/idrl/N840EN.pdf

[502]"IORA Meet on Disaster Risk Management concludes," Press Information Bureau, Ministry of Home Affairs, Government of India, 06 February 2019, https://pib.gov.in/Pressreleaseshare.aspx?PRID=1562849

[503] Authors are indebted to officials from CNA for their comments on this point, February 01, 2022.

In the Bay of Bengal, bilateral HADR is usually India centric. Among the littorals one of the most geographically vulnerable and yet risk resilient countries is India. Hence, in 2004, despite itself being affected, India deployed several HADR operations, earning a good name as a provider of disaster relief. Since then, it has provided HADR to many of the countries outlining the Bay of Bengal region and is the largest regional provider of relief assistance. Unofficially it has therefore become almost customary for affected Bay littorals to seek India's assistance on a bilateral basis. HADR has since then emerged as one of the key components of the Indian navy's peace-time strategy. **Figure 6** provides an overview of India's major HADR assistance to Bay littorals in recent years.

Figure 6: India's HADR assistance to Bay littoral Countries

Incidents	India's HADR outreach
2004 Indian Ocean Tsunami	India sent 3 relief operations to Sri Lanka, Indonesia and the Maldives, comprising 32 ships, 20 helicopters and 7 air-crafts.
2007 Cyclone Sidr, Bangladesh	The Indian Navy sent relief supplies including milk powder, blankets, water filters, food and medicine to Bangladesh.
2008 Cyclone Nargis, Myanmar	The Indian Navy sent two naval ships, INS Rana and INS Kirpan to provide relief to the victims in under Operation Sahayata.
2015 Cyclone Komen, Myanmar	IAF aircrafts C-17 and C-130 airlifted 104 tons of relief material from Delhi to Kalay and Mandalay.
2017 Cyclone Mora, Bangladesh and Sri Lanka.	Indian Navy ran two simultaneous HADR operations; one in Sri Lanka and the other in Bangladesh.
2018 Tsunami, Indonesia	India launched 'Operation Samudra Maitri' to assist victims in Central Sulawesi with the Airforce and Navy at the helm.

Source: Anasua Basu Ray Chaudhury, Pratnashree Basu and Sohini Bose, Exploring Maritime Connectivity in the extended Bay of Bengal, New Delhi: Observer Research Foundation, November 08, 2019, pp. 84-85 https://www.orfonline.org/wp-content/uploads/2019/11/ORF_Report_India-ExtendedBOB.pdf

In recent years, Bangladesh has also increased its disaster response capability and become a provider of relief assistance to other Bay littorals. For instance, in 2016, the Bangladesh Navy delivered relief to Sri Lanka after widespread flooding and landslides.[504] In the event of disasters of severe magnitude therefore it is this kind of bilateral support that has best served the Bay littorals.

[504]"Bangladesh Navy's ship starts for Sri Lanka with more aid for flood victims," *bdnews24.com*, 31 May 2016, https://bdnews24.com/bangladesh/2016/05/31/bangladesh-navys-ship-starts-for-sri-lanka-with-more-aid-for-flood-victims

Indeed, the discussion above, outlines those policies and practices that have developed organically in this turbulent region to enhance disaster management. However there continues to be many areas where there is still scope for improvement.

4. Fixing the gaps

Analysing the Bay of Bengal region as well as the regional institution of BIMSTEC several areas can be identified which need attention. These can be classified as follows:

- Domestic
- Bilateral
- Multilateral

4.1 Domestic

It may be expected that with this constant state of vulnerability the countries of the Bay of Bengal region would have mastered the art of disaster management with substantial policies and mechanisms. However, most of these countries are ill equipped to self-sufficiently deal with the impact of disasters as natural disasters are seemingly peripheral problems which do not attract much attention unless they are at the door. People living along the coast of the Bay are used to facing cyclones intermittently and it is a part of their way of life. It is not a matter of much concern unless it is of extremely severe magnitude and does substantial damage. There was little consciousness in the region about the need for disaster management, prior to the devastating tsunami of 2004, with the exception of Bangladesh, which had faced Cyclone Bhola much earlier, in 1970. The familiarity with cyclones also explains why more funds are usually set aside for disaster response rather than preparedness.

To date, India remains the best equipped in terms of disaster management capacity amongst the Bay littorals, as has already been seen in terms of providing HADR. Malaysia and Singapore too have developed disaster management facilities and as they are not geographically vulnerable, they use their expertise and resources to serve as HADR donors.[505] In Bangladesh although the CPP programme has gained recognition and the government is engaging in HADR missions, it remains heavily reliant on NGOs in disaster relief activities.[506] There is inadequacy of coordination and uneven resource allocation amongst the involved government agencies. Similar problems exist in Myanmar but have

[505] Anasua Basu Ray Chaudhury, Pratnashree Basu and Sohini Bose, *Exploring Maritime Connectivity in the extended Bay of Bengal*, New Delhi: Observer Research Foundation, 8 November, 2019, pp. 45-46, https://www.orfonline.org/wp-content/uploads/2019/11/ORF_Report_India-ExtendedBOB.pdf

[506] Anasua Basu Ray Chaudhury and Sohini Bose, "Disasters Without Borders: Strengthening BIMSTEC Cooperation in Humanitarian Assistance," *Observer Research Foundation*, Issue no. 207, November 08, 2017, p. 3, https://www.orfonline.org/wp-content/uploads/2017/11/ORF_Issue_Brief_207_BIMSTEC-HADR.pdf

been worsened owing to its poverty.[507] It continues to be identified as a Least Developed Country by the UN. Sri Lanka is in a relatively better position, as its National Council for Disaster Management works efficiently. But it still requires more enhanced private sector participation and community involvement.[508] In Thailand the culture of not seeking external assistance complimented by the political authority which seeks to maintain a tight control over response operations has created a deficiency in the management of large-scale disasters.[509] Indonesia so frequently buffeted by intense calamities, still relies on external assistance in disaster response although it is steadily developing its own capacity.[510]

Hence disaster management remains at a nascent stage of development in most Bay littorals and they continue to depend substantially on external HADR to deal with disasters of severe magnitude. Thus, there is a pre-dominant culture of "adhocism" in the region.

4.2 Bilateral

Informal partnerships

Adhocism also finds reflection in the bilateral dimension of disaster management in the Bay. Despite the reliance of Bay littorals on bilateral support in crisis situations and the prevalence of joint naval exercises, there are no formal agreements on disaster management or pertaining to it, between any of the littoral countries, with the exception of non-binding Memoranda of Understanding (MoU) between India-Indonesia[511] and India-Bangladesh.[512] The state of Odisha, India has signed an MOU with the Regional Integrated

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[507] Anasua Basu Ray Chaudhury and Sohini Bose, "Disasters Without Borders: Strengthening BIMSTEC Cooperation in Humanitarian Assistance," *Observer Research Foundation*, Issue no. 207, November 08, 2017, p. 4, https://www.orfonline.org/wp-content/uploads/2017/11/ORF_Issue_Brief_207_BIMSTEC-HADR.pdf

[508] Anasua Basu Ray Chaudhury and Sohini Bose, "Disasters Without Borders: Strengthening BIMSTEC Cooperation in Humanitarian Assistance," *Observer Research Foundation*, Issue no. 207, November 08, 2017, p. 3, https://www.orfonline.org/wp-content/uploads/2017/11/ORF_Issue_Brief_207_BIMSTEC-HADR.pdf

[509] Anasua Basu Ray Chaudhury, Pratnashree Basu and Sohini Bose, *Exploring Maritime Connectivity in the extended Bay of Bengal*, New Delhi: Observer Research Foundation, 8 November, 2019, p. 45, https://www.orfonline.org/wp-content/uploads/2019/11/ORF_Report_India-ExtendedBOB.pdf

[510] Anasua Basu Ray Chaudhury, Pratnashree Basu and Sohini Bose, *Exploring Maritime Connectivity in the extended Bay of Bengal*, New Delhi: Observer Research Foundation, 8 November, 2019, p. 47, https://www.orfonline.org/wp-content/uploads/2019/11/ORF_Report_India-ExtendedBOB.pdf

[511] "MoU between India and Indonesia on Scientific and Technological Cooperation," *The Times of India*, August 09, 2018, https://timesofindia.indiatimes.com/india/cabinet-nod-to-pacts-between-india-indonesia-for-cooperation-in-science-technology-health/articleshow/65340983.cms

[512] "Cabinet approves MoU between India and Bangladesh on cooperation in the field of Disaster Management, Resilience and Mitigation," *PM India*, 18 August 2021,

Multi-Hazard Early Warning System (RIMES), based in Thailand, to manage all kinds of disasters in the state.[513] However, MoUs are only joint decisions of the governments involved.[514] Bilateral assistance between other countries are not governed by any standing arrangements. Such arrangements are necessary to create a durable solution for inter-country disaster response and preparedness in the Bay of Bengal region.

Sensitivity to sovereignty

In the Bay of Bengal region, disaster relief is often not readily accepted when it is offered. This dilemma to accept relief aid is a predominant feature of the practice of HADR in South and Southeast Asia and can be traced back to countries' sensitivity to sovereignty which arises out of a cautiousness due to the colonial past or difficult regional relationships.[515] For example, when Cyclone Sidr struck Bangladesh in 2007, Bangladesh limited India's HADR involvement to the port of Chittagong and the Dhaka airport.[516] Offers to deploy helicopters to conduct rescue operations in more remote affected areas, were declined. Also, while naval relief via fixed-wing aircraft was accepted, relief via rotary-wing aircraft in remote areas was declined.[517] In another instance, the Myanmar government refused to accept relief assistance from USA in the aftermath of Cyclone Nargis in 2008 (**Figure 7**), but India was allowed to provide HADR.[518]

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https://www.pmindia.gov.in/en/news_updates/cabinet-approves-mou-between-india-and-bangladesh-on-cooperation-in-the-field-of-disaster-management-resilience-and-mitigation/

[513] Subrat Das, "MoU signed for disaster management," *The Telegraph*, 1 July 2018, https://www.telegraphindia.com/odisha/mou-signed-for-disaster-management/cid/1417769

[514]Sohini Bose, "Finding Solutions to Fishermen Transgressions in the India-Bangladesh Maritime Space," *ORF Occasional Paper*, No. 331, 10 September 2021, p. 15, https://www.orfonline.org/wp-content/uploads/2021/09/ORF_OccasionalPaper_331_FishingTransgressions.pdf

[515]Anasua Basu Ray Chaudhury, Pratnashree Basu and Sohini Bose, *Exploring Maritime Connectivity in the extended Bay of Bengal*, New Delhi: Observer Research Foundation, 8 November, 2019, p. 44, https://www.orfonline.org/wp-content/uploads/2019/11/ORF_Report_India-ExtendedBOB.pdf

[516] Nilanthi Samaranayake, "Non-traditional security in the Bay of Bengal," in Sohini Bose and Pratnashree Basu (eds.) "Strategic High Tide in the Indo-Pacific: Economics, Ecology, and Security," *Observer Research Foundation Series*, 13 December 2021, https://www.orfonline.org/expert-speak/non-traditional-security-in-the-bay-of-bengal/

[517]"Statement by External Affairs Minister, Shri Pranab Mukherjee to the Bangladeshi media followed by Question and Answer session prior to departure from Dhaka," Media Center, Ministry of External Affairs, Government of India, 1 December 2007, https://www.mea.gov.in/media-briefings.htm?dtl/3879/Statement+by+External+Affairs+Minister+Shri+Pranab+Mukherjee+to+the+Bangladeshi+media+followed+by+Question+and+Answer+session+prior+to+departure+from+Dhaka

[518]Corky Seimaszko, "Myanmar government refuses U.S. aid," *Daily News*, 8 May 2008, https://www.nydailynews.com/news/world/myanmar-government-refuses-u-s-aid-article-1.328655

Figure 7: Newspaper clippings of declined assistance.

Source: Prepared by the Authors.

As a major provider of relief assistance, India thus ensures that "responsibility to protect should not be a pretext for intervention." Hence it does not provide relief assistance unless requested to do so.[519] This is in accordance with the UN Oslo guidelines of 2007, which clearly state that, "All disaster relief, … should be provided at the request or with the consent of the Affected State and, in principle, on the basis of an appeal for international assistance."[520] It is for the very same reason that, in the aftermath of the 2004 tsunami, the Indonesian Vice-president Jusuf Kalle announced that external forces were welcome to help—but only for a limit of three months.[521]

However, there is a distinct difference in the way the military's role in disaster management is understood by the OSLO guidelines and by the Asia Pacific. The former despite being a global standard reflects European practices more in treating the military as a last resort. In the Asia Pacific however, it is treated as a first responder.[522] There was thus a need for Asia Pacific guidelines. In 2005 an International Seminar held in New Delhi discussed the requirement for a more detailed framework for Military Assistance to Disaster Relief Operations in the Asia Pacific. This led to the first of the Asia Pacific Conferences on Military

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[519]Sarabjit Singh Parmar, "Humanitarian Assistance and Disaster Relief (HADR) in India's National Strategy," *Journal of Defence Studies*, Volume 6, Issue no. 1, January 2012, p.https://www.researchgate.net/publication/260041843_Humanitarian_Assistance_and_Disaster_Relief_HADR_in_India%27s_National_Strategy_Focus 91,

[520]*Oslo Guidelines: Guidelines for the use of Foreign military and Civil Defence Assets in Disaster Relief*, Revised 1.1, United Nations Office for the Coordination of Humanitarian Affairs, November 2007, p.13, https://www.unocha.org/sites/unocha/files/OSLO%20Guidelines%20Rev%201.1%20-%20Nov%2007.pdf

[521] Heide HaruyoGentner, "ASEAN: Cooperative disaster relief after the tsunami," SSOAR, p.7, https://d-nb.info/1191505480/34

[522] Anthony Mely Caballero-, Alistair D.B. Cook and Christopher Chen, "Re-imagining the global humanitarian system: Emerging dynamics in the Asia-Pacific," *International Journal of Disaster Risk Reduction*, Volume 56, 1 April 2021, pp.3-4, https://doi.org/10.1016/j.ijdrr.2021.102098

Assistance to Disaster Relief Operations (APC MADRO)[523] in 2006 jointly hosted by Singapore Defence Forces and the United Nations Office for the Coordination of Humanitarian Affairs. It finally led to the endorsement of the 'Asia-Pacific Regional Guidelines for the use of Foreign Military Assets in Natural Disaster Response Operations' in 2010. These are now accepted as a regional version of the Oslo Guidelines.[524]

HADR missions in this part of the world are carried out by military agencies because 'mobility' is key in these emergency relief operations and the armed forces are best trained to make coordinated and swift deployments.[525] Hence in most of the Bay littorals which are HADR donors, the armed forces, to save time, begin preparations for providing HADR as soon as news is received that a country has been affected by a disaster of severe impact. However, the forces are only deployed by the donor government if a request is received from the affected country for assistance.

For its part, India also refrains from accepting relief assistance from other countries, as was witnessed during the devastation wrought by the 2004 tsunami. The Indian explanation was that rescue and relief were tasks it was better equipped to execute on its own. This hesitance finds expression in a 'policy precedent' set in 2004, when the then Indian Prime Minister, Manmohan Singh stated, "We feel that we can cope with the situation on our own".[526] This stance has been articulated in India's National Disaster Management Plan of 2016.[527] This reluctance to accept aid can also been explained in terms of India's national pride. As the 'net security provider' of the region, "India aspires to take a leading strategic role throughout the Indian Ocean.[528] In such circumstances the narrative of "self-sufficiency" is better suited for India's image.[529]

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[523] Authors are indebted to officials from the Nanyang Technological University, Singapore for their comments on this point, 1 February 2022.
[524] The Asia Pacific Conferences on Military Assistance to Disaster Relief Operations (APC MADRO), UNOCHA, https://aseanregionalforum.asean.org/wp-content/uploads/2019/07/Annex-24-UNOCHA-on-APC-Madro-Presentation-10th-ARF-ISM-on-DR.pdf
[525] Authors in consultation with officials from the National Maritime Foundation, India, 27 November 2021.
[526]Happymon Jacob, "Pride and foreign aid," *The Hindu*, 31 August 2018, https://www.thehindu.com/ opinion/lead/pride-and-foreign-aid/article24822860.ece
[527]"National Disaster Management Plan, 2018" (draft), National Disaster Management Authority, Ministry of Home Affairs, Government of India, 2018, 287, https://ndma.gov.in/images/pdf/NDMP-2018-Revised-Draft-1-2018OCT16-A.pdf
[528]David Brewster, "India: Regional net security provider," Public Diplomacy, Ministry of External Affairs, Government of India, 5 November 2013, https://www.mea.gov.in/in-focus-article.htm?22468
[529] Anasua Basu Ray Chaudhury, Pratnashree Basu and Sohini Bose, Exploring Maritime Connectivity in the extended Bay of Bengal, New Delhi: Observer Research Foundation, November 08, 2019, p. 44, https://www.orfonline.org/wp-content/uploads/2019/11/ORF_Report_India-ExtendedBOB.pdf

These nuances indicate that greater confidence building is required amongst the littorals if regional mechanisms of disaster management are to prosper. Effective regional organisation requires its members to shed a fraction of their autonomy towards greater allegiance towards functionalizing the institution, as is seen in ASEAN.

4.3 Multilateral

Institutional weakness

BIMSTEC is thwarted by institutional weaknesses. It lacks a long-term constructive plan, in general, as well as for disaster management in particular. As of 2018, BIMSTEC had a lean budget of US$200,000, used for operational duties and leaving little for funding cooperative efforts. There is no programme budget in BIMSTEC and it relies solely on member funding.[530] To overcome this issue the Fourth BIMSTEC Summit, directed its member states to explore the possibility of establishing a BIMSTEC Developmental Fund at an "appropriate time" and with voluntary contributions from member states for planning and financing of BIMSTEC projects. However, no further steps have been taken towards the creation of this Fund and there is no clear timeframe for its establishment.[531] The BIMSTEC Secretariat also continues to be understaffed and needs to be strengthened through increased financial and human resources.[532] It is hoped that the adoption of BIMSTEC's long awaited Charter will resolve some of the institutional issues for the organisation.[533]

Dearth of multiple stakeholder cooperation

For disaster management to be truly integrated across the region, it must be both holistic and domain-specific to ensure maximum effectiveness.[534] For example, if the region can develop an early-warning system where hotlines are installed at different ports along the Bay of Bengal, this would enable early dissemination of alerts for the ships at sea.[535] Similarly, the private sector in all the Bay littorals, which often undertakes disaster relief and recovery activities as their Corporate Social Responsibility in their respective countries, can

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[530] Authors in conversation with officials from BIMSTEC Secretariat, 17 February 2022.
[531] Authors in conversation with officials from BIMSTEC Secretariat, 17 February 2022.
[532]Sohini Bose, "BIMSTEC and Disaster Management: Future Prospects for Regional Cooperation," *ORF Issue Brief*, Issue No. 383, 20 July 2020, pp.9-10, https://www.orfonline.org/wp-content/uploads/2020/07/ORF_IssueBrief_383_BIMSTEC-Disasters.pdf
[533] BIMSTEC Charter, BIMSTEC, 30 March 2022, https://bimstec.org/?page_id=4866
[534]Sohini Bose, "Disaster Management and Regional Cooperation in the Bay of Bengal," Interview by Thomas Lutken, *The National Bureau of Asian Research*, 25 March 2021, https://www.nbr.org/publication/disaster-management-and-regional-cooperation-in-the-bay-of-bengal/
[535]Anasua Basu Ray Chaudhury, Pratnashree Basu, Sreeparna Banerjee and Sohini Bose, "India's Maritime Connectivity: Importance of the Bay of Bengal,"*Observer Research Foundation*, 26 March 2018, p. 47, https://www.orfonline.org/wp-content/uploads/2018/03/ORF_Maritime_Connectivity.pdf

also be included in regional collaborations. In effect this could solve the problem of inadequate funding that BIMSTEC is most often faced with.[536]

Currently within BIMSTEC, cooperation remains limited to the governments and the armed forces. A more layered and inclusive understanding of the problem is thus needed wherein different stakeholders, such as ports, fishing communities, and the private sector are engaged in disaster mitigation efforts. This would not only help in devising a functional system of collective disaster management; but in the long run, would also usher in a culture of disaster risk resilience in the region.[537]

Pandemic and the delayed response

Evacuation Operations during Cyclone Amphan

Source: "Super-cyclone Amphan hits coast of India and Bangladesh"[538]

Identified as a 'disaster' in India and demanding attention from the ASEAN AHA Centre, Covid has created the need to revamp disaster management in several ways. For one it has amplified the need for planning and preparedness more than ever before. Evacuation operations and the allotment of shelters to evacuees are in particular need of scrutiny. The need of physical distancing and requirement for more space for every individual, has led to the need for more nuanced planning by the authorities. Disaster response can no longer be ad-hoc. Providing disaster relief also demands more sensitive handling, through sanitation

[536] Authors in consultation with officials from the National Maritime Foundation, India (November 27, 2021) and the Department of Disaster Management, Myanmar Red Cross Society (February 10, 2022).

[537]Sohini Bose, "Disaster Management and Regional Cooperation in the Bay of Bengal," Interview by Thomas Lutken, *The National Bureau of Asian Research*, 25 March 2021, https://www.nbr.org/publication/disaster-management-and-regional-cooperation-in-the-bay-of-bengal/

[538]Hannah Ellis-Petersen and Rebecca Ratcliffe, "Super-cyclone Amphan hits coast of India and Bangladesh," *The Guardian*, 20 May 2020, https://www.theguardian.com/world/2020/may/20/super-cyclone-amphan-evacuations-in-india-and-bangladesh-slowed-by-virus

and hygiene.[539]The domestic efforts undertaken by the West Bengal government in the aftermath of cyclone Amphan in May 2020 is a case in this purview.[540] However as far as regional collaboration is concerned, the dearth of cooperation amongst BIMSTEC members during Covid raised serious doubts about the organisation's credibility, especially as both its neighbouring regional organisations, SAARC[541] and ASEAN[542] collaborated in this domain. It was only in late December 2021, that is a year well into the covid crisis, that BIMSTEC through its third disaster management exercise sought to better institutionalize regional cooperation to respond more effectively to natural disasters against the backdrop of the pandemic.

This Exercise which consequently named PANEX-21, consisted of a Multi-Agency Exercise to operate the disaster management structures in handling earthquakes and floods in a pandemic situation and a Table Top Exercise to wargame Disaster Management plans in the pandemic with sequential build up. The aim of this exercise which spanned over three days was to assess and evaluate the efficiency of plans and procedures to deal with a natural disaster in the backdrop of a pandemic and also enhance mutual understanding and sharing of best practices amongst disaster management experts of the BIMSTEC region.[543]

5. Bringing the Oceans together

Regional collaboration in disaster management in the Bay of Bengal cannot be understood only through the lens of one institution. BIMSTEC of course features in its canvas, but what is simultaneously portrayed is a larger landscape of other factors, both positive and negative, which are shaping the development of disaster management across the littorals of this maritime space.

The 2004 Tsunami jerked the region into the urgency of forging a regional mechanism for collaboration to manage this transnational threat. But more than 18 years later, bilateral approaches dominate disaster response as well as disaster preparedness. Bilateralism has

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[539]Cherian Thomas, "COVID-19: Lessons for disaster management," *Down To Earth*, 11 June 2020, https://www.downtoearth.org.in/blog/governance/covid-19-lessons-for-disaster-management-71706

[540]"All Precautionary Measures In Place: Mamata Banerjee On Cyclone Amphan," NDTV, 4 June 2020, https://www.ndtv.com/india-news/cyclone-amphan-west-bengal-cm-mamata-banerjee-says-all-precautionary-measures-in-place-2231082

[541]SAARC Disaster Management Centre, http://www.covid19-sdmc.org/

[542]ASEAN delivers medical support for COVID-19 response to the People of Myanmar, Association of Southeast Asian Nations, 15 September 2021, https://asean.org/asean-delivers-medical-support-to-myanmars-response-to-covid-19/

[543] "Tri-services Humanitarian Aid and Disaster Relief Exercise: PANEX-21 for BIMSTEC Member States held in Pune," BIMSTEC, December 2021, https://bimstec.org/?event=tri-services-humanitarian-aid-and-disaster-relief-exercise-panex-21-for-bimstec-member-states-held-in-pune#:~:text=The%20objective%20of%20this%203,backdrop%20of%20a%20viral%20pandemic.

been India centric, but that is natural given the country's capabilities in which it wishes to be seen as the 'first responder' in a crisis.

Although the present dominant paradigm of disaster management in the Bay is bilateralism, the same cannot be predicted for the future. Where relations are troubled, bilateral relief assistance may not be provided, leaving the affected country in a difficult position if it is dependent on a single donor. Herein multilateralism has its advantages. Ideally such a forum would not be hindered by bilateral turmoil but remain focused on its agenda. It would also offer the scope of better funding to collectively develop the region's disaster preparedness and wider opportunity to learn from each other's best practices.

BIMSTEC aspires to strengthen regional collaboration in disaster management, fueled by strategic aspirations. The following recommendation and some lessons from other institutions are suggested to make the attempt more meaningful:

- Efforts must be made to strengthen the institutional structure of BIMSTEC and ascertain it better funding, for the organisation to make concrete progress.
- The ambit of BIMSTEC may be broadened to form "BIMSTEC Plus" by including Malaysia, Singapore, Indonesia and ASEAN as 'Observers'. Imbibing the expertise of these countries as well as the long-standing regional organisation will help develop its capabilities.[544]
- There is need for more clarity on how disaster management is to be tackled in the region and what are the terms of engagement amongst BISMETC member countries. To address this, a short brief on such aspect can be released by BIMSTEC, inspired by its recently adopted Charter.
- There is need for more digital support within BIMSTEC in the pandemic and post pandemic era. This will especially help in generation of early warning alerts and coordination in preparedness and response as regards disaster management.
- The functions of the BIMSTEC Centre of Weather and Climate can be broadened to provide periodic review of vulnerabilities of the member countries very much like the ASEAN Coordinating Centre for Humanitarian Assistance.[545]
- The joint disaster management exercises must be held more regularly, encompassing training and capacity building exercises. The ASEAN Disaster Relief Exercises[546] can be an inspiration in this respect.
- BIMSTEC could create a regional pool of expertise and resources followed by a demonstration of the latest equipment and disaster response skills.[547]

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[544]Sohini Bose and Sohini Nayak, "BIMSTEC Plus: Towards a Bay of Bengal Community," in RakhahariChatterji and Anasua Basu Ray Chaudhury (eds.), *Reimagining BIMSTEC: Strengthening Regional Solidarity Across the Bay of Bengal*, Observer Research Foundation: New Delhi, 2020, p. 490, https://www.orfonline.org/wp-content/uploads/2021/02/BIMSTEC-digital-9-04-2021.pdf

[545]ASEAN Coordinating Centre for Humanitarian Assistance, https://ahacentre.org/

[546]"ASEAN begins disaster response exercise in Indonesia", *Association of Southeast Asian Nations*, 5 November 2018, https://asean.org/asean-begins-disaster-response-exercise-indonesia/

[547]See SAARC Agreement on Rapid Response to Natural Disasters, SAARC, http://saarc-sec.org/uploads/digital_library_document/28_Rapid_response_to_Natural_disasters.pdf

- The BIMSTEC Expert Group on disaster management must devise collective response strategies and invest in capacity building.[548] It is to be noted that the Expert Group is already designing a response framework inspired from ASEAN's 'One ASEAN One Response' action plan.[549]

Overall, BIMSTEC should promote a flexible arrangement where countries can choose to engage in issue-based cooperation. Meanwhile the existing bilateral ties and domestic initiatives must also be better nurtured.

[548]"IORA Meet on Disaster Risk Management concludes," Press Information Bureau, Ministry of Home Affairs, Government of India, 6 February 2019, https://pib.gov.in/Pressreleaseshare.aspx?PRID=1562849

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RECOMMENDATIONS FOR THE AUSTRALIAN GOVERNMENT TO PROMOTE ENHANCED INDO-PACIFIC COOPERATION IN MARINE ECOLOGY

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Executive Summary of Report Recommendations for Australia

This part of the report includes recommendations on ways in which the Australian Government should promote enhanced Indo-Pacific cooperation in the field of marine ecology as part of its commitment to the Indo-Pacific Oceans Initiative:

1. ***Indo-Pacific Declaration on Marine Plastics:*** Australia should work with India and other selected partners to co-sponsor an Indo-Pacific Declaration and Action Plan on Marine Plastics. This would be open to all littoral states of the Pacific and Indian Oceans.

2. ***Enhance interactions between Indo-Pacific regional groupings:*** Australia should work with India and other selected partners to facilitate regular meetings/workshops among representatives from IORA, ASEAN and PIF to share experience and consider cooperative mechanisms in selected areas of marine ecology.

3. ***Study on IUU fishing in Bay of Bengal:*** Australia should consider sponsoring a quantitative study on IUU fishing in the Bay of Bengal area, potentially through BIMSTEC or BOBLME-P.

4. ***Observer status with BIMSTEC***: Australia should seek observer status in BIMSTEC, with a focus on engagement on marine ecology issues.

5. ***Observer status with IOC***: Australia should seek observer status with IOC, with a focus on engagement on marine ecology issues.

6. ***Pairing of Australian and Indian cities in marine ecology***: The Australian and Indian governments should promote pairing of Australian and Indian coastal cities to share experiences in combating marine plastics or other marine ecology challenges.

7. ***Bringing Pacific and Indian Ocean island states together***: Australia should facilitate sharing of experiences of Pacific and Indian Ocean island states on marine ecology issues through hosting events, workshops and training exercises in fisheries management, monitoring, control and surveillance, marine plastics and ocean science.

8. ***Enhance support for G16 on IUU fishing***: Australia should increase its financial and diplomatic support to the Group of 16 IOTC Coastal States, with the objective of strengthening regional fisheries management by IOTC in identified areas.

9. ***Establish a Pacific Ocean Expedition***: Australia should work together with Pacific Island countries, key Pacific partners and international bodies to establish a Pacific Ocean Expedition modelled on the Second International Indian Ocean Expedition

10. ***Establish an Indian Ocean Centre for Environmental Security***: The Australian Government should sponsor an Indian Ocean environmental security centre as a regional hub for professional development and research in environmental security.

This part of the Report draws conclusions and learnings from the regional arrangements examined in the Baseline Reports as the basis for recommendations on actions that the Australian Government should take to promote greater Indo-Pacific cooperation in marine ecology as part of the Indo-Pacific Oceans Initiative.

The nine Baseline Reports undertaken for this report examined regional arrangements in three subregions of the Indo-Pacific (Pacific islands; Southeast Asia; and Bay of Bengal) in relation to several marine ecology challenges (marine plastics; IUU fishing; ocean science and conservation; and disaster management).

The purpose of the Baseline Reports was to better understand the shape of regional arrangements in marine ecology, whether they achieve the goals, objectives and targets, including action plans and projects and the particular challenges they face.

This part of the Report includes the following sections:
1. General observations drawn from the Baseline Reports on factors that may contribute to effective regional cooperation in marine cooperation.
2. Recommendations for the Australian Government to promote Indo-Pacific cooperative initiatives in marine ecology.

1. General observations on the effectiveness of regional cooperation

The following general observations can be drawn from the findings of the nine baseline reports that were undertaken:

Optimal forms of regional cooperation will differ according to the challenge and context

- The Baseline Reports do not identify any single form of regional implementation that is optimal for all types of marine ecology challenges. Context matters and implementing arrangements that work well in one setting may fall flat in another setting. In addition, appropriate forms of regional implementation will likely differ according to the type of issue being addressed. Generally speaking, the more well understood problems were

found to be easier to solve than those where there was a lot of uncertainty and that a favourable political context greatly helped achieve success.

Importance of existing foundation of regional cooperation

- Unsurprisingly, the most successful regional cooperative arrangements are often built upon broad, pre-existing regional cooperative arrangements e.g. IUU fishing in the Pacific (Baseline Report 2) and marine debris in ASEAN (Baseline Report 4).

- But this is not always the case – the Coral Triangle Initiative (Baseline Report 6) that brings together Southeast Asian states such as Indonesia, Philippines and Malaysia with PNG, Timor Leste and Solomon Islands is an example of a cross-regional initiative that is relatively successful despite there being no prior history of substantial cooperation among those countries.

Importance of national implementation

- A key factor in the success regional initiatives in marine ecology is the extent to which regional agreements or understandings are implemented in national legislation or by national authorities. In most cases, regional groupings will not have the legal authority or resources to implement measures themselves and will rely on the implementation of agreements by national members. Generally speaking, it was found that the problem-solving capacity, skills and energy of national members was a key factor in successfully addressing challenges.

- IUU fishing in the Pacific (Baseline Report 2) provides a good example of countries successfully coordinating the national implementation of agreed measures (e.g. through the creation of standardised licensing terms applicable to all fishers). However, it should be noted that this national coordination is facilitated and supported by relatively well-resources regional institutions such as the Pacific Islands Forum Fisheries Agency.

- The instances of marine debris in the Bay of Bengal (Baseline Report 7) provides an example of weak regional understandings that are poorly implemented in national jurisdictions. There are no effective regional institutions to examine the problem, develop data, define norms or support national implementation of those norms. This results in a relatively ineffective regional regime.

2. Recommendations for Indo-Pacific cooperative initiatives in marine ecology

The Baseline Reports demonstrate there are substantially differing levels of cooperation in marine ecology issues in different parts of the Indo-Pacific. Regional mechanisms in Southeast Asia and the Pacific islands are generally more developed. In contrast, regional cooperation in the Bay of Bengal region in the areas of marine plastics, IUU fishing and disaster management (Baseline Reports 7, 8 and 9) is weak. Even where, for example, declaratory statements among Bay of Bengal countries exist, they are not backed by effective regional mechanisms and they are poorly or not enforced at a national level. Similar observations might be made about much of the rest of the Indian Ocean region.

But these deficiencies can't simply be addressed through trying to apply regional models that may work in, say, Southeast Asia or the Pacific, where there is a much more established web of institutions and arrangements and habits of cooperation on a wide range of issues.

Section 2 includes recommendations for initiatives to promote greater inter-regional cooperation in marine ecology among different parts of the Indo-Pacific (e.g. among the IOR, Southeast Asia and Pacific). The potential benefits of pursuing an inter-regional Indo-Pacific approach in relation marine ecology challenges could include:

- The development and/or application of norms across the Indo-Pacific in relation to marine ecology challenges. The concept of Indo-Pacific-wide responses or norms could potentially be extended to other issues/challenges beyond environmental challenges, thus encouraging habits of trans-Indo-Pacific cooperation.
- The sharing of the lessons/benefits from well-functioning regional arrangements or institutions with regions where arrangements are less developed or less well-functioning.
- The development of shared perspectives towards environmental challenges across the Indo-Pacific.

There are several different ways in which greater inter-regional cooperation in marine ecology challenges could be achieved or facilitated. These include:

- Expanding the geographic scope of existing regional arrangements. For example, by expanding existing ASEAN arrangements to include other countries in the Bay of Bengal region (e.g. India, Bangladesh, Sri Lanka) or even all of the Indian Ocean region.
- Developing understandings/declarations/arrangements between relevant regional groupings (e.g. between ASEAN, PIF, BIMSTEC, IORA, IOC).
- Establishing new arrangements that cross regional boundaries as traditionally understood. One example of this is the Coral Triangle Initiative (examined in Baseline Report 6), that brings together Southeast Asian and Pacific states of Indonesia, Malaysia, Philippines, Papua New Guinea, Solomon Islands and Timor Leste.
- Facilitating the sharing of experiences and lessons learned between different regions, including through peak regional bodies (ASEAN, PIF, BIMSTEC, IORA) and functional bodies such as FFA and IOTC.
- Establishing a regional centre as a hub for expertise/professional development in marine ecology issues from across the Indo-Pacific.

With these options in mind, we make the following recommendations for the Australian Government on Indo-Pacific inter-regional cooperative initiatives in marine ecology.

2.1 An Indo-Pacific Declaration and Action Plan on Marine Plastics

An Indo-Pacific Declaration and Action Plan on Marine Plastics could be a valuable precursor to a global treaty on marine plastics. The UN Environment Assembly 5.2 earlier this year agreed to forge such a global instrument. An Indo-Pacific Declaration and Action Plan on Marine Plastics would be an important indication of regional solidarity and potentially establish concepts that could be adopted in a broader treaty. It would encourage ongoing and future cooperation in the region on marine plastics.

Baseline Report 4 (Marine Plastic Pollution in Southeast Asia: Cooperation, Challenges and Opportunities) discusses the relatively detailed arrangements on marine plastics that have been developed by ASEAN (even though their implementation may not be adequate). These could provide a valuable model for an Indo-Pacific arrangement: key elements of an Indo-Pacific Declaration and Action Plan could be based on ASEAN arrangements, with identified priority areas for national action in areas such as

- Policy Support and Planning
- Research, Innovation, and Capacity Building
- Public Awareness, Education, and Outreach
- Private Sector Engagement

Support for an Indo-Pacific Declaration could be mobilised through working with peak regional groupings such as ASEAN, PIF and IORA.

Recommendation: ***Australia should work with India and other selected partners to co-sponsor an Indo-Pacific Declaration and Action Plan on Marine Plastics. This would be open to all littoral states of the Pacific and Indian Oceans.***

2.2 Regular meetings/workshops to enhancing cooperation between regional groupings in selected marine ecology challenges

Currently there appears to be little or no cooperation or substantive interactions among different Indo-Pacific regional/sub-regional groupings (e.g. ASEAN, PIF, BIMSTEC, IORA, IOC) on marine ecology challenges. This is despite the fact that some groupings (e.g. ASEAN in relation to marine plastics; PIF in relation to IUU fishing) have developed relatively successful responses to certain marine ecology issues that other groupings or sub-regions could benefit from.

Suggested areas for cooperation among Indo-Pacific regional groupings could include three key themes:

- IUU fishing, including through between the Pacific Islands Forum Fisheries Agency, IOTC and the Indian Ocean G16 (discussed in Section 3.2 below)
- Marine Plastics, between ASEAN, BIMSTEC and IORA
- Disaster Relief, between ASEAN, BIMSTEC and Pacific arrangements such as FRANZ.

Australia and India are well placed to work with selected regional partners to promote greater interactions between key regional groupings, including in the field of marine ecology.

Recommendation: ***Australia should work with India and other selected partners to facilitate regular meetings/workshops among representatives from IORA, ASEAN and PIF to share experience in marine ecology and, where appropriate, consider cooperative mechanisms in selected areas of marine ecology***.

2.3 Support for inter-regional arrangements in the Bay of Bengal area in selected marine ecology challenges

Baseline Reports 7, 8 & 9 indicate that there is currently little effective multilateral arrangements in the Bay of Bengal area to address challenges in marine debris, IUU fishing or disaster risk management. This in part reflects the notional historical division of the area between ASEAN (including Indonesia, Malaysia, Thailand and Myanmar) and other Bay of Bengal states represented by BIMSTEC and/or SAARC (India, Sri Lanka, Bangladesh)[550].

In the case of IUU fishing, for example, this division leaves some key regional states with large commercial fishing fleets (e.g. Thailand vs Sri Lanka) or large artisanal fleets (e.g. Bangladesh vs Indonesia) on different sides of a notional regional divide and without effective mechanisms to reach multilateral understandings.

But while the problem is evident, there are considerable challenges in engaging with Bay of Bengal multilateral groupings, particularly on marine ecology issues.

BIMSTEC, the area's main multilateral political grouping, currently undertakes relatively little direct work in marine ecology. BIMSTEC's focus areas (so-called Sectors of Cooperation) currently comprise:

- Trade, Investment and Development (led by Bangladesh)
- Environment and Climate Change (led by Bhutan)
- Security (led by India)
- Agriculture and Food Security (led by Myanmar)
- People-to-People Contact (led by Nepal)
- Science, Technology & Innovation (led by Sri Lanka)
- Connectivity (led by Thailand)

There are no Sectors of Cooperation that are specifically focused on the maritime realm/maritime ecology. The Environmental and Climate Change sector (led by Bhutan) is focused on climate change. The Security sector (led by India) includes Disaster Management as one of its sub-themes. The Agriculture and Food Security sector (led by Myanmar) includes Fisheries and Livestock as one of its subthemes, for which an Expert Group was established in April 2021.

In addition, the BIMSTEC grouping does not include Indonesia and Malaysia as members (both of these are of course ASEAN members), meaning that two important Bay of Bengal states are not included in any BIMSTEC initiatives. All this creates some practical and political challenges in using BIMSTEC as a vehicle for multilateral engagement in the area of IUU fishing or other marine ecology issues.

A possible alternative mechanism for Bay of Bengal trans-regional engagement on marine ecology could be the Bay of Bengal Large Marine Ecosystem Project (BOBLME-P). This was established in 2009 with funding from the UN Food and Agriculture Organisation and the

[550] Thailand and Myanmar are members of both ASEAN and BIMSTEC.

Global Environment Facility. The project brought together the Fisheries, Environmental and Agriculture Ministries of all Bay of Bengal littoral states with the addition of nearby Maldives (i.e. Bangladesh, India, Indonesia, Malaysia, Maldives, Myanmar, Sri Lanka, Thailand) in a practical project with a considerable emphasis on research. However, BOBLME-P has been quiescent in recent years and it may well be that external funding has run out.

One practical contribution could be to sponsor an independent expert's report that provides quantitative data on the IUU fishing problem in the Bay of Bengal area (essentially updating the 2014 MRAG work on this subject previously commissioned by BOBLME-P).[551] This would provide a basis of data for potential further initiatives relating to IUU fishing.

Recommendation: ***Australia should consider sponsoring a quantitative study on IUU fishing in the Bay of Bengal area, potentially through BIMSTEC or BOBLME-P***

2.4 Australia to seek observer status with key subregional groupings: BIMSTEC and IOC

Australia could play an important role in helping to better stitch together the Indo-Pacific through playing a more active role in selected regional multilateral groupings in which it does not currently participate. Two groupings in particular, BIMSTEC and IOC, would provide a relatively inexpensive way of extending Australia's influence in the Indian Ocean region.

BIMSTEC is the multilateral grouping that represents the majority of littoral states in the Bay of Bengal region (including India, Sri Lanka, Bangladesh and Myanmar), as well as the land-locked states of Bhutan and Nepal. Australia's participation in BIMSTEC as an observer/dialogue partner, with particular focus on marine ecology issues, would be an important statement of Australia's commitment to enhanced engagement with Bay of Bengal countries.

The Indian Ocean Commission (IOC) is a multilateral grouping whose membership includes the Indian Ocean island states of Mauritius, Seychelles, Madagascar, Comoros and French Reunion. It is one of the more effective and focused regional groupings in the IOR and receives considerable funding from the EU/France. Its agenda has a strong focus on marine ecology, Blue Economy and maritime security. Participation by Australia in that grouping as an observer with a focus on marine ecology issues would be a low cost way of enhancing Australia's influence and reputation in the Western Indian Ocean region.

Recommendation: ***Australia should seek observer status in BIMSTEC with a focus on engagement on marine ecology issues.***

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[551] Transboundary Diagnostic Analysis Volume 2: Background and Environmental Assessment. https://www.boblme.org/documentRepository/BOBLME-2012-TDA-Volume_2.pdf

Recommendation: ***Australia should seek observer status with IOC with a focus on engagement on marine ecology issues***

2.5 Promote Indo-Pacific city/island partnerships in combatting marine plastics

Much of the front-line work in combating marine plastics in the Indo-Pacific effectively occurs at the municipal level, including recycling and waste disposal and cleaning of waterways. Although municipal arrangements were beyond the scope of the studies undertaken through this project there would be benefits bringing together selected local communities (e.g. say Indian and Australian cities or Pacific and Indian Ocean islands) to share lessons and experiences in combatting marine plastics. This could potentially be extended to other environmental challenges.

Recommendation: ***The Australian and Indian governments should promote the pairing of Australian and Indian coastal cities to share experiences in combating marine plastics or other marine ecology challenges.***

2.6 Facilitating cooperation among Pacific and Indian Ocean island states on selected marine ecology issues

As a continental state situated between the Pacific and Indian Oceans, Australia would be a natural sponsor of enhanced interactions among Pacific and Indian Ocean island states, particularly in the field of marine ecology.

Australia should use its strong regional relationships, particularly with Pacific island countries to host events/workshops/training exercises that provide an opportunity for experts from Pacific island countries to share their experience with Indian Ocean island states. Key themes to be pursued could include:

- Fisheries management
- Marine plastics
- Ocean science

Recommendation: ***Australia should facilitate sharing of experiences of Pacific and Indian Ocean island states on marine ecology issues through hosting events, workshops and training exercises in fisheries management, marine plastics and ocean science.***

2.7 Strengthening the Group of 16 Indian Ocean coastal states on IUU fishing

Baseline Report 2 (IUU and the Blue Pacific: Cooperative Arrangements Among Pacific Island Countries) argues that cooperative arrangements among Pacific Island countries regarding IUU fishing represent the 'Gold Standard' in regional cooperation.

In contrast, cooperative arrangements on IUU fishing among Indian Ocean states, mostly undertaken through the Indian Ocean Tuna Commission (IOTC), are relatively weak. Compared with the Pacific, Indian Ocean littoral states have relatively little influence in the IOTC with extra-regional fishing states having considerable influence. In 2011, Indian Ocean

coastal states formed the G16 Group of IOTC Coastal States (including Australia) to consider ways in which IOTC rules and practices should be reformed.[552] Australia should continue to work directly with the IOTC, as well as through the G16, to adopt best practices in monitoring, control and surveillance to combat IUU fishing for the benefit of all littoral states.

Australia's support for the G16 Indian Ocean states and its work with IOTC should focus on the following initiatives to combat IUU fishing:

- Introduction of compulsory observers/electronic observation systems
- The introduction of a region-wide VMS system with direct data access by IOTC through central management of reporting data
- Development of harmonised minimum terms and conditions for access to coastal states EEZs to prevent one island country being played off against another
- Information exchange on the management of transshipment and port state controls
- The establishment of an independent scientific research function to support data-driven policy-making by the IOTC

Recommendation: ***Australia should increase its financial and diplomatic support to the Group of 16 coastal states of the IOTC, with the objective of strengthening regional fisheries management by IOTC, especially in monitoring, control and surveillance.***

2.8 Establish a Pacific Ocean Expedition

In the Pacific there's never been a coherent scientific examination of the ocean as is occurring in the Indian Ocean through the Second International Indian Ocean Expedition. IIOE-2 provides a strong basis for improved scientific knowledge transfer to regional governments in the Indian Ocean and enables capacity development opportunities in support of regional and early career scientists.

Australia and key Pacific partners should work with the International Oceanographic Commission to develop an "International Pacific Ocean Expedition". This would be a powerful "branding exercise" for the Pacific framed under the UN Decade of Ocean Science. It would be a once in a generation ocean science initiative to have a lasting legacy aimed at improving livelihoods and sustaining the region's ocean environment.

Recommendation: ***Australia should work together with Pacific island countries, key Pacific partners and international bodies to establish a Pacific Ocean Expedition modelled on the Second International Indian Ocean Expedition.***

[552] Which includes Australia, Bangladesh, Comoros, India, Indonesia, Iran, Kenya, Madagascar, Malaysia, Maldives, Mauritius, Mozambique, Oman, Pakistan, Seychelles, Somalia, South Africa, Sri Lanka, Tanzania and Thailand. See https://io-g16.org/.

2.9 Establish an Indian Ocean centre on environmental security

Baseline Report 3 (Ocean Science in the Blue Pacific: Regional Arrangements among Pacific Island Countries) examines a successful model for regional cooperation in ocean science (even if there still remains considerable room for strengthening national capabilities in ocean science research).

IOR littoral states, and particularly island states, face similar issues in research and responses to a range of environmental security threats, that include but extend beyond marine ecology challenges.

Currently, there is no college or centre in the region dedicated to advancing national environmental security capabilities through professional development and encouraging regional cooperation in environmental security.

There is considerable value in establishing a centre that would be the premier resource and learning institution for the environmental security training needs of the countries of the Indian Ocean. It would offer tailored environmental security training at middle and senior management levels and provide professional development for young leaders of agencies concerned with environmental security affairs in the Indian Ocean.

The centre could also act as a focal point for academic institutions and think tanks that are active in the marine ecology and environmental security spaces. This could assist in the development of more effective regional networks for research and policy development.

The centre would be a credible and trusted regional source for environmental security expertise and work in partnership with all stakeholders to ensure that diverse environmental security perspectives are fed into the centre's approaches. It would serve as a knowledge hub and information conduit, including for capacity development in environmental security across the Indian Ocean.[553]

Recommendation: The Australian Government should sponsor an Indian Ocean environmental security centre as a regional hub for professional development and research in environmental security.

[553] Anthony Bergin and David Brewster are currently preparing a detailed business case for an Indo-Pacific environmental security centre. It will set out its strategic objectives, institutional options, staffing, funding, location and risk management issues.

Annex 1
Project Scope and Roles

The overall purpose of the project was to undertake baseline studies of international cooperation arrangements in the area of marine ecology in three Indo-Pacific subregions. These studies were to inform proposals for potential inter-regional collaboration arrangements in the area of marine ecology for the Indo-Pacific.

Overview of the project

The project was undertaken in the following parts:

1. Baseline study of Pacific collaboration in three selected areas relating to marine ecology undertaken by Dr Anthony Bergin of ASPI.

2. Baseline study of Bay of Bengal collaboration in three selected areas relating to marine ecology to be undertaken by Observer Research Foundation, Kolkata led by Dr Anasua Basu Ray Chaudhury.

3. Baseline study of Southeast Asia collaboration in three selected areas relating to marine ecology undertaken by RSIS led by Dr Julius Trajano.

4. Overview of studies and proposals for how Australia and India can work together to sponsor inter-regional collaboration arrangements in the Indo Pacific led by Dr David Brewster

The selected areas of study are as follows:

Bay of Bengal

- **Marine plastics**: Examine actions for managing plastics, relevance of SACEP for the BoB and regional collaboration for curtailing plastic pollution at source.
- **Disaster risk reduction*:*** Evaluate implementation of the *Sendai Framework on Disaster Risk Reduction 2015-2030*; relevance of the RIMES, existing or plausible nature-based solutions and the role of bilateral partnerships and BIMSTEC on Environment and Disaster Management.
- **IUU fishing*:*** Explore legal frameworks, the scope of bilateral cooperative arrangements and multilateral arrangements such as BOBLME, IOTC, BIMSTEC to combat IUU fishing.

Southeast Asia

- **Marine debris/plastics**: Examine the implementation of the 2019 ASEAN framework of action on combatting marine debris and collaboration with other extra-regional countries in terms of capacity building.
- **Coral Triangle Initiatives**: A study of the Coral Triangle Initiatives on Coral Reefs, Fisheries and Food Security (CTI), an initiative involving three ASEAN countries as well as Papua New Guinea, Solomon Islands, and Timor-Leste.

- **Maritime disaster response**: Disasters at sea, caused by natural or man-made or technical factors, can lead to negative impact on the marine environment. This case study will assess the effectiveness of current ASEAN arrangements.

Pacific Islands

- **Marine plastics**: The Pacific islands progress in the *Pacific Regional Action Plan on Marine Litter 2018–2025* and further steps that need to be taken.
- **IUU fishing**: How the region is responding to the IUU fishing challenge and next steps.
- **Ocean science**: Pacific islands capacity to develop their ocean science research policy and national capacities and the level of regional cooperation on ocean science.

Annex 2
Consultations with Officials and Stakeholders

Consultations on Regional Arrangements in the Pacific

Consultations with officials and other experts were undertaken on the basis of anonymity, but included persons from the following agencies/organisations:

- Australia DFAT
- Australian Department of Defence
- Australian Department of Home Affairs
- Australian Department of Agriculture, Water and Environment
- Australian Fisheries Management Authority
- CSIRO
- International Oceanographic Commission (Perth office)
- Secretariat of the Pacific – Regional Environment Programme
- Pacific Community (SPC)
- Pacific Islands Forum Fisheries Agency
- Western and Central Pacific Fisheries Commission
- Parties to the Nauru Agreement
- University of South Pacific ocean science experts
- World Wide Fund for Nature, Fiji
- Asian Development Bank
- UN Environmental Program
- International Monitoring, Control, and Surveillance Network
- Environmental Investigation Agency
- University of Technology Sydney (marine plastics experts)

Consultations on Regional Arrangements in Southeast Asia

1. Datu Tungko M. Saikol - Director, Biodiversity Management Bureau, Department of Environment and Natural Resources of the Philippines and Chair of the Philippine Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security (CTI CFF) National CTI CFF Coordinating Committee Secretariat The Philippines

2. Ms Agnetha Vave-Karamui - Ministry of Environment, Climate Change, Disaster Management and MeteorologySolomon Islands

3. Mr Horacio Guterres - National Director of Aquaculture,Dili, Timor-Leste

4. Dr Arisman (Indonesia) - Executive Director, Centre for Southeast Asian Studies-Co-head and Coordinator of the ASEAN-Norwegian cooperation project on local capacity building for reducing plastic pollution in the ASEAN region (ASEANO)

5. Ms Ellen Putri Edita - Research Associate, Regional Knowledge Centre for Marine Plastic Debris, Economic Research Institute for ASEAN and East Asia

6. Dr Sujitra Vassanadumrongdee - Senior Researcher, Environmental Research Institute, Research Cluster on Plastic Pollution, Chulalongkorn University, Thailand; and Member of the Sub-Committee on Plastic Waste and Electronic Waste Ministry of Natural Resources and Environment, Thailand

7. Dr Laura David - Director, Marine Science Institute of the University of the Philippines; Part of the MICROSEAP Consortium- a Southeast Asia-wide consortium of universities conducting research on marine plastics pollution

8. Dr Deo Florence Onda - Deputy Director, Marine Science Institute of the University of the Philippines.

9. Dr Vu Hai Dang - Senior Research Fellow for Ocean Law and Policy Centre for International Law, National University of Singapore. Also former officer at the Ministry of Foreign Affairs of Vietnam

10. Ms Gloria Estenzo Ramos - Vice President of Oceana Philippines and Member of the Executive Committee of Oceana International

11. Ms Mae Chatto - Campaign Specialist for Anti-Plastic Oceana Philippines

12. Mrs. Somsri Hananuntasuk (Thailand) - A Board Member of Union for Civil Liberty (UCL), Vice-Chair of Cross-Cultural Foundation (CrCF) and a Board Member of Friend of Women Foundation (FWF)

13. Ms Maneewan Sanlee (Thailand) - Secretariat Officer, Save Andaman Network Foundation

14. Mr. Parkpoon Witantirawat (Thailand) - Chair of Save Andaman Network Foundation

15. Mr Patargol Tularak - Former officer at the Pollution Control Department, Thailand

16. Mr Leon Oei (Singapore) - Project Officer, South China Sea project of the Centre for Humanitarian Dialogue

17. Dr Collin Koh - Research Fellow, Maritime Security Programme, S. Rajaratnam School of International Studies, Nanyang Technological University, Singapore

18. Mr John Bradford, Senior Fellow, Maritime Security Programme, S. Rajaratnam - School of International Studies, Nanyang Technological University, Singapore

19. Dr Alistair D.B. Cook - Senior Fellow, Humanitarian Assistance and Disaster Relief Programme, S. Rajaratnam School of International Studies, Nanyang Technological University, Singapore

20. Dr Tafsir Johansson - Associate Research Officer, World Maritime University

21. Ms Cheryl Rita Kaur - Head, Centre for Straits of Malacca, Maritime Institute of Malaysia

Consultations relating to Marine Litter in the Bay of Bengal

1. Bangladesh: Mr. Md. Mostafa Kamal, Secretary, Ministry of Environment, Forest and Climate Change, Government of the People's Republic of Bangladesh, Dhaka.

2. India: Ms. LeenaNandan, Secretary (EF&CC), Ministry of Environment, Forests & Climate Change, New Delhi
   Dr. M. Ravichandran, Secretary, Ministry of Earth Sciences, New Delhi

3. Sri Lanka: Dr. Anil Jasinghe, Secretary, Ministry of Environment, Sri Lanka

4. Indonesia: Mr. M.R. Karliansyah, Director General, Environmental Pollution and Degradation Control, Ministry of Environment and Forestry, Jakarta, Indonesia

5. Malaysia: Mr. Jamalulail bin Abu Bakar, Undersecretary Environmental Management Division, Environmental Management Sector, Ministry of Environment & Water Putrajaya, Malaysia

6. Thailand: Mr. SoponThongdee, Director-General, Department of Marine and Coastal Resources, Ministry of Natural Resources and Environment
   Bangkok, Thailand

7. BIMSTEC: Ms. Chimmy Penn

8. South Asia Co-operative Environment Program: Mr. Md. Moniruzzaman

9. Other: Jenna Jambeck, Professor, Environmental Engineering, University of Georgia, National Geographic Fellow

Consultations relating to Disaster Management in the Bay of Bengal

1. Discussion and consultation while participating in the Virtual Workshop on: "Nontraditional Security Challenges in South Asia: Improving Disaster Management Cooperation," organised by The National Bureau of Asian Research, Washington on 8-9 September 2021

2. Amb. Tariq Karim, Director Centre for Bay of Bengal Studies, Bangladesh Independent University, Dhaka

3. Captain Sarabjeet Sing Parmar, Executive Director, National Maritime Foundation, New Delhi, India

4. Ahmadul Haque, Deputy Secretary, Director, Cyclone Preparedness Programme, Ministry of Disaster Management & Relief, Government of Bangladesh

5. Nilanthi Samaranayake, Director, CNA's Strategy and Policy Analysis Program, Washington D.C., US

6. Ashley Johnson, Director for the Energy and Environmental Affairs Group, The National Bureau of Asian Research, US

7. Alistair David Cook, Senior Fellow, Coordinator of the Humanitarian Assistance and Disaster Relief Programme, RSIS, Nanyang Technological University

8. Daw San San Maw, Director, Department of Disaster Management, Myanmar Red Cross Society

9. Kunal Satyarthi, Advisor (Policy & Plan), National Disaster Management Authority, Government of India

10. Sarabjeet Singh Parmar, Executive Director, National Maritime Foundation, India

11. Ristian Supriyanto, Associate Research Fellow, RSIS, Nanyang Technological University, Singapore

12. Md. Mosharaf Hossain, Director (Security), BIMSTEC

Consultations relating to IUU Fishing in the Bay of Bengal

1. Frank Van Der Valk of WWF Myanmar

2. Mike Akester, Regional Director South-East Asia and the Pacific, WorldFish

3. Naveen Namboothri, Founder trustee of Dakshin Foundation, India

4. Dr. Pramod Ganpathiraju, Independent MCS & Fisheries Consultant, India

5. Shri B. Ravichandran, Additional Private Secretary, Department of Fisheries, Government of India

Annex 3
Biographies of Project Leaders David Brewster and Anthony Bergin

David Brewster

Dr David Brewster is a Senior Research Fellow with the National Security College, Australian National University, where he is one of Australia's leading experts on security in the Indian Ocean region, including geo-environmental security issues.

Dr Brewster's books include *India as an Asia Pacific power* and *India's Ocean: the story of India's bid for regional leadership.* His latest edited volume is *India and China at Sea: Competition for naval dominance in the Indian Ocean*.

Dr Brewster's recent reports include:

- *Australia's Second Sea: Facing our multipolar future in the Indian Ocean,* Australian Strategic Policy Institute, 2019.
- *Ocean Horizons: Strengthening maritime security in Indo-Pacific island states*, Australian Strategic Policy Institute, 2019 (with Anthony Bergin and Aakriti Bachhawat).
- *Geo-environmental security challenges in the Indian Ocean Region: Setting a regional agenda*, Emirates Diplomatic Academy, 2019.
- *Environmental security in the eastern Indian Ocean, Antarctica and the Southern Ocean: A risk mapping approach*, National Security College, 2019 (with Anthony Bergin, François Gemenne and Paul Barnes).

Anthony Bergin

Dr Bergin is a senior fellow with the Australian Strategic Policy Institute (ASPI), an independent think tank. He was formerly the research director and deputy director at ASPI. For 20 years Dr Bergin served as an academic at the Australian Defence Force Academy teaching military officer cadets and senior officers. His academic training is in law and international relations and he holds a doctorate on the law of the sea. He served for four years as adjunct reader in law at the ANU Law School. He has been a consultant to a wide range of public and private sector clients on matters related to maritime security.

Annex 4

RSIS Research Team

Dr Julius Cesar I. Trajano is Research Fellow at the Centre for Non-Traditional Security Studies (NTS Centre), S. Rajaratnam School of International Studies, Nanyang Technological University, Singapore. He is a member of the leadership team of the International Nuclear Security Education Network, the Asia-Pacific Nuclear Advisory Panel, and the Council for Security Cooperation in the Asia-Pacific Nuclear Energy Experts Group. Dr Trajano conducts policy research studies and has publications on non-traditional security issues, particularly on nuclear governance in the Asia-Pacific, marine environmental protection in Southeast Asia, peacebuilding, humanitarian affairs, migration and human trafficking.

Dr Lina Gong is a Research Fellow with the Humanitarian Assistance and Disaster Relief (HADR) Programme at the Centre for Non-Traditional Security Studies (NTS Centre), S. Rajaratnam School of International Studies (RSIS), Nanyang Technological University. Her research interests are in non-traditional security studies in East Asia, humanitarian affairs, China's foreign policy, and global governance. She has published several journal articles and book chapters on non-traditional security issues in Asia as well as on China's foreign policy.

Ms Margareth Sembiring is a PhD candidate and an Associate Research Fellow at the Centre for Non-Traditional Security Studies (NTS Centre), S. Rajaratnam School of International Studies, Nanyang Technological University, Singapore. Her research focuses on climate change governance and climate mitigation, especially in low carbon transition, in Southeast Asia. She is the manager of the NTS-Asia Consortium Secretariat.

Annex 5

ORF Research Team

Dr Anasua Basu Ray Chaudhury is a Senior Fellow with the Neighbourhood Initiative, Observer Research Foundation, Kolkata. She specialises in regional/ sub-regional studies, mainly with regard to SAARC, BBIN, and BIMSTEC. She has coordinated the research project entitled "Proximity to Connectivity". Under her supervision five monographs, with extensive first-hand data, on the connectivity between India and her neighbours and India's maritime connectivity in the Bay of Bengal, have been published by ORF (see https://www.orfonline.org/people-expert/anasua-basu-ray-chaudhury/). She is the recipient of the Public Service Broadcasting Trust Senior Media Fellowship (2007) and the Kodikara Award from the Regional Centre for Strategic Studies, Colombo (1998–99). Her recent publications include *New futures of BIMSTEC: connectivity, commerce and security* (co-edited Routledge: UK, 2021), *Reimagining BIMSTEC: Strengthening regional solidarity across the Bay of Bengal region* (Co-edited/ ORF, New Delhi, 2021); *India– Myanmar Borderlands: Ethnicity, Security and Connectivity* (co-edited/ Routledge, UK, 2020) and *Connecting Nations: India and Southeast Asia* (coedited/ Promus, New Delhi, 2019).

Dr Anamitra Anurag Danda is Senior Visiting Fellow with ORF's Energy and Climate Change Programme, and Director – Sundarbans Programme at WWF-India. His research interests include: sustainability and stewardship, collective action and institution building, adaptation to climate change, resolving human-wildlife conflict, and nature conservation. He has several publications to his credit including peer reviewed journal articles and book chapters. He has been a practitioner for over two decades in the environment and development sectors. The bulk of his experience in nature conservation, the practice of sustainable development and adaptation to climate change was gained in the Sundarban region across sectors spanning aquaculture and agriculture, water and energy access, rural transportation, and conservation. Danda has been offering courses on sustainability and sustainable development since 2016 at various business schools in India.

Mr Sayanangshu Modak is a Junior Fellow at the Kolkata Centre of Observer Research Foundation. His research focus is at the interface of science and policy. He currently works on the broad themes of transboundary water governance, hydro-diplomacy, and flood-risk management. He has been engaging with issues affecting marine living resources such as marine plastics and IUU fishing and exploring the role of an ecosystem-based approach for managing marine fisheries in the shallow waters of the Bay of Bengal. He tracks issues related to natural resource management and environmental sustainability. Sayanangshu has previously worked as a Project Manager in the Foundation for Ecological Security. He holds a B.Sc. (Hons.) in Geography from Presidency University, Kolkata, and an M.Sc. in Water Policy and Governance from the Tata Institute of Social Sciences, Mumbai.

Ms Sohini Bose is a Junior Fellow at Observer Research Foundation (ORF), Kolkata with the Strategic Studies Programme. Her area of research is India's eastern maritime neighbourhood, where she explores connectivity, geopolitics and security concerns in the Bay of Bengal and Andaman Sea. Disaster management in the Bay and its associated strategic considerations, with an eye on BIMSTEC, is her particular area of interest. She has

an active interest in the Blue Economy and developments in Bangladesh as part of the ORF, Neighbourhood Studies Initiative. Sohini is a 2021, US Department of State IVLP Fellow. She is Non-Resident Fellow at the National Bureau of Asian Research, Washington D.C and pursuing her Ph.D. in international relations from Jadavpur University.

Annex 6
Notes on the Geographical Definition of the Bay of Bengal

According to the International Hydrographic Organisation[554] (IHO), the Bay of Bengal is demarcated in the east from the Andaman Sea by a line running south from Cape Negaris, through the large islands of the Andaman and Nicobar Island chain, till a point in Little Andaman. In the south, it is delimited from the Indian Ocean by the Adam's Bridge, between India and Sri Lanka and from the Southern extreme of Dondra Head to the North point of Poeloe Bras. This definition is accepted by the signatories of the IHO, which includes all countries outlining this maritime space. Thus cartographically, the Bay of Bengal is not triangular as often perceived and its littorals are India, Sri Lanka, Bangladesh and Myanmar.

In this project, the Bay is understood inclusive of the Andaman Sea and the Strait of Malacca and referred to as the "Extended Bay". Accordingly, the countries in consideration are India, Sri Lanka, Bangladesh, Myanmar, Thailand, Indonesia, Malaysia and Singapore. The last three countries are included as they are increasingly seeking greater engagement in the Bay. Indeed, Bangladesh has already proposed to BIMSTEC the idea of granting an Observer[555] status to Indonesia. Experts have also recommended inclusion of Malaysia, Indonesia and Singapore within BIMSTEC to form a Bay of Bengal Community.[556]

Map 1: NOAA Map of the Bay of Bengal Large Marine Ecosystems Hub

Source: https://www.lmehub.net/#bay-of-bengal

[554] 'Limits of Ocean and seas', International Hydrographic Organisation, https://epic.awi.de/id/eprint/29772/1/IHO1953a.pdf
[555] https://drive.google.com/file/d/1AvJ8guGY06wuq3Hgykxrsu8-AXhnjc0J/view
[556] V. Suryanarayan, 'Prospect of the Bay of Bengal Community', https://www.india-seminar.com/2000/487/487%20suryanarayan.htm

Annex 7
Glossary of Abbreviated Terms

AADMER	ASEAN Agreement on Disaster Management and Emergency Response
ADB	Asian Development Bank
ADMM Plus	ASEAN Defence Ministers' Meeting-Plus
AHA Centre	ASEAN Coordinating Centre for Humanitarian Assistance on disaster management
AHEG	Ad Hoc Open-ended Expert Group
AIMS	Australian Institute of Marine Science
AIS	Automatic Identification System
ANI	Andaman and Nicobar Islands
ANZPAC	ANZPAC Plastics Pact
APEC	Asia-Pacific Economic Cooperation
APC MADRO	Asia Pacific Conferences on Military Assistance to Disaster Relief Operations
APFIC	Asia-Pacific Fishery Commission
ARF	ASEAN Regional Forum
ARFD	Advance Recovery and Fee Deposits
ARL	Australasian Recycling Label
ASEAN	Association of South East Asian Nations
ASEANO	ASEAN-Norwegian cooperation project on local capacity building for reducing plastic pollution in the ASEAN region
ASEAN SHIELD	Bandar Seri Begawan Declaration on the Strategic and Holistic Initiative to Link ASEAN Responses to Emergencies and Disasters
AWGCME	ASEAN Working Group on Coastal and Marine Environment

BIMSTEC	Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation
BIMSTEC Plus	BIMSTEC plus Malaysia, Singapore and Indonesia
BoB	Bay of Bengal
BOBLME	Bay of Bengal Large Marine Ecosystem
BOBLME-P	BOBLME Project
BOBG-IGO	Bay of Bengal Programme Inter-Governmental Organisation
CBD	UN Convention on Biological Diversity
CBDRM	Community Based Disaster Risk Management
CCA	Climate Change Adaptation
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
CCSBT	Commission for the Conservation of Southern Bluefin Tuna
CDS	Container Deposit Scheme
CDS	Catch Documentation Scheme
CMFRI	ICAR-Central Marine Fisheries Research Institute
CMM	Conservation and Management Measure
COBSEA	Co-ordinating Body on the Seas of East Asia
COFI	FAO Committee on Fisheries
CORPAT	Coordinated Patrol
COSPPAC	Climate and Oceans Support Program in the Pacific
CounterMEASURE	Promotion of Countermeasures Against Marine Plastic Litter in Southeast Asia and India
CPC	Cooperation non-contracting Party
CPP	Cyclone Preparedness Programme
CROP	Council of Regional Organisations in the Pacific

CSEAS	Center for Southeast Asian Studies in Indonesia
CTI-CFF	Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security
Danida	Danish International Development Agency
DELSA	Disaster Emergency Logistics System for ASEAN
DoF	Department of Fisheries
DWFN	Distant Water Fishing Nations
EAF	Ecosystem Approach to Fisheries
EAFM	Ecosystems Approach to Fisheries Management
EAS	East Asian Seas
EAS	East Asia Summit
EEZ	Exclusive Economic Zone
EM observer	Electronic Monitoring observer
EPL	Environmental Protection Law
EPR	Extended Producer Warranty
ERIA	Economic Research Institute for ASEAN and East Asia
FAD	Fish Aggregating Device
FAME	Fisheries Aquaculture and Marine Ecosystems
FAO	Food and Agriculture Organisation
FFA	Forum Fisheries Agency
FIMS	Fishery Information System
FSM	Federated States of Micronesia
G16	Group of 16 Like-Minded Coastal States of the Indian Ocean Tuna Commission
GIZ	German Government Development Agency

HADR	Humanitarian Assistance and Disaster Relief
ICSF	International Collective in support of Small-Scale Fisheries
IFR-IOR	Information Fusion Centre – Indian Ocean Regime
IIOE-2	Second International Indian Ocean Expedition
IMIC	Indonesian Maritime Information Centre
IOC	Indian Ocean Commission
IONS	Indian Ocean Naval Symposium
IOR	Indian Ocean Region
IORA	Indian Ocean Rim Association
IOTC	Indian Ocean Tuna Commission
IOWave initiative	An initiative of the UN and Intergovernmental Oceanographic Commission
IMO	International Maritime Organisation
IPCC	Intergovernmental Panel on Climate Change
IPOA-IUU	International Plan of Action to Prevent, Deter, and Eliminate IUU Fishing
IPOI	Indo-Pacific Oceans Initiative
ISMERLO	International Submarine Escape and Rescue Liaison Office
IUCN	International Union for the Conservation of Nature
IUU fishing	Illegal, Unreported and Unregulated fishing
JOMSRE-SCS	Joint Oceanographic and Marine Scientific Research Expedition in the South China Sea
JWG	Joint Working Group
KOEM	Korea Marine Environment Management Corporation
KOICA	Korea International Cooperation Agency

LEAP	Local Early Action Plan
MAREA	Malaysian Recycling Alliance
MARPOL	International Convention for the Prevention of Pollution from Ships
MCS	Monitoring, Control and Surveillance
MICROSEAP	Microbial Transformation of Plastics in South East Asian Seas program
MMAF	Ministry of Marine Affairs and Fisheries
MPA	Marine Protected Area
MRAG	MRAG Asia Pacific consulting company
MSY	Maximum Sustainable Yield
MSWG	Marine Sector Working Group
MTC	Minimum Terms and Conditions
NAP	National Action Plan
NCC	National Coordinating Committee
NERC	Natural Environment Research Council
NIVA	Norwegian Institute for Water Research
NRF	Singapore's National Research Foundation
NTS threats	Non-Traditional Security threats
NTSA	Niue Treaty Subsidiary Agreement
OMP	Oceans and Maritime Program
OMZ	Oxygen Minimum Zone
ORF	Observer Research Foundation
PACPOL	Pacific Oceans Prevention Pollution Program
PacWastePlus	Pacific Hazardous Waste
PARMS	Philippine Alliance for Recycling and Materials Sustainability

PCCC	Pacific Climate Change Centre
PCCOS	Pacific Community Centre for Ocean Science
PEMSEA	Partnerships in Environmental Management for the Seas of East Asia
PET	Polyethylene Terephthalate
PIF	Pacific Islands Forum
PI-GOOS	Pacific Islands Global Ocean Observing System
PIMOS	Pacific Island Marine and Ocean Services
PIMS	Pacific Island Meteorological Strategy
PIPO	Port-In, Port-Out
PIRFO	Pacific Islands Regional Fisheries Observer
PMC	Pacific Meteorological Council
PMLAP	Pacific Marine Litter Action Plan
PMSP	Pacific Maritime Security Program, formerly the Pacific Patrol Boat Program
PNA	Parties to the Nauru Agreement
POLP	Pacific Ocean Litter Project
PPE	Personal Protective Equipment
PRAS	Plastics Recycling Association of Singapore
PRO	Packaging Recycling Organization
PRO	Packaging Recovery Organization
PSM	Port State Measures
PSMA	Port State Measures Agreement
RAP MALI	Regional Action Plan on Marine Litter
RC3S	Regional Capacity Center for Clean Seas

RFMO	Regional Fisheries Management Organisations
RFSC	Regional Fisheries Surveillance Centre
RHCC	Changi Regional HADR Coordination Centre
RKC-MPD	Regional Knowledge Centre for Marine Plastic Debris
RIMES	Regional Integrated Multi-Hazard Early Warning System
RSCAP	Regional Seas Convention and Action Plan
SAARC	South Asian Association for Regional Cooperation
SAGAR	Security and Growth for All in the Region
SAS	South Asian Seas
SACEP	South Asia Cooperative Environment Programme
SCS-LME	Strategic Action Program for the Sustainable Fisheries Management of the Celebes Sea Large Marine Ecosystem
SEAFDEC	Southeast Asian Fisheries Development Center
SEAP Programme	South-East Asia Plastics programme
SIOFA	Southern Indian Ocean Fisheries Agreement
SME	Small and Medium-sized Enterprises
SOLAS	Safety Of Life At Sea Convention
SPC	Pacific Community (formerly the South Pacific Commission)
SPREP	South Pacific Regional Environmental Program
SPRFMO	Convention on the Conservation and Management of High Seas Fishery Resources in the South Pacific Ocean
SUP	Single-use Plastic
SWAT	Solid Waste Management Association of Thailand
TAC	Total Allowable Catch

TDA	Transboundary Diagnostic Analysis
THAI-MECC	Thai Maritime Enforcement Command Center
TS	Threatened Species
UNCLOS	Law of the Sea Convention
UNEP	United Nations Environment Programme
UNFCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
USCG	United States Coast Guard
VDS	Vessel-Day Scheme
VMS	Vessel Monitoring System
WCPFC	Western Central Pacific Fisheries Commission
WCS	World Conservation Society
WWF	World Wildlife Fund