25th Anniversary

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Indian Ocean Rim Association

1997-2022

TABLE OF CONTENT

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পররাষ্ট্র মন্ত্রী
FOREIGN MINISTER
Government of The People's
Republic of Bangladesh, Dhaka

FOREWORD

On the occasion of the 25th anniversary of the Indian Ocean Rim Association, I extend my warm greetings and heartfelt felicitations to all member states and dialogue partners of the Indian Ocean Rim Association. As we commemorate the silver jubilee of this inter governmental organization that has impacted vastly the cooperation and interaction of the countries bordering the Indian Ocean, it s time to strengthen our ties more than ever before to achieve the goals that had been selected 25 years ago.

I express my heartfelt gratitude as Bangladesh assumed the position of the IORA Chair during the 21st IORA COM Meeting and adopted the theme of Harnessing the opportunities of the Indian Ocean sustainably for inclusive development for its Chairship from 2021 2023. I would like to express my immense pleasure in the fact that the People s Republic of Bangladesh has been assigned this responsibility when the country is celebrating the 50th anniversary of its independence. I am hopeful that Bangladesh will contribute more efficiently through a number of modern and advanced ways that will be helpful in achieving the goals of priority and focused areas of the organization.

IORA can play an effective role to protect the prosperity and security of the Indian Ocean region for inclusive growth. I believe, in this tenure from 2021-2023, Bangladesh will be carrying out a number of measures as the chair to achieve sustainable development in all the priority and focused areas of IORA. The proper utilization of fisheries resources and tourism can also bring an economic boost in this region. The region often faces natural calamities that affect the people in the coastal areas devastatingly. Modern initiatives regarding science and technology and disaster management can mitigate these incidents.

IORA is a platform of various nations with diverse cultural practices, different geographical locations, and different climates and so on. Though there is variety, we all are connected through a single thread- The Indian Ocean. I wish the platform, IORA achieves its goals and it emerges as a dynamic and effective platform in the global context for the betterment of the people s livelihood of this region.

(Dr. A K Abdul Momen, MP)

FOREWORD

Foreign Minister of the Democratic Socialist Republic of Sri Lanka

Ayubowan!

It is my great pleasure conveying the best wishes of the government and the people of Sri Lanka on this happy occasion of the 25th IORA Silver Jubilee celebrations commemorated on the Indian Ocean Rim Association Day on 7th March 2022.

The Indian Ocean is a connector of 23 IORA Member States located strategically between the east and the west coasts. It is the home to abundance of natural resources across its boundaries that run deep in to the ocean bed. This Ocean provides us, the member states, a platform for growth, and brings boundless opportunities on the travel and trade industry binding all of us, together. These bonds go back to the centuries of our history which is reflected today, in our cultures, way of life and rich civilizations. It is therefore significant indeed, to extend our best wishes, to all the Member States of the IORA and the Secretariat at the occasion of its 25th silver jubilee, as it has brought to the fore, yet again, the great convergence of our countries and our deep link to this ocean.

Sri Lanka, as a founding member of the IORA, has been a steadfast supporter and active partner throughout the historical journey of the IORA. Today, as the vice chair of the group, we remain ever more ready to work with all the Member States and the Secretariat in fostering peace, prosperity and sustainable development within our region.

I wish IORA success in all its collective efforts to promote its goals and objectives as enshrined in its charter and to bring endeavours that benefits all of us.

Wish you a happy IORA day!

(Professor G. L. Peiris, MP)

FOREWORD

Minister of State
United Arab Emirates

On the occasion of the 25th Anniversary of the Indian Ocean Rim Association (IORA), I would like to extend the United Arab Emirates warmest congratulations and best wishes to IORA Member States, Dialogue Partners, and citizens of the Indian Ocean region.

In celebrating its Silver Jubilee, IORA can be proud of the work it has undertaken in its six strategic priority areas and two cross cutting issues. It should also be a source of great pride that IORA continues to grow in importance within the Indian Ocean region, with membership now expanded to 23 Member States. Together, Member States and Dialogue partners relentlessly pursue the goal of promoting sustained growth and balanced development within the Indian Ocean region.

Of course, there have been significant global changes since IORA was established with the above goal in 1997. Fortunately, IORA has proven on countless occasions its ability to adapt to change and effectively address dramatic changes in global circumstances and important regional issues. One such recent example is IORA s response to the COVID-19 pandemic. IORA managed to not only take extraordinary measures to ensure cooperation between Member States and Dialogue Partners during the pandemic, but also maintain momentum within its core initiatives over the past two years.

As a Member State to this prestigious association, the United Arab Emirates believes in IORA s capacity to drive cooperation and engagement in the Indian Ocean region, and I have no doubt that we will be able to work together and forge closer bonds in the face of common challenges and opportunities. Together, we must continue to strive for the development of an open and inclusive regional architecture, so that we may share in a bright future for the next 25 years and beyond.

In conclusion, I would like to thank the Secretariat for their efforts in drafting this publication to celebrate IORA s Silver Jubilee. I am sure that it will offer rich insight into our history, as well as glimpses of the future, as we pursue ever-deeper regional cooperation.

Once again, I wish you all a happy IORA Day.

HE Ahmed Al Sayegh

FOREWORD

The Indian Ocean Rim Association (IORA) seeks to build and expand understanding and mutually beneficial co-operation in the Indian Ocean region through a consensus based, evolutionary and non-intrusive approach. Our co-operation is based on principles of sovereignty, equality, territorial integrity, political independence, and non-interference in internal affairs of Member States, peaceful coexistence and mutual benefit.

This year, our Association proudly observes its 25th anniversary as the apex international regional organisation that stretches from South Africa in the west, running up the eastern coast of Africa, along the Gulf to South and Southeast Asia, and ending with Australia in the east.

Many things have changed since the core seven initiating Member States congregated in 1995, and the 14 founding members adopted the Charter in 1997. We have grown our membership to 23 States and with 10 Dialogue Partner countries spread across the globe. Inter alia, we have also consolidated and strengthened the institutional mechanisms with which we manage our programmes and activities in 6 strategic priority areas and 2 cross cutting issues.

At this precarious time in our history, we are being confronted with tremendous global challenges in an Indian Ocean region that is charactarised by growing geostrategic importance and heightened power contestations. As the preeminent international organization in the region, I am convinced that we are well placed to respond and manage these challenges as a collective and single platform that our founding father Former President Nelson Mandela envisaged back in 1995.

It is in this context and with great pleasure that I introduce this special commemorative magazine which captures our historical evolution as an Association, and provides high level insights and perspectives on our success, challenges and solutions in taking IORA to even higher levels in the next 25 years.

In this regard we extend our sincere thanks and gratitude for the profound writings of the Hon ble Foreign Ministers of the current, future and previous Chairs of IORA (The TROIKA), along with the distinguished Excellencies and authors from our Member States and Dialogue Partners who wrote such insightful and interesting papers for this publication.

I would also like to thank our Dialogue Partner, Germany, and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), for their generous and enduring support for the publication of this magazine and a multitude of other activities planned to mark our Silver Jubilee this year.

Last but not least, I would like to thank the members of the Secretariat s Editorial Board and coordination team who have provided sincere and tireless efforts to bring this Silver Jubilee Magazine to you.

With kinds regards and best wishes.

H.E. Salman Al Farisi
Secretary-General of IORA and Editor-in-Chief

Member States

Dialogue Partners

IORA at a Glance

The Indian Ocean Rim Association (IORA) is a dynamic inter-governmental organisation which was established on 07 March 1997. The vision for IORA originated during a visit by late President Nelson Mandela of South Africa to India in 1995, where he said:

The natural urge of the facts of history and geography should broaden itself to include the concept of an Indian Ocean Rim for socio-economic co-operation and other peaceful endeavours. Recent changes in the international system demand that the countries of the Indian Ocean shall become a single platform."

23 Member States

Australia, Bangladesh, Comoros, France, India, Indonesia, Iran, Kenya, Madagascar, Malaysia, Maldives, Mauritius, Mozambique, Oman, Seychelles, Singapore, Somalia, South Africa, Sri Lanka, Tanzania, Thailand, United Arab Emirates and Yemen.

CHAIR	
The Council of Ministers elects the Chair of the Association for a period of two years. This is based on the voluntary offer by Member States to become the Chair or; if there is no voluntary offer, the Chair will be elected based on geographical consideration.	
Chair	Year
Republic of Mauritius	1997 – 1998
Republic of Mozambique	1999 – 2000
Sultanate of Oman	2001 – 2002
Democratic Socialist Republic of Sri Lanka	2003 – 2005
Islamic Republic of Iran	2006 – 2008
Republic of Yemen	2009 – 2010
Republic of India	2011 – 2012
Commonwealth of Australia	2013 – 2014
Republic of Indonesia	2015 – 2017
Republic of South Africa	2017 – 2019
United Arab Emirates	2019 – 2021
People's Republic of Bangladesh	2021 – 2023
Democratic Socialist Republic of Sri Lanka (Upcoming)	2023 – 2025

10 Dialogue Partners

China, Egypt, Germany, Italy, Japan, Republic of Korea, Russia, Turkey, United Kingdom and United States of America.

Priority Areas & Cross-cutting issues

- Maritime Safety and Security
- Fisheries Management
- Academic, Science and Technology Co-operation
- Trade and Investment Facilitation
- Disaster Risk Management
- Tourism and Cultural Exchanges
- Blue Economy
- Women s Economic Empowerment

Structure

IORA s apex body is the Council of (Foreign) Ministers (COM) that meets annually. A Committee of Senior Officials (CSO) meets bi-annually to review and prioritise IORA s activities. The Association has Functional Bodies which strengthen and promote activities in the Association and are governed by their Terms of Reference (TOR) as recommended by the CSO and approved by the COM.

Specialised Agencies of IORA

- The Regional Centre for Science and Technology Transfer (RCSTT) based in Tehran, Iran.
- The Fisheries Support Unit (FSU) based in Muscat, Oman.

IORA Special Fund

The IORA Special Fund is a financial mechanism for supporting projects and programmes adopted by the Association within the identified priority areas and cross-cutting issues of the Association.

IORA Secretariat

The Secretariat manages, coordinates, services and monitors the implementation of policy decisions and work programmes adopted by the Association. It is based in Mauritius and overseen by a Secretary-General who is appointed for a three-year period.

ISSUES OF MARITIME SAFETY AND SECURITY UNDER THRESHOLD OF THE INDIAN OCEAN RIM ASSOCIATION (IORA)

Rear Admiral (Retd.) Md. Khurshed Alam
Secretary -Maritime Affairs, Ministry of Foreign Affairs, Dhaka

Maritime safety and security are principally concerned with ensuring safety of life at sea, safety of navigation, and the protection and preservation of the marine security environment. This is because the region accounts for seventy percent of the traffic of petroleum products for the entire world . Oil and gas laden ships travel from the Persian Gulf, transit around Sri Lanka into the waters of South China Sea, whilst reciprocal traffic carrying finished goods from China, Japan, Korea, and Taiwan moves the other way. During this long voyage, ships run the risk of encountering piracy and maritime terrorism. And this worries many nations whose economies are dependent on trade and energy. Authorities have identified that the energy security of many nations depends on the Indian Ocean, as the fuel requirements of many industrializing nations are met through the energy resources transported through it. For all these reasons and more, the Indian Ocean s importance in the global context is very great .

The geographical location and embayed disposition of the Indian Ocean Region (IOR) has historically imparted a distinctive character and geostrategic salience to the region, which continues to the present times. The IOR is also a major source of natural resources particularly hydrocarbons and a busy sea route, and thus essential to the global economy. Nearly half of the world s container shipping, one-third of bulk cargo, and two-thirds of oil shipments are carried onboard ships across the Indian Ocean. At another level, while the IOR is widely diverse in terms of culture, religion, systems of governance and levels of economic development, its rim countries realize the need for cohesion and cooperation through a pan-IOR grouping. This led to establishment of the Indian Ocean Rim Association for Regional Cooperation (IOR-ARC) in 1995, which was renamed as Indian Ocean Rim Association (IORA) in November 2013 during the 13th meeting of Foreign Ministers at Perth, Australia. The IORA represents a collective will of its member states to enhance economic cooperation for their sustained development and balanced economic growth.

Although security is a relatively recent addition to IORA s agenda, the need to develop cooperative structures in this predominantly maritime- configured region is compelling. The sea-borne economic exchange across the maritime global commons of the IOR is plagued by a variety of non-traditional maritime threats and other security challenges. These range from maritime crimes (piracy, terrorism, drug-trafficking, gun running and human smuggling), natural disasters (tsunamis, cyclones and other natural phenomenon), and resource management issues (unlawful exploitation of

living and non-living marine resources, and environment degradation). It is true that many IOR rim countries lack adequate capacity for the safety and security of their maritime interests and have chosen to engage in cooperation, capability-building and capacity optimization of functional arrangements including linking of IORA and IONS was deliberated.

Issues to be addressed in the Indian Ocean

There are limited maritime and naval resources to ensure good order at sea in the Indian Ocean. Further, issues such as unresolved maritime boundaries, Illegal Unregulated and Unreported (IUU), and the mushrooming of Private Maritime Security Companies (PMSC) present complex legal challenges and have further complicated the security environment in the Indian Ocean. Given the increasing strategic, political, and economic significance of the IOR, these issues bear significantly on all stakeholders, both within and beyond the region. IORA primarily focusses on the regional challenges in maritime safety and security. It attempted to review maritime safety and security challenges and to prioritize them based on identification of common denominators. Issues such as trans-national crime including piracy, terrorism, drug and arms smuggling; Humanitarian Assistance and Disaster Relief (HA/ DR) and maritime and aeronautical Search and Rescue (SAR); Illegal, Unreported and Unregulated (IUU) fishing and resource management for sustainable development are to be addressed. It also addressed the cooperative organizational structures in the IOR. Maritime safety and security structures and current programmes of member states, including inter-state arrangements need to be discussed. The way ahead for harmonization of existing regional / sub- regional groupings and agreements and developing a pan-IOR website. It emerged that the efforts must be taken to build legal capacity of member states and an IORA Working Group on maritime safety and security could contribute to this goal. The first concerns the rising salience of the IOR as part of the broader Asian region s strategic calculus. Chiefly of all, IORA has steadily gathered pace to build institutional processes amongst its member states. Second, is the increasing geopolitical focus on the IOR by different actors. The recently revised maritime strategy released by Washington couched its strategic approach within the Indo- Asia-Pacific construct, thus reflecting its cognizance of the rising role played by IOR. This also coincides with China s increasing forays into the IOR, including economic and military outreaches to the rim countries. Japan has also become a recent player in the IOR, in part because of its continued reliance on energy imports from the region but also due to its ongoing rivalry with China. France has also become a member of the IORA. Much has been written about major powers perspectives on the IOR. Not unlike the major powers, all countries also possess vested interests in the IOR. Certainly, some countries do not have such grand scheme of ideas for the IOR compared to the major powers, but nonetheless, it remains exposed to variable developments taking place in the region. In upholding its national interests, all rim countries necessarily must be cognizant of the maritime safety and security challenges in the IOR. Seen holistically, vulnerability is a function of threats and the ability to mitigate those threats. There is one more catch to that the potential consequences that stem from the collective imperative to mitigate those threats.

It, however, must be remembered that promoting robust cooperation is easier said than done given enormous diversity and vast distances that separate the sub-regions of the Indian Ocean from one another because there is a strong tendency among policymakers and analysts alike to view the Indian Ocean region not as one composite region but comprising several sub-regions. Nonetheless, these links were neither uniform nor consistent, varied widely, and were sporadic, except with some regions such as South Asia, Southeast Asia and Africa which had always been much stronger and lasted for more than two millennia. Skills and knowledge were transmitted through this region, and civilizations, cultures, languages, religions, ideas and commerce and trade interactions flowed back and forth from one end to the other seamlessly are visible even today. In any case, all these were fundamentally disrupted with the onset of

colonialism. It must, however, be granted that the British, who controlled much of the Indian Ocean region, were to an extent instrumental in bringing the sub- regions together. However, these links were tenuous and basically created to serve the colonial interests as compared to the previous relationships that mutually beneficial and free flowing. Consequently, the British had maintained strong connections at the cost of pre-existing inter-regional linkages thus contributing to further segregation of sub-regions from each other. Whatever the colonial links were that existed among the sub-regions; they virtually diminished with the cold war engulfing much of the region. That has changed dramatically firstly with the end of the cold war, secondly due to the phenomenal rise of East Asia, especially China and to an extent India, and finally the Indian Ocean rim gradually becoming economically a vibrant region. Indeed, the revival of Indo-Pacific as a framework of analysis owes to the rise of the Indian Ocean from being the global backwaters to becoming geo-strategically and economically a pivotal region and its close nexus with West Pacific. As a result, the Indian Ocean does not merely represent vital sea lines of communications alone but as a region that is economically thriving. It may be necessary to create a variety of specialized and effective mechanisms under the aegis of the Association to achieve greater cooperation.

Maritime Security Threats

The IOR is geographically broad and heterogeneous, comprising a diverse number of countries with differing national contexts and circumstances, ranging from political, economic, socioculturral, and military. This means differing and at times conflictual national interests and this thereby shape how one views those threats. The UN report has identified seven specific threats to maritime security: Piracy and armed robbery at sea, terrorist acts involving shipping, offshore installations and other maritime interests, illicit trafficking in arms and weapons of mass destruction, illicit traffic in narcotic drugs and psychotropic substances, smuggling and trafficking of persons by sea, illegal, unreported and unregulated fishing and intentional and unlawful damage to the marine environment [2008 UN report on Oceans and the Law of the Seas]. Many studies focused on state-to-state naval conflict, but some looked beyond traditional threats to examine a diverse range of broader, non-traditional maritime concerns, such as ocean resource management, changes in patterns of commercial shipping, transnational crime, and environmental pollution. We emphasize the necessity to resolve all sovereignty and jurisdictional issues by peaceful means and urged all parties concerned to exercise restraint with the view to creating a positive climate for the eventual resolution of all disputes. (G. V. C. Naidu) Despite these contextual differences, there are similarities where threat perceptions are concerned. First, there ought to be virtual agreement amongst the IOR countries that the SLOCs passing through the region are of utmost importance to not just national survival and prosperity, but also the regional and international well-being at large. This naturally implies common concerns about safety and security to shipping from a myriad of hazards, for example piracy and armed robbery against ships. The more recent international reports showed that piracy attacks have been declining off the Horn of Africa, and the focus of attention has been shifting towards East Asian waters such as the Malacca Strait and South China Sea where there have been resurgent incidents.

The sea borne trade associated maritime enterprises and maritime security environment are now being challenged by piracy, gun running, drug smuggling, illegal migration, environmental pollution, maritime boundary disputes and illegal fishing etc. In the past, most of the maritime security problems were either political or military in nature and were resolved through diplomatic negotiations or through military action. The international seafaring community has always been romanticized by writers and film makers and many people harbour visions of bearded renegades sailing across the blue seas, something akin to a maritime Robin Hood. The truth is that modern day piracy, of whatever form is violent and is made more fearsome by the knowledge on the part of the victim that they are on their own and absolutely defenceless. They endanger navigation by tying up

the bridge crew that can result in ships including fully laden tankers, left without command. This creates the potential for grounding or collision leading to a possible environmental disaster, especially when attacks occur in busy waterways. Modern piracy has become ruthless, sophisticated, and much organized. It has now become the global enemy of commerce and depriving the international shipping of freedom of seas. Its impact on national security, exploration, and protection of natural and marine resources within the EEZ and the life of innocent persons and their property cannot be undermined. There have been growing concerns in the recent years over the sharp increase in the piracy attacks throughout the world. UNCLOS defines it is an illegal act involving violence, detention, or depredation, committed for private ends, On the high seas-beyond 200nm /EEZ, involving at least two ships and no framework to prosecute and punish pirates, and did not set universal penalty. International Maritime Bureau, however, takes a broader view and defines piracy as (ICC International Maritime Bureau 2018); An act of boarding or attempting to board any ship with the intent to commit theft or any other crime and with the intent or capability to use force in the furtherance of that act . This definition includes piracy attacks against ships in the territorial sea or archipelagic waters as well as attacks from shore when the ship is anchored or berthed in port.

Suppression of Unlawful Acts against the Safety of Maritime Navigation (SUA) defined it as intentionally seizing or damaging a ship or act violently against person or property, attempting to seize or damage a ship or place devices, removes two ship requirement, motive-private ends and geographical limits but does not mention trial procedures or establish penalties for offenses, state jurisdiction over an offense only if committed against a ship flying that state s flag, in that state territory or against national of that state. The IMO Code of Practice for Investigation of Crimes of Piracy and Armed Robbery states that any unlawful act of violence or detention or any act of depredation, or threat thereof, other than an act of piracy, directed against a ship or against persons or property on board such ship, within a State s jurisdiction over such offences. Regional Cooperation Agreement on Combating Piracy and Armed Robbery Against Ships in Asia (Re-CAAP) accepted definitions of UNCLOS and IMO as violence Factor-Intensity of violence, type of weapons used, treatment of crew and number of pirates, economic Factor-type of property taken-cases of theft and hijacking, CAT 1- Very Significant, CAT 2- Moderately Significant, CAT 3-Less Significant. International Chamber of Shipping defines petty theft- opportunity theft by persons who manage to gain access to the vessel, usually in port or at anchor, and steal anything handy such as paint or ropes; Armed robbery- planned robbery, alongside, at anchor or underway, targeted mainly at money, crews personal effects, and ships equipment, cargo if possible, often carried out by increasingly organized determined and well-armed gangs; Hijacking- Permanent hijacking of ships and cargoes with crews some- times being murdered cast adrift or held to ransom. Stolen vessels are often used as so-called phantom ships after having been repainted, renamed, and equipped with new documents. Although definition does not matter to the victims on board ships, the persecution of the pirates if apprehended create great hindrance for the law enforcement agencies due to lack of domestic piracy prosecution laws/ administrative machinery of all coastal states.

Several factors are responsible for proliferating piracy in this region

Growing volume of shipping through the IOR increases targets of opportunity for pirates to seize valuable and accessible cargo from ships in port or at sea, poverty and lack of economic opportunities, the additional role of organized criminal groups with sophisticated equipment and high speed boats, arms etc. and lax implementation of rules and regulations by the law enforcement agencies as maritime offence begins and ends on land. The issue of legality and inherent risk of Privately Contracted Armed Security Personnel (PCASP) also needs review by the operators. Geography, history, and politics currently place the IORA countries in a unique position for exerting a meaningful impact on making global strategies more effective in erad-

icating all threats. The past push of hostage taking closer to the eastern coast of the Arabian Sea is encouraging greater willingness by the IORA littoral countries to take a concerted stand on seeking greater global attention to address and remedy issues of immediate concern to the region. Viewing maritime piracy as an act of crime committed on sea, this paper makes a case for greater non-military functional collaboration by the South Asian Coast Guards. This is the right time for the IORA littoral countries to take a lead in: urging immediate remedial action to address issue specific concerns of IOR; undertaking/ supporting quantifiable examination of the relative global costs of eradicating and managing; and facilitating greater information sharing between the Coast Guards, merchant fleet and fishing vessels for early alerts, swifter response to an impending/ occurring act of piracy and initiating appropriate measures for legislating anti-piracy law and for getting release of hostages at the earliest .

Due to the expanse of the ocean and availability of marine resources, fishing is another factor that plays an important role in the IOR. Illegal, Unreported and Unregulated (IUU) fishing by small- and large-scale businesses tend to threaten the marine resources and ecosystems mainly due to the lack of regulation or the inability to monitor certain illegal fishing activities. Coastal waters are abundant with marine resources which provide a great source of income to the fisher folk. However, due to the wealth of fishing resources, the EEZ is being threatened by IUU activities around the IOR. Further, bottom trawling, use of illegal fishing nets, and the use of explosives and poison have become both a security and safety threat to many coastal countries. To this end, most of the navies of the IOR face a huge challenge in safeguarding the waters and resources from illegal fishing activities. Increasing global temperatures are affecting islands and their coastlines. As a result, some rim countries coastline too will be affected due to changes in the global climatic conditions with predictions indicating that a significant proportion of the coastline would be underwater. A projected rise in sea level of between 0.2m - 0.6m would see the inundation of the coastal regions. The question then for both littoral states and extra regional stakeholders is not whether an inclusive approach should be adopted or not, but rather, how to go about achieving an inclusive security/safety framework while ensuring that it is as effective as well as comprehensive. This is essentially capturing the IORA perspective of IOR maritime safety and security challenges. Common threats originate from unconventional sources which have strategic ramifications for the region, yet at the same time each IOR country possesses its own national agenda shaped by unique threat perceptions and varying resource capacities (Koh Swee Lean Collin). This strategic friction can only be overcome by inclusivity in the region, while promoting institution-building focusing on strengthening the IORA as the key process that can propel the IOR forward. This can only be done in an incremental manner, through a building block approach that every IOR country can agree on. The Blue Economy, which calls for sustainable and shared development in the maritime dimension, constitutes a common platform to bring together the diverse national interests of IOR countries and extra-regional stakeholders. In more recent times, the threat posed by religious extremism and militancy shows that unconventional security threats know no boundaries. It may just be a matter of time that religious extremism and militancy broadens into the maritime domain, posing new dangers to SLOC security.

The Indian Oceanic islands and littoral countries are densely populated, and these maritime regions are also very vulnerable to different types of natural disasters. Since most countries along the Indian Ocean rim are relatively poor and developing countries, the human toll and damage to infrastructure tend to be much larger. Moreover, increasingly natural disasters are linked to climate change. Global warming and rising sea levels are already having a devastating effect on island states and coastal regions. Nonetheless, there are no region-wide arrangements for early warning, risk reduction, disaster mitigation, regional responses, and timely relief. Most countries are too small and have limited capacities and hence there is an urgent need to create a variety of information shar-

ing and response mechanisms including joint development of mitigation and post-disaster rehabilitation. Setting up of National Disaster Management Offices and linking them is needed urgently. The IORA is the most appropriate organization to undertake this exercise by involving extra-regional powers such as Japan, which have developed advanced technologies and procedures to deal with natural disasters.

These man-made threats aside, the second type of threat that sees virtual agreement amongst IOR countries are natural calamities. The Indian Ocean earthquake and tsunami in December 2004 showed that the surrounding rim countries can be affected in various degrees. In more recent years, new contingencies emerged. One notes the missing Malaysia Airlines flight MH 370 in March 2014 and the sustained duration of search-and-locate operations involving countries across the Indo-Asia-Pacific. It exemplifies the rising salience of aeronautical and maritime contingencies in the region, not least further reinforced by the loss of Air Asia flight QZ 8501 in late December the same year. These unconventional security threats are shown to be multi-faceted, transboundary in nature and that no one nation-state can single-handedly deal with them alone. What happens in the IOR has spillover effects on the surrounding sub-regions. As such, cooperation becomes necessary to mitigate those threats.

How to mitigate threats posed in the maritime arena of IOR?

All rim countries are heavily dependent on maritime trade finds itself particularly sensitive to the surrounding, evolving security landscape. As a self-help measure, which is in line with its long-upheld security policy of maintaining its relevance to the international community, few country has become more involved in international security operations in the IOR, most notably for example counter-piracy missions as part of CTF151 in the Gulf of Aden (Operation Blue Sapphire) since 2009. It is likely that rim countries will continue to devote attention to the IOR through limited military deployments and provision of niche capabilities, such as the recently promulgated Regional Humanitarian Assistance and Disaster Relief Coordination Centre (RHCC), based alongside the Information Fusion Centre in India, Seychelles and Singapore. However, it is also clear that due to its size, geostrategic position, and resource constraints it becomes imperative for all rim countries to seek collective solutions with other nation-states to address those maritime safety and security threats. In this connection, one needs to adopt a realistic outlook on the IOR s ability to mitigate those maritime safety and security threats. Only several IOR countries possess the requisite capabilities to respond to major maritime safety and security threats. Inevitably, the better-endowed IOR countries are relied upon to provide more public security goods . But clearly also, depending on such a small handful of these better-endowed countries is not sufficient. The existing capabilities and capacities are just spread too thinly across the region.

The need to cope with such a diverse range of maritime safety and security threats, a more sustainable long-term solution will be for every littoral state in the IOR to step up its national capacities. For example, Singapore-based Regional Cooperation Agreement on Combating Piracy and Armed Robbery against Ships in Asia (Re CAAP) information sharing centre and Piracy reporting centre in Kuala Lumpur helped East African countries build information-sharing centres to deal with piracy incidents. Such financial and technical assistance will continue, but contingent on the assisting countries capacities as well as the recipient countries ability to absorb such assistance. Concurrently, there is a need to start promoting institutionalized forms of cooperation so that collective solutions become a habit instead of ad-hoc processes. This dual-tracked approach does not refer to just the military, but a wide range of non-military, civilian agencies in what can be deemed a whole of government approach. Therefore, it becomes necessary to bring these diverse entities together, leverage on one another s strengths and promote a habit of cooperation. This ought to take place at both national and regional levels. One potential area of concern is that governments may not be willing to cooperate

because of their cognizance of lack of capacities which they bring to the table. While it can be assumed that given the financial and technical abilities, each country may strive to develop a balanced range of capabilities, it may help to focus on niche areas for national capacity- building to minimize duplication or overlapping of efforts.

In the process of mitigating those threats, there are bound to be disagreement on how best to collectively address those issues. This is especially the case when individual member states may have their own overarching national interests that can precede those of the organization. This problem is certainly replicated in IORA, especially given its heterogeneity of membership. It does not mean that having a common platform for cooperation dispels all the potential for friction and discord. In the case of IORA, the Blue Economy concept which calls for sustainable and shared development in the maritime domain as its core theme constitutes one such platform. It allows IOR countries to come together, conceive common challenges and find collective ways to address those challenges. Other extra-regional powers have legitimate interests as well. Foremost of all has been to ensure continuous, uninterrupted access to energy supplies from the Middle East and Africa. Seaborne transport of energy invariably must pass through the Indian Ocean before reaching, say, the Northeast Asian economic power houses such as China, Japan and South Korea. These countries can claim legitimate stakes in the IOR maritime safety and security. Some of these extra-regional stakeholders may have national agendas that fit with what the IOR countries may have. Possessing variable capacities that others can possibly tap on, these extra-regional stakeholders can be encouraged to play a constructive role in mitigating IOR maritime safety and security threats. To bring in extra- regional powers to work with IOR countries, harness their capacities and to minimize the likelihood of strategic friction it is necessary to build multilateral institutional mechanisms. These platforms can serve as a vehicle for practical maritime safety and security cooperation as well as build confidence.

IORA as a Platform for contributing to improve Security

IORA represents an excellent platform to achieve a more inclusive approach to maritime security and safety in the Indian Ocean and maritime security should now become a key focus area of IORA. To do this however, IORA needs to look at a more holistic approach to the Indian Ocean and to embrace all littoral states and important external stakeholders. IONS represent another promising platform but not as it stands today. It was initiated by the Indian Navy in 2008 and inspired by the Western Pacific Naval Symposium. However, much of the focus of IONS has been to build on mutual discussions rather than actions in the form of joint naval operations in the region. While the littoral states of Indian Ocean might not have the naval capacity, some of the dialogue partners of IORA not only have the capacity but experience and interest in strengthening IONS. Greater operationalization of IONS not just on piracy and maritime crime but also on Search And Rescue (SAR), Humanitarian Assistance and Disaster Rescue (HADR), counter terrorism and so on, will have a positive impact on a more inclusive approach to maritime security in the IOR. Perhaps the time has now come for multilateral form of cooperation between the two Indian Ocean organisations IORA and IONS. An all-inclusive maritime framework really required in the Indian Ocean. Some stakeholders, including those in the defence establishments might not be so inclined and understandably so. As for IORA, it has always prided itself on being a rather loose and informal organisation. If it decides to become more institutionalized in order to bring about a more effective inclusive environment in the Indian Ocean, current practices like consensual decision making could prove to be both a blessing and a curse for the organization in the long run. Indian Ocean stakeholders must ask themselves if they are prepared to move forward at the pace of its slowest member.

Capacity Building

As stated earlier, the littoral states of the Indian Ocean are remarkably diverse in terms of size, economic, strategic, and operational strength, and capacity. Not all states have the capacity to fulfil

their responsibilities for managing their respective maritime zones, let alone ensuring the security of the wider region. Contributions in capacity building are a key role which can see greater involvement of external stakeholders in the Indian Ocean. Exploitation, pollution, and water-security infringements largely proceed unchecked in many national jurisdictions, and at the high seas. Few regional countries have the capacity to deal with massive human tragedies and environmental damage to coastal areas, which arise from repeated natural disasters. On the other hand, some of the Indian Ocean extra regional stakeholders are very advanced in terms of capability and capacity when it comes to maritime security. They include major powers, like the US, France, Germany, China, Japan and the European Union, and powerful commercial interests that can aid those less capable stakeholders in capacity building. Most of these external stakeholders have vested interests in the Indian Ocean and require a secure maritime environment. It is after all more effective to professionally train and equip local forces to maintain local maritime safety and security than to deploy foreign forces for extended periods of time.

Building Maritime Domain awareness

Continuing intensification of human activity in coastal and marine areas adversely affect marine and coastal ecosystems world-wide and threatens the well-being of the human population. Humans themselves have entered conflict with the very environment that supports them. It is vital to take immediate action to strengthen environmental security if global human security is to be sustained. Climate change, coastal environment degradation and resources depletion and overfishing, and lack of public participation had influenced the fisher s livelihoods activities. Moreover, there is a substantial risk of pirates causing environmental disasters.

Regional Cooperation Mechanism

Good order at sea not only encourages the free flow of sea borne traffic but also ensures that nations can pursue their maritime interests and develops their maritime resources in an ecologically sustainable and peaceful manner in accordance with international law and practice. All states individually are not always capable of ensuring such environment and hence there is the question of evolving an acceptable framework of regional maritime cooperation. The immense and diverse Indian Ocean maritime region poses significant security challenges, particularly in devising coordinated, collaborative and inclusive approaches to shared security challenges that transcend national maritime boundaries. Due to the geographical scope and capacity issues, many of these challenges are beyond the sphere and capabilities of any single nation to address. Like the South China Sea, the issues affecting maritime security in the Indian Ocean are multifaceted and complex, running both the gamut of traditional and non-traditional threats. These include issues of sovereignty and the application of international law, freedom of navigation including that of trade and energy security, the potential of inter-state conflict including those which originate from the Indian Ocean and those that use the region another front , conservation and protection of maritime resources and the environment, trans boundary crime, terrorism, and the movements of displaced people amongst others. According to study on risks and vulnerabilities in the Indian Ocean, there are still no concrete multilateral security architectures and mechanisms specifically designed for dealing with maritime security in the Indian Ocean. However, there are signs that governments and regional organizations in the region, like the IORA, are moving to address the issues in a comprehensive manner.

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SOUTH AFRICA IN THE INDIAN OCEAN RIM ASSOCIATION (IORA)

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Historical Background On The Indian Ocean Rim Association And The Role Of South Africa

The 21st century has increasingly become an epoch defined by new, unchartered terrains that we, as IORA Member States, have been forced to navigate and in this regard, South Africa s chairship of IORA (2017 - 2019) has not only been humbling, but also an enriching experience. This was especially true because, as generally accepted, the foundation for the creation of IORA was in fact laid by President Nelson Mandela, who originated from a generation of forward looking inspirational leaders and it was therefore important for South Africa to continue this trend by playing a leadership role in the Association.

Noting that we live in an increasingly fractious world as we grapple with the major power shifts in the current global geopolitical architecture, it is important for IORA to ensure that the Indian Ocean remains a zone of peace, security and cooperation. This is essential in addressing the development challenges of the Member States as well as the global south and ensuring the sustainable development of all in creating a more equitable and inclusive global community with a shared future harnessing the vast opportunities that the Indian Ocean present to us.

It is South Africa s view that the main feature in the regional blocs, including IORA, would be the structural economic reforms underway that would increase productivity, boost competitiveness, creating better opportunities for development and strengthening countries human capital. The intensification of the accompanying risks, especially in respect of climate change, highlights the need for continued investments in social assistance and insurance programmes to protect the most vulnerable in the Indian Ocean Region. The United Nations Sustainable Development Goal (SDG) 14, to conserve and sustainably use the oceans, seas and marine resources for sustainable development, is therefore central to the economic benefits that could be leveraged and combined with the wealth of resources of the Indian Ocean. The opportunities are therefore endless and should be explored.

The Role and Views of the late President Mandela

In the statement by Her Royal Highness (HRH) Princess Zezani Dlamini, High Commissioner of South Africa to Mauritius, delivered at the 18th IORA Council of Ministers (COM) in Durban, she reminded us that nearly 24 years ago in India, her father, the late President Nelson Mandela, delivered a lecture at the Rajiv Gandhi Foundation where he proposed: "an Indian Ocean Rim of socio-economic cooperation and other peaceful endeavors". He envisioned "a special relationship that should help improve the lot of the developing

nations in multi-lateral institutions". Originating from this generation of forward looking inspirational leaders, the late President Mandela highlighted the importance of economic cooperation between the countries bordering the Indian Ocean, and expressed his vision for IORA during his official visit to India in 1995, where he said:

The natural urge of the facts of history and geography should broaden itself to include the concept of an Indian Ocean Rim for socio-economic co-operation and other peaceful endeavors. Recent changes in the international system demand that the countries of the Indian Ocean shall become a single platform."

This sentiment and rationale, which has been widely accepted as the foundation for the founding of the Indian Ocean Rim Initiative (IORI) in March 1995, and the creation in March 1997 of the Indian Ocean Rim Association for Regional Co-operation (IOR-ARC), as IORA was then called, continues to remain the key position of IORA. Today, IORA is the apex regional organization in the Indian Ocean region consisting of 23 Member States and 10 Dialogue Partners, stretching from South Africa in the west, running up the eastern coast of Africa, along the Gulf to South and Southeast Asia, ending with Australia in the east, including all P5 Countries as either a Member State (France on account of Reunion) or IORA Dialogue Partner.

South Africa as a Founding Member State

In March 1995, officials, businesspeople and academics from seven countries; Australia, India, Kenya, Mauritius, the Sultanate of Oman, Singapore and South Africa met to discuss how to promote economic cooperation in the Indian Ocean Rim region. This group, subsequently referred to as the "core group states" or M-7, issued a joint statement declaring that they had agreed on:

> *"Principles of open regionalism and inclusivity of membership, with the objectives of trade liberalisation and promoting trade co-operation. Activities would focus on trade facilitation, promotion and liberalisation of trade, investment promotion and economic co-operation."*

The Charter for the creation of IORA was finalised at the meeting in September 1996 and the membership was further expanded to include; Indonesia, Malaysia, Sri Lanka, Yemen, Tanzania, Madagascar and Mozambique, also known as the M-14.

The Charter establishing the Indian Ocean Rim Association for Regional Co-operation was adopted by a Resolution in the first Ministerial Meeting in Port Louis, Mauritius, on 7 March 1997; reviewed in the 10th Meeting of the Council of Ministers in Sana a, Yemen, in 2010; amended in the 14th Meeting of the Council of Ministers in Perth, Australia, in 2014 following the new name of the Association; the Indian Ocean Rim Association (IORA); and amended again in the 18th Meeting of the Council of Ministers in Durban, South Africa, in 2018.

South Africa s original involvement in IORA, becoming IORA Chair and our Secretary General of the Association

The IORA Charter declares that IORA seeks to build and expand understanding and mutually beneficial cooperation through a consensus based evolutionary and non-intrusive approach. There are no laws and binding contracts; all decisions are based on consensus; cooperation is based on the principles of sovereignty, equality, territorial integrity, political independence, and non-interference in the internal affairs of Member States, peaceful co-existence and mutual benefit. The IORA Charter explicitly excludes bilateral and other issues likely to generate controversy that could become obstacles or impediments for regional cooperation. Cooperation within IORA does not prejudice the rights and obligations of the Member States within the framework of other economic and trade cooperation arrangements. It does not seek to be a substitute, but reinforce, be complementary to and consistent with, the bilateral, pluri-lateral and multilateral rights and obligations of Member States, in line with an open regionalism approach.

The objectives of IORA that are underpinned by the principle of open regionalism include:

- To promote sustainable growth and balanced development of the region and Member States;
- To focus on those areas of economic cooperation which provide maximum opportunities for development, shared interest and mutual benefits;
- To promote liberalisation, remove impediments and lower barriers towards a freer and enhanced

flow of goods, services, investment, and technology within the Indian Ocean Rim region.

South Africa s view as IORA Chair was that the Indian Ocean Region should be characterised as a region of peace, stability and development within which to pursue the goal of promoting (economic) cooperation for the wellbeing and development of the countries and peoples of the Indian Ocean Rim. To this end, South Africa adopted the theme as IORA Chair for the period 2017 2019 as:

> *IORA; uniting the peoples of Africa, Asia, Australasia, and the Middle East through enhanced cooperation for peace, stability and sustainable development .*

Moving forward, it was very important to recognise that South Africa did not assume the Chair in a vacuum. We were building on a solid foundation laid by other important strategic partners in the region that have led IORA such as India, Australia and Indonesia. These Member States made tremendous contributions to the development of IORA.

India (2011 2013): The work of IORA was streamlined and invigorated to become more focused and targeted towards the sustained growth and balanced development of the Indian Ocean region and of Member States and to create common ground for regional economic cooperation. IORA subsequently adopted the following six (6) key priority areas:

- Maritime Safety and Security
- Trade and Investment Facilitation
- Fisheries Management
- Disaster Risk Management
- Academic, Science and Technology Cooperation
- Tourism Promotion and Cultural Exchange

Australia (2013 2015): Sustained the momentum through sharpening IORA s strategic focus with the adoption of two cross-cutting issues:

- The Blue Economy and
- Women's Economic Empowerment.

Recommendations were made for ensuring that IORA was better placed to work on these priority areas including the re-organisation of the agenda items based on the six Priority Areas and two Cross-cutting Issues, format of reports and for IORA Special Fund applications. The Association changed its name from the Indian Ocean Rim Association for Regional Co-operation (IOR-ARC) to the Indian Ocean Rim Association (IORA), signifying this renewed vigor in the work of the Association.

Indonesia (2015 2017): Coinciding with the Association's 20th anniversary, the 1st IORA Leaders Summit was held in Jakarta on 7 March 2017. The Summit s adoption and signing of The Jakarta Concord elevated the Association s profile and stature to a significantly higher level and charted the way forward for IORA. The Jakarta Concord provided the highest levels of commitment ensuring that the Indian Ocean remains a region of peace, stability and development through enhanced cooperation, including, but not limited to, the six Priority Areas and two Cross-cuttingIssues.

The Jakarta Concord was accompanied by a five-year IORA Action Plan (2017-2021) which provided a firm set of realistic and measurable commitments for the IORA Council of Ministers (COM) and its Committee of Senior Officials (CSO) to implement the Jakarta Concord and take IORA forward in a more outcome orientated manner. This original IORA Action Plan determined short, medium and long term goals in each of IORA s Priority Areas and Cross-cutting Issues. The Second IORA Action Plan (2022-2027) has been prepared to become a high-level policy document with the Work Plans of the respective Working Groups and Core Groups focusing on the

details for the implementation of the IORA Action Plan and to encourage Member States to take responsibility and ownership for the activities of their Association.

THE SOUTH AFRICAN CHAIRSHIP OF IORA DURING 2017-2019

To give effect to the IORA targets, the South African Chairship focused on the strengthening of the Association s institutional mechanisms and bodies, including the Secretariat and the establishment of new dedicated functional bodies to deal specifically with the critical priorities in the areas of Maritime Safety and Security, Blue Economy, Women s Economic Empowerment, and Tourism. There was also a strong focus on enhancing trade and investment between IORA Members States, for the empowering of the youth, ensuring the effective utilisation of resources, such as water and fisheries, and promoting research, development and innovation. South Africa maintained a seconded Director from DIRCO at the IORA Secretariat in Mauritius for the past 14 of the Association s 25 years of existence.

South Africa focused on the deepening and broadening of IORA s engagement with its Dialogue Partners, enhancing their role in support of the core objectives of the IORA Action Plan. The unprecedented interest in IORA amongst countries, wishing to become Dialogue Partners, has become a testament to the progress that has been made in taking IORA forward as the pre-eminent international organisation in the Indian Ocean. Today, all P5 countries are either a Member State or IORA Dialogue Partner, each with a clear plan of engagement for the advancement of IORA s objectives.

Furthermore, South Africa has remained committed to deepening and strengthening IORA s partnerships with international and regional bodies such as the United Nations, the African Union, ASEAN, APEC, as well as other important maritime bodies in the Indian Ocean. IORA has obtained Observer Status at both the United Nations General Assembly and the African Union and, has been working towards strengthening its engagements with these important organs, particularly cooperation on development in the areas of capacity and institution building under the IORA Action Plan.

With reference to the United Nations, IORA is collaborating with agencies and bodies such as the Food and Agricultural Organisation (FAO) and the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (IOC-UNESCO). for the exchange and dissemination of ocean data and information. IORA concluded a Memorandum of Understanding (MOU) with the UN Institute for Training and Research (UNITAR) which is in support of the UN s Agenda 2030 and the Sustainable Development Goals, particularly SDG-14, to conserve and sustainably use the oceans, seas and marine resources for sustainable development.

South Africa s Substantive Priorities

South Africa recognised the importance of IORA as a platform to pursue its domestic imperatives such as the National Development Plan (NDP) and its Operation Phakisa: Oceans Economy; as well as Regional and International imperatives, such as the AU s Agenda 2063; 2050 African Integrated Maritime Strategy (AIMS); NEPAD, and Agenda 2030 (SDGs).

In this regard, South Africa focused its Chairship of IORA to:

- Maximise linkages between Operation Phakisa: Oceans Economy and IORA s Blue Economy strategic outlook within IORA s Working Group on the Blue Economy (WGBE)).
- Support for the African Agenda.
- Enhance trade and investment: revitalise the Indian Ocean Rim Business Forum (IORBF) and the Working Group on Trade and Investment (WGTI), including a MOU on SMEs.
- Reform of the Indian Ocean Rim Academic Group (IORAG).
- Support the establishment of new Working Groups on Women s Economic Empowerment (WGWEE), Blue Economy (WGBE), Maritime Safety and Security (WGMSS), Core Group on Tourism (CGT) and Working Group

on Disaster Risk Management (WGDRM).

- Elevate the focus on Water and Water Management.
- Strengthening of IORA and its Secretariat.
- Continuity of leadership, responsibility and ownership of the IORA Action Plans.
- Strengthen the work programme of IORA Working Groups and Core Groups.
- Consolidate IORA's membership through an inclusive approach.
- Strengthening IORA's relations with its Dialogue Partners.
- Consolidate partnerships, especially with the UN and AU.
- Improve the functioning and efficiency of IORA s mechanisms.
- Strengthen capacity and efficiency of the Secretariat through secondment of staff and resources.
- Support the Secretary-General position and strengthen relationship between the Chair, Troika and Secretariat.

South Africa s Key Achievements as IORA Chair

As IORA Chair, South Africa successfully hosted the 17th and 18th Meetings of the IORA Council of Ministers (COM) in Durban in October 2017 and October 2018, respectively. From these meetings the following key achievements include:

- Increased progress in implementing the IORA Action Plan (2017-2021): The establishment of Working Groups on Blue Economy, Maritime Safety and Security, and Women s Economic Empowerment, as well as the Core Group on Tourism and Working Group on Disaster Risk Management (WGDRM).
- Revised Charter approved: Allowed for the establishment and review of new functional bodies and priorities without the need to review the Charter repeatedly.
- Strengthened IORA's engagement with Dialogue Partners: IORA adopted the Declaration on Guidelines for Enhancing Interaction with Dialogue Partners.
- The Mandela Legacy in IORA: IORA adopted a Special Declaration to commemorate the Centenary and launched the IORA Nelson Mandela Be the Legacy internship programme as a contribution to empowering and capacitating the youth of the Indian Ocean Region (Due to COVID-19 pandemic the programme has yet to be launched at the Secretariat in Mauritius).
- Institutionalisation of the Indian Ocean Dialogue (IOD) and the on-going work of the Academic Group will strengthen the role of academia, as well as the re-defining of the role of the Chair in Indian Ocean Studies (CIOS).
- Progress in linking IORA with the international community through Memoranda of Understanding (MOU) e.g. International Solar Alliance (ISA), Non-Aligned Movement Centre for South-South Technical Cooperation (NAM CSSTC) in Indonesia, and the Water Research Commission in South Africa.
- Expanded membership: South Africa oversaw the approval of the Maldives as 22nd Member State and Turkey, South Korea and Italy as 8th, 9th and 10th Dialogue Partner States respectively.
- In 2019, South Africa hosted the 1st IORA Strategic Planning Workshop to discuss the emerging Indo-Pacific Concept with a view to ensuring that no sub-region, including Africa, within IORA are left out in the evolution of this important strategic concept.
- Institutional Strengthening of the IORA Secretariat through the introduction of relevant instruments to enhance the Secretariat s capacity to deliver on its mandate.
- Enhanced implementation of the Trade and Investment Facilitation priority area through the hosting of the Trade Modernisation Conference and other related meetings with the objective to increase both intra-regional trade and intra-regional investment profiles within the

region that could have a direct impact on the lives of people in the Indian Ocean region.

- Signing of IORA instruments: Including the Promotion of Small and Medium Enterprises (SMEs) and the MOU for the Coordination and Cooperation of Search and Rescue Services in the Indian Ocean Region.
- A Handing over Report was prepared for the incoming Chair, the United Arab Emirates (UAE) at the conclusion of the South African chairship.
- Continuity of leadership: Bangladesh was elected Chair for the period 2021-2023 and Sri Lanka as Vice-Chair. Dr. Nomvuyo Nokwe, who was appointed as IORA Secretary-General for the period 2018 to 2021, concluded her term as IORA Secretary-General in February 2021 and H.E. Ambassador Salman Al Farisi of the Republic of Indonesia was appointed IORA Secretary-General on 17 December 2021 to commence in January 2022.

IORA and its way forward

At the conclusion of its IORA chairship, South Africa recommended the following Way Forward:

- To have a 2nd IORA Leaders' Summit.
- To strengthen IORA's position as the pre-eminent regional body on matters relating to the Indian Ocean.
- To continue discussions within IORA to enhance the Trade and Investment Facilitation priority area through the establishment of a focused trade and investment regime aimed at increasing the intra-regional trade and investment patterns and, to strengthen intra-regional business relations.
- To explore synergies with the African Continent s African Continental Free Trade Agreement (AfCFTA) focusing on the trade enhancement related agenda, particularly with respect to trade facilitation and dealing with Non-Tariff Barrier (NTBs) issues.
- To continue supporting the implementation of UN Resolution 2832 on the Declaration of the Indian Ocean as a Zone of Peace.
- To ensure that IORA is a prominent multilateral bloc dealing with strategic themes such as the Indo-Pacific Concept.
- To further enhance IORA's voice on major global themes such as Climate Change and to also establish credible collaborative instruments that could positively position the region in dealing with future pandemics and other natural or man-made disasters.
- To continue creating working linkages with other prominent regional bodies such as the African Union, ASEAN, APEC, etc.

Key Areas recommended for the further Strengthening of IORA

The following key areas have been identified by South Africa for the further strengthening of IORA:

- Creation of a Security Forum for IORA: Increasing security threats require the Association s attention through the possible creation of a Security Forum for IORA, similar to regional initiatives such as ASEAN Regional Forum (ARF), Shangri-La Dialogue and Organisation of Security and Cooperation in Europe (OSCE).
- Strengthen the Summit Level of IORA: IORA Member States Heads of States should meet periodically to drive the regional agenda forward and to ensure political support for IORA at the highest level.
- Improve efficacy of IORA: (a) to increase the annual Member States contribution to similar levels as that of other similar regional organsations; and (b) to improve planning for manpower resources and capacity development at the IORA Secretariat, enhancing resource allocation in the IORA Secretariat and improve policy and academic research in the Secretariat.
- Increase in applications for Dialogue Partner status to be managed optimally. Discussions on the criteria for membership, and the enlargement of IORA, have been an ongoing process since the inception of IORA in 1997.

Currently the determination is that in terms of those sovereign countries of the Indian Ocean Rim the shores of which are directly washed by the Indian Ocean and there could be a future need for the redefinition in geographical terms of the Indian Ocean. However, the Charter is silent on Dialogue Partner and Observer status membership criteria. Further details for Dialogue Partner status, while not included in the Charter, was discussed during the 18th COM Meeting which adopted the Declaration on Guidelines for Enhancing Interaction with Dialogue Partners in IORA and in due dourse, there may be a need in the future to further develop and formalize these criteria. Currently, all P5 countries are either a Member State or Dialogue Partner of IORA., with the Kingdom of Saudi Arabia being considered, bringing the total number of Dialogue Partners to eleven.

- The management of the Indo-Pacific Concept and the role of IORA within this formation. The former Prime Minister of Japan, Mr.Shinzō Abe, in his speech to the Indian Parliament in August 2007, made reference to the; "Confluence of the Indian and Pacific Oceans" as "the dynamic coupling as seas of freedom and of prosperity" in the "broader Asia". Geographically, the use of the term Indo Pacific , as opposed to Asia Pacific , is strategically inclusive of Africa with the East Coast of Africa and the Indian Ocean acting as a bonding agent between the Pacific and the Indian Ocean region, where Maritime safety and security is central to maintaining and securing a Zone of Peace, Development and Prosperity in the Indian Ocean. IORA, therefore, needs to finalise its Vision on the Indo Pacific Region.
- Addressing Climate Change where according to the Intergovernmental Panel on Climate Change (IPCC), the Indian Ocean is warming at a higher rate than other oceans around the world". The South African Chair of the Working Group on the Blue Economy (WGBE)of IORA, chaired the preparatory Meeting on Climate Change, to consider it to be elevated to a Cross-cutting priority area of IORA, on 4 March 2021.
- Ensure that IORA remains the Apex Body in the Indian Ocean.

CONCLUSION

The Indian Ocean Region (IOR) has become an increasingly contested space with dynamic relations unfolding between the countries of the region,particularly the large influential Member States such as France, India, Indonesia, Sri Lanka and Australia, both with and between the large outside powers such as the US, China, Russia and the UK that are IORA Dialogue Partner States. As a key multilateral organisation, it would become imperative for IORA to enunciate its views on critical issues such as the Indo-Pacific concept and Climate Change, defining its role whilst being mindful of the universally accepted principles and objectives consistent with the values of the Association. Since its inception, IORA has sought to build and expand understanding and mutually beneficial cooperation through a consensus-based approach that could also be considered along with other universally accepted principles for the envisaged larger Indo-Pacific region.

For Africa s IORA membership, their strategic location among the Seas and Continents of the world requires serious attention. The last time that this level of interest was shown in the Indian Ocean Region was during the age of colonization and the lessons that have been learned from history are critical, the balance of forces must be monitored closely and foreign policy positions must be coordinated and managed in line with those assessments. As already mentioned, maritime safety and security will remain central for securing a Zone of Peace, Development and Prosperity in the Indian Ocean. The reality of great power rivalries impacting on the security of the region, where both IORA, in general, and Africa, in particular, would be very concerned about the impact it may have on the regional economic development stressing the need for IORA to finalise its Vision on the Indo Pacific region.

There is no doubt that the Indian Ocean Region is of great strategic importance and value to the

world and it is of utmost importance to safeguard and develop the region for the benefit of all its peoples. Maybe a new regional architecture is required to deal with the myriad security and socio-economic challenges facing the Indian Ocean Region and, in this regard, the position should be stressed that any future regional architecture for the Indian Ocean Region must have IORA at its core.

With the aforementioned sentiments in mind, it is therefore imperative that we extend a warm welcome to IORA s new Secretary-General, Ambassador Salman Al Farisi, and assure him of our full support in the important work that lies ahead during his term of tenure.

TRADE & INVESTMENT: IORA S GEOSTRATEGIC IMPORTANCE COMPELS US TO TRANSFORM OUR ECONOMIC LANDSCAPE

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For centuries, the Indian Ocean Rim has been linked by commerce. As of today, it is still at the center of global trade and investment flows. Half of the world s container ships, two thirds of the world s oil shipment, more than 50% of the world's maritime oil trade and one third of bulk cargo traffic pass through the Indian Ocean.

Politically, the Indian Ocean has emerged as a region of strategic importance. The presence and rise of economic powers in the region have compelled other world powerhouses to review their Indian Ocean strategy.

There is no doubt that the geostrategic importance of the Indian Ocean Rim should inspire the IORA region to reshape regional cooperation for enhanced prosperity of its Member States.

The IORA has existed now for 25 years and for all those years, there has not been a formal structure to fully exploit the Trade and Investment potential amongst its Member States.

This is one of the reasons why during its term as Coordinating Country for Trade and Investment Facilitation (2017 2021), Mauritius pushed forward an agenda which could constitute the main elements of a Framework Agreement for IORA to address impediments to the flow of intra-regional trade and investment.

It is to be recalled that at the IORA Experts' Meeting to Enhance Intra-Regional Trade and Investment held in Mauritius on 30 31 January 2020, there was a proposal from the coordinator to transform the IORA into a fully-fledged Regional Economic Community. As IORA is a full-fledged regional organisation, the meeting agreed that there was potential to consider, in time, a framework to eliminate intra-regional barriers to trade and investment.

Accordingly, in 2020, Mauritius prepared a scoping paper for a Framework Agreement to promote trade and investment in the IORA region as a first step to initiate discussions on the matter. It is the hope that in the future, such an Agreement would become a reality and serves as an instrument for the IORA region to unleash its full Trade and Investment potential.

An economic space of great potential

Economically, the countries bordering the Indian Ocean represent an economic space of great potential and opportunities for the business community. It is a huge market of more than three billion

people and a combined Gross Domestic Product (GDP) estimated at US$ 8 trillion[1] , in 2017, representing approximately 10% of global GDP at that point in time.

In his technical analysis titled "Building Trade Integration Dynamics in the Indian Ocean Rim Association", Professor Peter Draper, Executive Director of the Institute for International Trade at The University of Adelaide in Australia highlights that Member States should consider deeper and more meaningful trade and investment cooperation initiatives. The study highlights that total trade in goods of IORA Member States increased from US$ 806 billion in 1995 to US$ 3,787 billion in 2018,an increase of almost five times.

However, a significant proportion of trade of IORA countries is happening outside the region with US$ 1.1 trillion worth of imports from the world against only US$ 255 billion from within the IORA region. Similarly, IORA Member States exported US$ 1.2 trillion worth to the world against US$ 294 billion among themselves during 2018.

Professor Draper s study reveals that about 39.3% of exports to the world comprises machinery and electronic products, and fuels. The other major traded product categories include chemicals, stone and glass, metals, transportation, plastics and rubber, vegetables, and minerals.

It must also be pointed out that in 2016, according to the study on bilateral and regional trade and investment-related agreements and dialogues between IORA Member States[2], the trade openness of the IORA region as a percentage of its Gross Domestic Product stood at 55%.

Strong demand for services

With regard to IORA's potential in terms of trade in goods, the analysis "Building Trade Integration Dynamics in the Indian Ocean Rim Association

Footnote:

1. *Professor Peter Draper, Executive Director, Institute for International Trade, The University of Adelaide (Australia)- Building Trade Integration Dynamics in the Indian Ocean Rim Association: A Technical Analysis; Report provided to IORA Member States in January 2020.*

2. *Professor V.N. Attri Chair of Indian Ocean Studies at the IORA Secretariat*

indicates that trade in parts and components is increasing. "This is currently concentrated on Southeast Asian IORA Members, and in a few sectors, notably electrical machinery with US$ 231.4 billion of exports, road vehicles (US$ 77.1 billion), office machines (US$ 64.5 billion), and telecommunication equipment (US$ 31.8 billion).

When it comes to trade in services, the study shows that trade of IORA Members has almost tripled, from US$ 493.8 billion in 2005 to US$ 1421.5 billion in 2018.

Travel services is the largest sector, with an absolute value of US$ 234.7 billion for export and US$ 142.2 billion for import. Other business services is the second largest export sector with a value of US$147.4 billion, followed by transport, ITC services and financial services.

On the investment front, in 2018, the value of Foreign Direct Investment (FDI) inflow into IORA was US$ 256.5 billion, almost double the value in 2008 representing about 20% of global FDI inflow. In 2017, the amount of FDI outflow from IORA Member States was US$ 107.5 billion, accounting for 7% of global investment outflow[3].

The above facts and figures bear testimony of the huge trade and investment potential of the IORA region.

Additionally, IORA Member States have diversified production, which is a sine qua non condition enabling the creation of strong regional value and supply chains.

Yet, up to now, the IORA region has not been able to unleash and realize its full trade and investment potential.

The need to strengthen dialogue among like-minded countries

It is against this background that the IORA should put into perspective the desire of its Members to facilitate and strengthen intra-regional trade and investment flows.

Mauritius is of the view that the region has yet to tackle impediments and barriers to enhance flow of goods, services and technology. Hence, its

Footnote:

3. *Ibid*

proposal on the need to strengthen cooperation and dialogue among like-minded countries in view of having a proper Trade and Investment Framework Agreement.

However, in view of setting up a Framework Agreement, concerns arise with regard to the fact that some IORA Members are not yet Members of the World Trade Organization (WTO).

Moreover, most IORA Member States are Parties to bilateral Free Trade Agreements and regional configurations, such as the Southern African Development Community (SADC), the Common Market for Eastern and Southern Africa (COMESA), the Association of Southeast Asian Nations (ASEAN) and the Gulf Cooperation Council (GCC), which are governed by their respective trade liberalization processes.

Despite the above, a sequential approach could be adopted to design an IORA Trade and Investment Framework Agreement which could encompass the key economic elements that would enable the region to collectively unlock the untapped potential with regard to trade, investment and economic cooperation.

Keeping the different levels of development of IORA Members in perspective, the principle of Variable Geometry could be considered, which guarantees a flexible participation of IORA Member States in the initiative. This would provide the appropriate latitude for those Members which are not ready to accept such an arrangement at the outset, to join at their convenience at a later stage. Inclusiveness would ensure the participation of all Member States in the development of the Framework Agreement so as to have the buy-in of each and every Member.

A binding framework would open market access, boost investment, generate revenue and create jobs. Such an Agreement would at the same time, enable sustainable development and equitable sharing of benefits of liberalized trade.

It would also provide the opportunity to the IORA region to move up the value chain since it is a well-known fact that higher shares of intra-regional trade usually generate value-added in intra-regional trade. Furthermore, making full use of complementarities within the region would reduce the overall production costs.

As highlighted by Professor V. N. Attri in his studyon bilateral and regional trade and investment-related agreements and dialogues between IORA Member States[4], greater trade integration would support export diversification as well as economic diversification.

On the services front, given the fact that some IORA Members are competitive service providers, any regional effort to improve services trade regimes could result in greater intra-regional services trade. For exporting countries, it would help generate further foreign exchange while for importing countries it would improve consumer welfare via the provision of better services at more competitive prices[5].

Unlocking IORA s potential

Under the new world order, reducing trade costs and joining regional and global value chains are more than ever a necessity than a matter of choice for countries.

In their endeavor to recover from the Covid-19 pandemic, many economies and group of countries have grasped the challenges facing multilateralism. They are having recourse to regional trade agreements to enhance growth and development. IORA cannot be the exception. From the status of functional sectors focusing on international trade, IORA should aim at upgrading the Association into a full-fledged regional organization with an ambitious economic agenda.

IORA s future depends on Member States commitment to an integration agenda.

Thus, ensuring that goods, services and people move easily across borders as well as the harmonization of tariffs should be at the top of IORA s agenda.

Now is the time for action and a Trade and Investment Framework Agreement is the kind of breakthrough that will harness positive development in trade relations within the IORA region.

Footnote:

4. Professor V.N. Attri Chair of Indian Ocean Studies at the IORA Secretariat

5. Professor Peter Draper, Executive Director, Institute for International Trade, The University of Adelaide (Australia)- Building Trade Integration Dynamics in the Indian Ocean Rim Association: A Technical Analysis; Report provided to IORA Member States in January 2020.

GENERAL OUTLOOK ON FISHERIES AND AQUACULTURE PRODUCTION IN IORA REGION

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Abstract
With its approximately area of 70 million km2, Indian ocean the third largest ocean in the world play an important role in the worldwide maritime, shipping and fisheries industries. Fisheries is one of the main priority area of cooperation in the Indian Ocean Rim Association's area. The total fisheries production from the IORA region represent about 13% of the world total fisheries production. In general, these was an increasing trend in the total fisheries production during the period of 1950-2019. Aquaculture today represent about 55.7% of the total fisheries production in IORA region. This indicate the importance of aquaculture as a source of fish. In term of total fisheries (capture and aquaculture), India and Indonesia dominated the since 1950. There are about 47 countries that fished in Indian Ocean including the 23 IORA member countries. Capture production from Indian Ocean represent about 13% of the total capture production from the oceans. The Western Indian Ocean region (Area 51) dominated the production during the period 1950-1980 with an average percentage of 62.5%, while Eastern Indian Ocean region (Area 57) dominated the period from 1980 to 2019 with an average percentage of 55%. There are several marine species that dominated the capture production such as red-toothed triggerfish, croaker, drums, Scad, Jack, Indian mackerel, Tunas, bonitos, skipjack tuna and yellowfin tuna, herring, sardine and anchovies. Aquaculture production is dominated by inland production with an average of 2.7 million tons during the period 1950-2019. This production from IORA region represent about 24% of the total world aquaculture production. As aquaculture become an important sector, four of IORA member countries have an aquaculture share more than 50% in the total fisheries production and these include Bangladesh, India, Indonesia and Singapore.

Introduction

Indian ocean is the third largest ocean with a surface area of around 70 million km2 and home to 30% of the world s coral reef and around 14% of global wild catch fisheries (Roxy et al. 2020; FAO, 2020). Indian Ocean region play an important role in the maritime industry as it hosts quarter of the world s top ports and carry 25-30% of the global shipping (LIewellyn et al. 2016). Indian Ocean Rim Association was established on Mars 1997 to enhance the cooperation between the countries Rimed Indian ocean. As of today, IORA has 23 member states and 9 dialogue partners. The total population of IORA member countries is about 2.4

billion people as of 2022 (source: https://data-bank.worldbank.org/).

Indian ocean includes wide range of fish stock which play an important role in the economy and livelihoods of the people living around the coasts of Indian Ocean region (Karim et al. 2020; Techera, 2019). Fish in this region provide a stable animal protein source for billions of people living around the coasts. With the expected increase in the population of Indian ocean to reach 2.6 billion people in 2030 and 3 billion people in 2050 (source: https://databank.worldbank.org), there will be a substantial need for fish as food and this necessitate the. FAO classified Indian Ocean as two distinct areas namely east Indian Ocean (Area 57) and west Indian Ocean (Area 51). The area 51 has a surface area of around 30 million km2 of which about 6.3% is continental shelf (Ye, 2011). Area 51 which extended from west coast of India to South Africa has regions with different ocean-ography and fishery resources features (Figure 1)

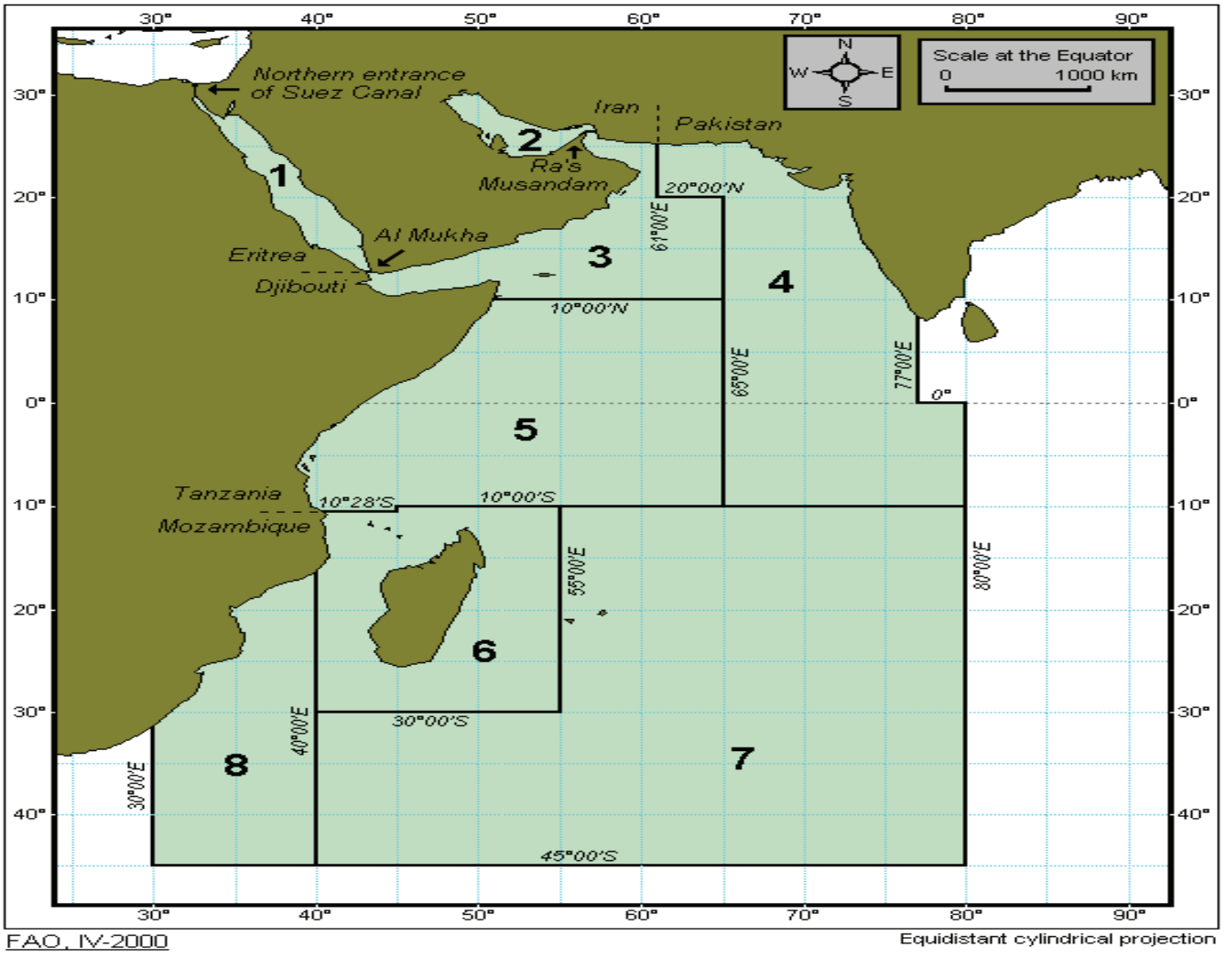

Figure 1: Western Indian Ocean, Area 51 (Source: https://www.fao.org/fishery/en/area/search)

Area 57 include the eastern coast of India to Australia and area (Figure 2). This area is delimited by the landmass in the north and east (Bianchi and Fletcher, 2011)

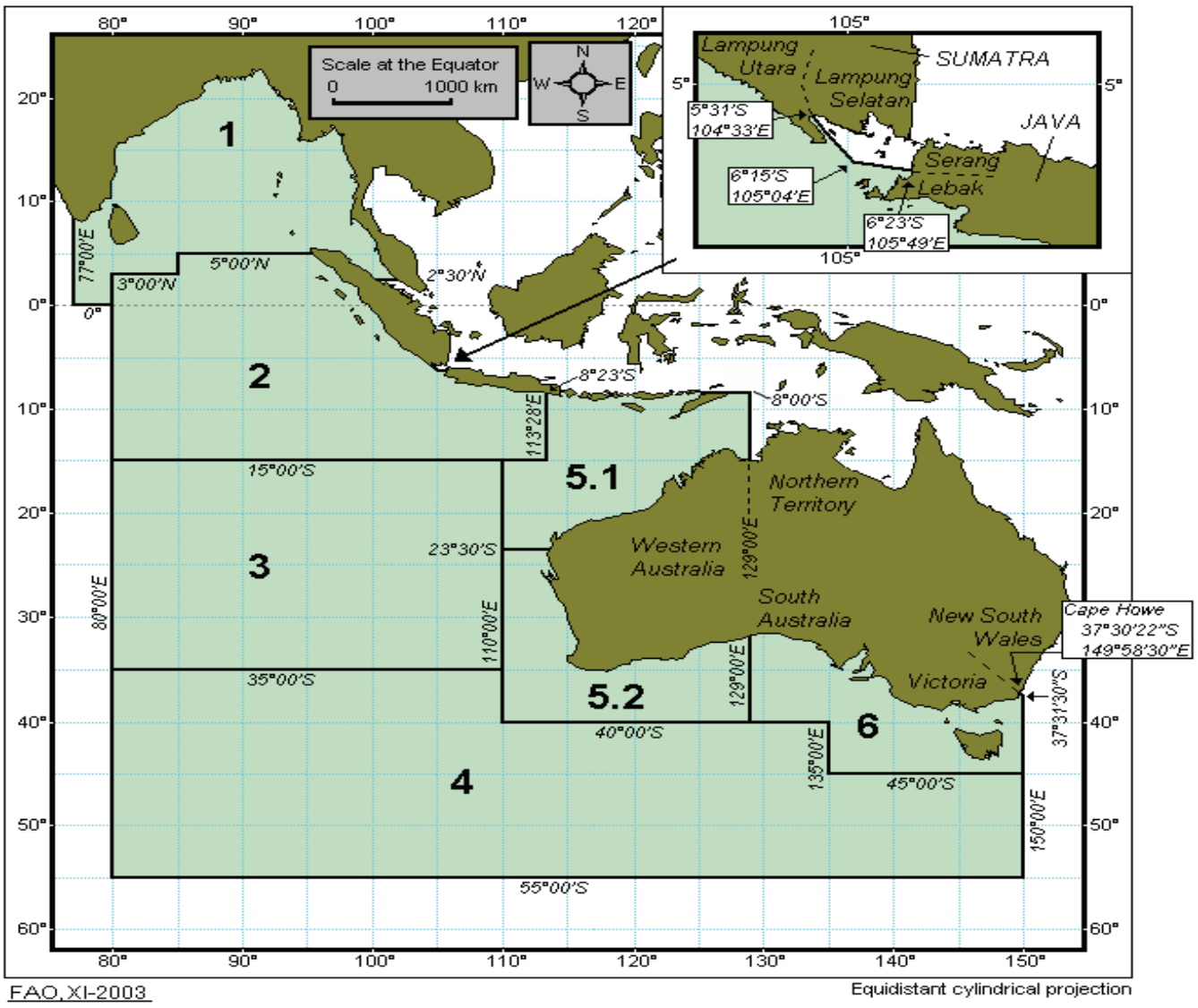

Figure 2: Eastern Indian Ocean, Area 57 (Source: https://www.fao.org/fishery/en/area/search)

This report highlight the situation of the fisheries and aquaculture sector in the Indian Ocean with more concentration in the member countries of Indian Ocean Rim Association.

2. Total fisheries production

The total fisheries production in IORA member countries increased from 2.6 million tons in 1950 to 51 million tons in 2019 (FAO, 2021). In this period 1950-2019, the capture production increased from 2.3 million tons to 22.5 million tons, while aquaculture increased from 0.23 million tons to 28.5 million tons (Figure 3). As inland production (capture and aquaculture), the production increased from 0.64 million tons in 1950 to 18.5 million tons in 2019, while marine production (capture and aquaculture) increased from 2 million tons to 32.5 million tons in the same period (Table 1). Aquaculture sharing in the total fisheries production increased from 9% in

1950 to 55.7 % in 2019. The aquaculture production started to increase dramatically after 1980.

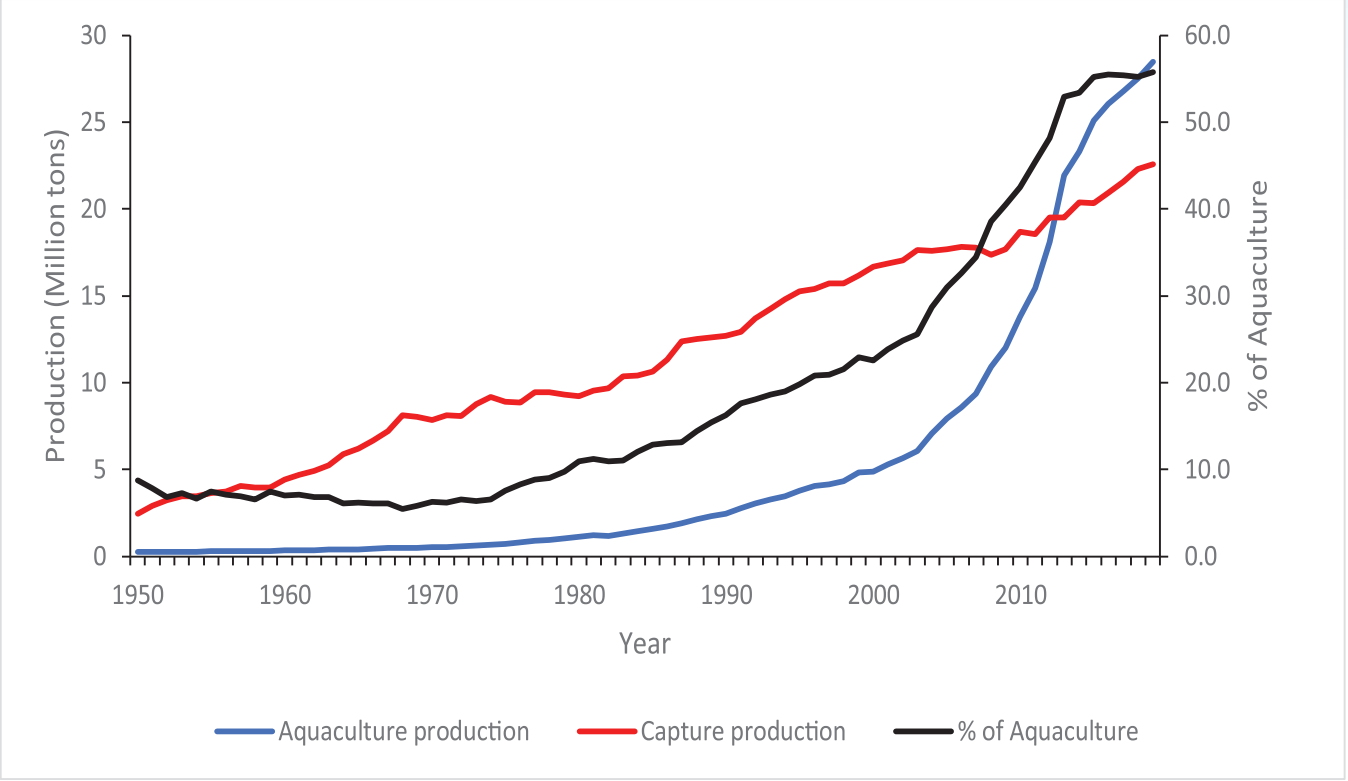

Figure 3: Total fisheries production and percentage of aquaculture in IORA countries during the period 1950-2019.

Note: Total fisheries production includes capture fisheries and aquaculture productions from inland and marine environment.

Table 1: Total fisheries production in IORA member countries by inland and marine environment in 1950 and 2019.

Year	Inland		Marine		Total
	Capture	Aquaculture	Capture	Aquaculture	
1950	567571	81173	1864791	152195	2665730
2019	4491282	14053764	18102166	14406000.4	51053213

Figure 4 showed the total fisheries production for IORA member countries from 1950 to 2019. Indonesia and India dominated the total fisheries production since 1950 with an average production of 5.2 and 4 million tons, respectively (FAO, 2021). Table 2 shows the ranking of production in term of producing countries. Indonesia dominated the production in 2019 with 23.4 million tons which represented about 45.8 % of the total fisheries production in IORA area. India was second after India with a production of 13.2 million tons representing about 26% of the total production. The production from these 10 countries represents about 96% of the total fisheries production in IORA area.

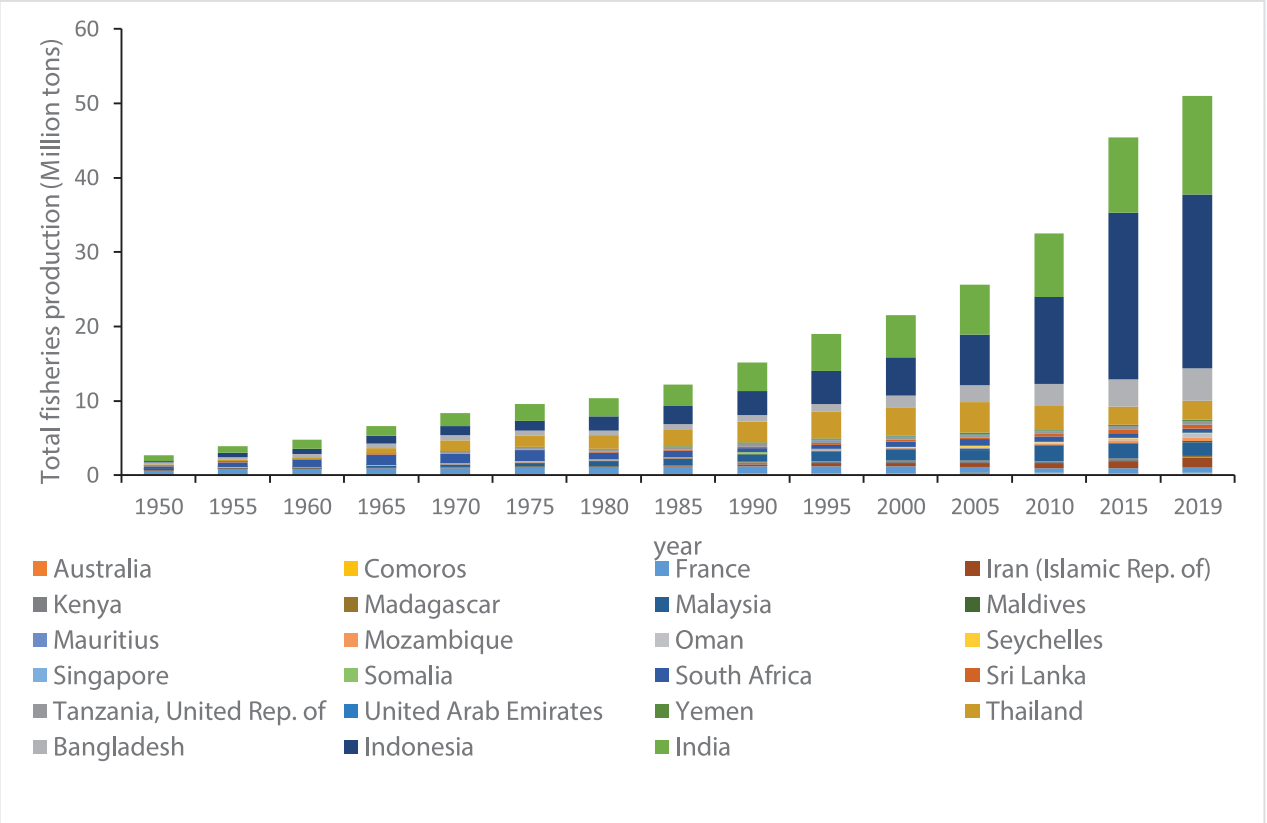

Figure 4: Total fisheries production in IORA member countries during the period from 1950-2019

Table 2: Top 10 producers for total fisheries production in 2019

Country	Total fisheries production (tons)	% of total production
Indonesia	23418105	45.87
India	13277400	26.01
Bangladesh	4384219	8.59
Thailand	2506731	4.91
Malaysia	1877376	3.68
Iran (Islamic Rep. of)	1284843	2.52
France	729041.8	1.43
Oman	580240	1.14
Sri Lanka	540192.7	1.06
Tanzania	488837.3	0.96

Figure 5 shows the percentage of total capture production by oceans. The capture production from Indian ocean represent about 13% of the total capture production from the oceans with a total of 12.3 million tons. It is ranked the third after Pacific Ocean (51%) and Atlantic Ocean (23%).

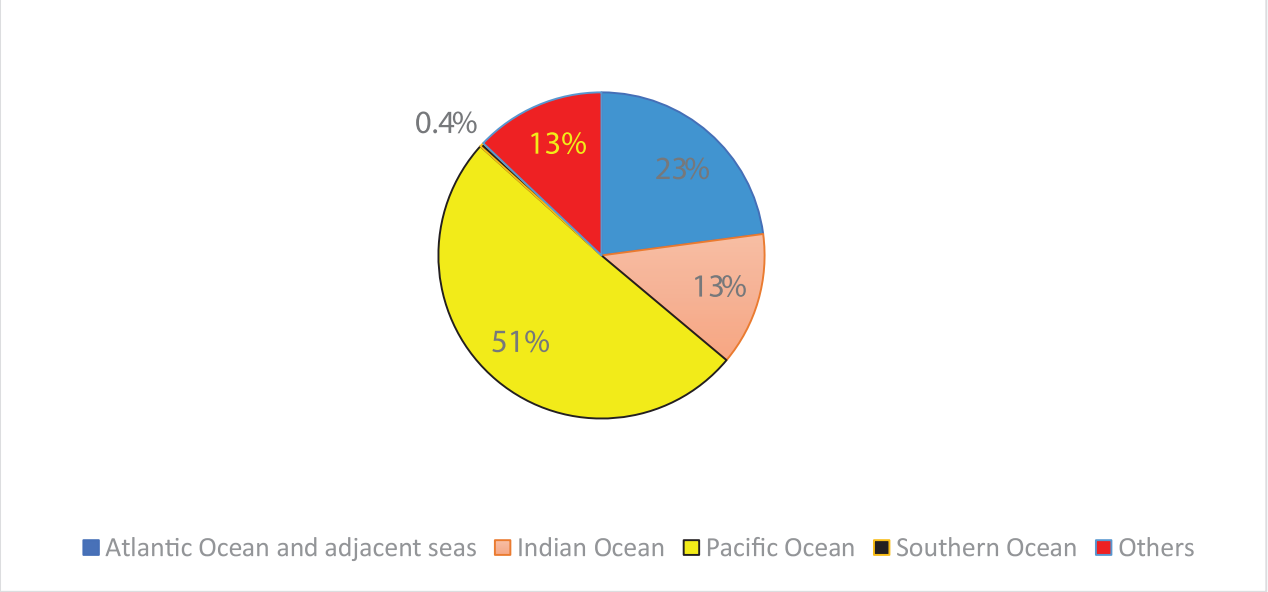

Figure 5: Total capture production by oceans.

The average fish consumption in IORA countries in 2019 was 26.7 (FAO stat). The highest fish per capita consumption in 2019 was in Maldives with a value of 90.5 kg/capita/year, followed by Malaysia and Seychelles with 56.9 kg/capita/year and 56.3 kg/capita/year, respectively (Table 3).

Table 3: Fish consumption (kg/capita/year) in IORA member countries in 2019

Country	Fish consumption (kg/capita/year)
Australia	26.12
Bangladesh	25.47
Comoros	14.62
France	34.24
India	6.76
Indonesia	43.7
Iran	11.45
Kenya	2.94
Madagascar	5.42
Malaysia	56.31
Maldives	84.58
Mauritius	24.02

Mozambique	11.75
Oman	55.7
Seychelles	56.96
South Africa	6.27
Sri Lanka	30.06
Thailand	29.35
Tanzania	6.63
Yemen	3.03

3. Fisheries sector According to latest FAO statistical fisheries data, the total marine capture production in the IORA countries increased from 0.8 million tons in 1950 to 10.4 million tons in 2019 (Table 4 and Figure 5). The inland capture fisheries in IORA member countries was 4.5 million tons in 2019. In Area 51, the marine production increased form 0.5 million tons in 1950 to 4.6 million ton in 2019, while in Area 57, the production increased from 0.28 million tons to 5.7 million tons in the same period (FAO, 2021). The Area 51 dominated the production during the period 1950-1980 with an average percentage of 62.5%, while Area 57 dominated the period from 1980 to 2019 with an average percentage of 55%. (Figure 7).

Table 4: Total capture production in IORA countries by Area 51 and Area 57 in the period 1950- 2019.

Year	Production (tons)				
	Eastern Indian Ocean (Area 57)	% of total	Western Indian Ocean (Area 51)	% of total	Total
1950	285610	35.5	518455	64.5	804065
1955	337359.3	35.0	626234.7	65.0	963594
1960	423063	32.2	890432	67.8	1313495
1965	554962	38.6	883231	61.4	1438193
1970	783299	41.0	1125921	59.0	1909220
1975	1195668	42.5	1620742	57.5	2816410
1980	1706152	52.4	1548082	47.6	3254234
1985	2123996	52.6	1912093	47.4	4036089
1990	2723206	51.6	2550503	48.4	5273709
1995	3630850	55.0	2968669	45.0	6599519

2000	4131097	58.2	2970263	41.8	7101360
2005	4211128	54.6	3501453	45.4	7712581
2010	4738441	57.3	3530691	42.7	8269132
2015	5244975	57.3	3902365	42.7	9147340
2019	5782646	55.5	4637391	44.5	10420038

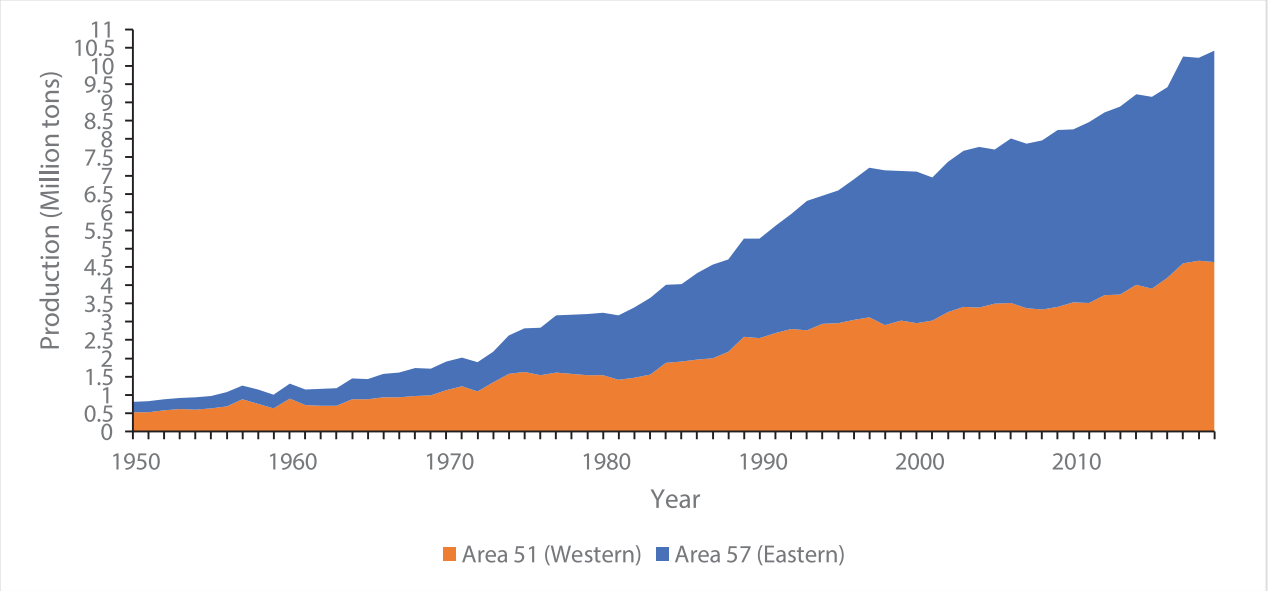

Figure 6: Total capture production in IORA countries by Area 51 and Area 57 in the period 1950-2019.

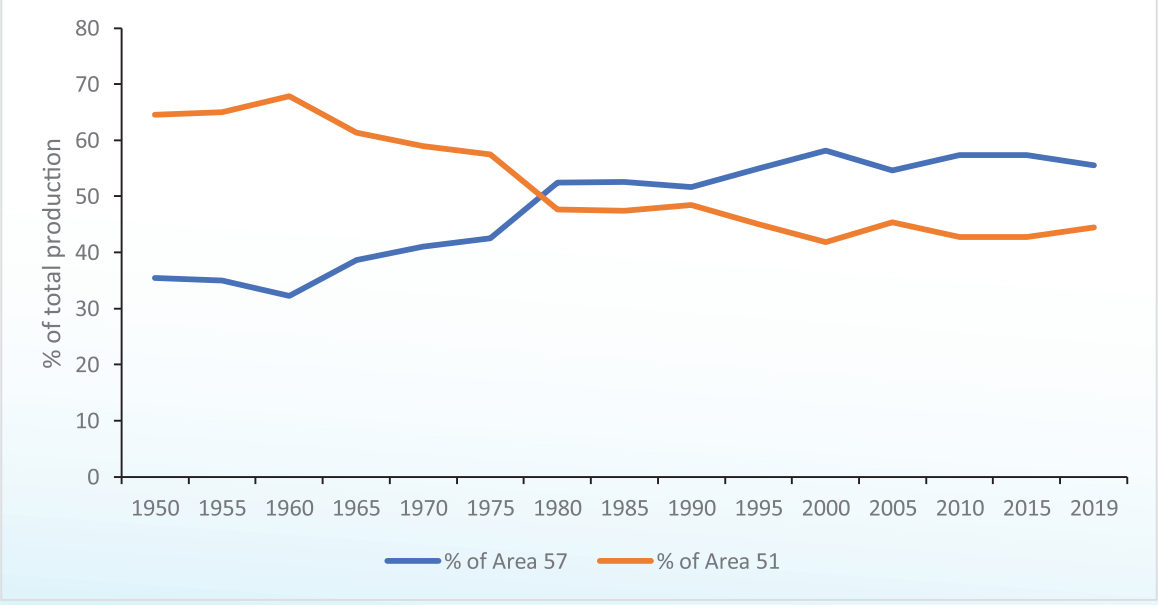

Figure 7: Percentage of sharing in the total capture production in IORA countries by Area 51 and Area 57 in the period 1950-2019

Figure 8 showed the total capture fisheries for IORA member countries from 1950 to 2019. India dominated the capture production since 1950 (FAO, 2021). Table 5 shows the ranking of production in term of producing countries. India dominated the production in 2019 with 3.7 million tons which represented about 36% of the total capture production in IORA area. Indonesia was second after India with a production of 2 million tons representing about 19% of the total production. The production from these 10 countries represents about 92% of the total capture production in IORA area.

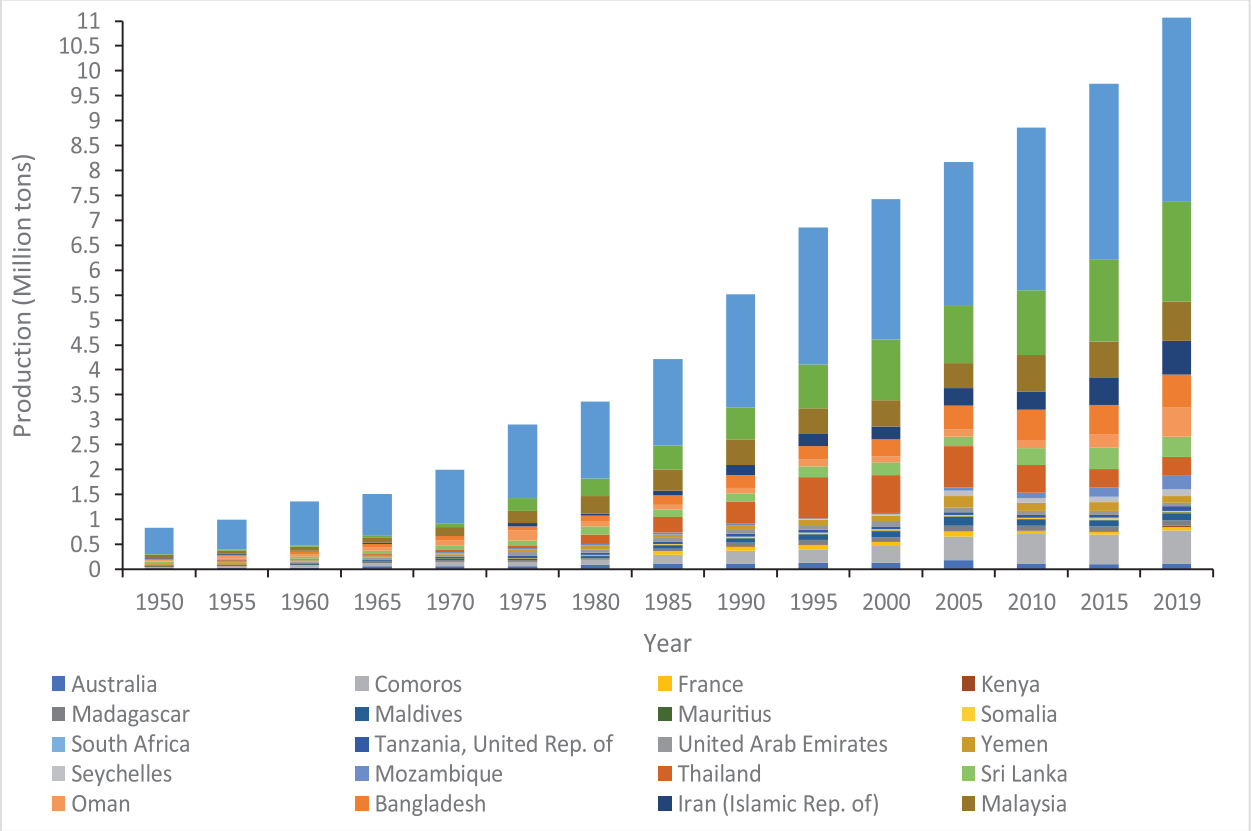

Figure 8: Total marine capture production by IORA member countries in 2019.

Table 5: Top 10 producers for marine capture fisheries in 2019

Country	Total capture production (tons)	% of total production
India	3690100	35.4
Indonesia	2005303	19.2
Malaysia	786538.2	7.5
Iran	678348	6.5
Bangladesh	659911	6.3
Oman	579186	5.6
Sri Lanka	415765.2	4.0
Thailand	370609	3.6
Mozambique	274791	2.6
Seychelles	135432	1.3

Table 6 shows the top 10 species in term of production. The marine fishes nei (fish that not still identified to specie level) dominate the production in 2019 with a production of 1.4 million tons (14.2 %), followed by Indian oil sardine (5.1%) and skpjack tuna (4.4%). The production from these 10 species represent about 44 % of the total capture production in 2019.

Table 6: Top 10 species for capture fisheries in 2019

Species	Total capture production (tons)
Marine fishes nei	1474601
Indian oil sardine	536429
Skipjack tuna	457163.5
Clupeoids nei	411294
Yellowfin tuna	365996.4
Hilsa shad	306569
Red-toothed triggerfish	273705
Natantian decapods nei	266784.1
Scads nei	266615.1
Hairtails, scabbardfishes nei	264624

In term of production by species groups, the species were aggregated according to FAO International Standard Statistical Classification of Aquatic Animal and Plants (ISSCAAP). In 2019, the Miscellaneous coastal fishes group dominated the production with 1.9 million tons which represent about 18% (Table 7 and Figure 9), followed by miscellaneous pelagic fish with 1.7 million ton (16%) and Tunas, bonitos and billfishes with 1.5 million tons (14%). These 10 species groups represent about 94% of the total capture production in 2019. The fastest growth rate in the catch was in the period from 1975 to 1995. The miscellaneous coastal fish group was dominated by red-toothed triggerfish and croaker and drums, while miscellaneous pelagic fish was dominated by Scad, Jack and Indian mackerel. The third group tunas, bonitos and billfishes was dominated by skipjack tuna and yellowfin tuna.

Table 7: Top 10 species groups for capture fisheries in 2019

Species	Total capture production (tons)
Miscellaneous coastal fishes	1862975
Miscellaneous pelagic fishes	1675816
Tunas, bonitos, billfishes	1508170
Marine fishes not identified	1474601
Herrings, sardines, anchovies	1384070
Shrimps, prawns	571392.3
Squids, cuttlefishes, octopuses	457512.2
Miscellaneous demersal fishes	409856
Shads	332329.1
Sharks, rays, chimaeras	143165.9

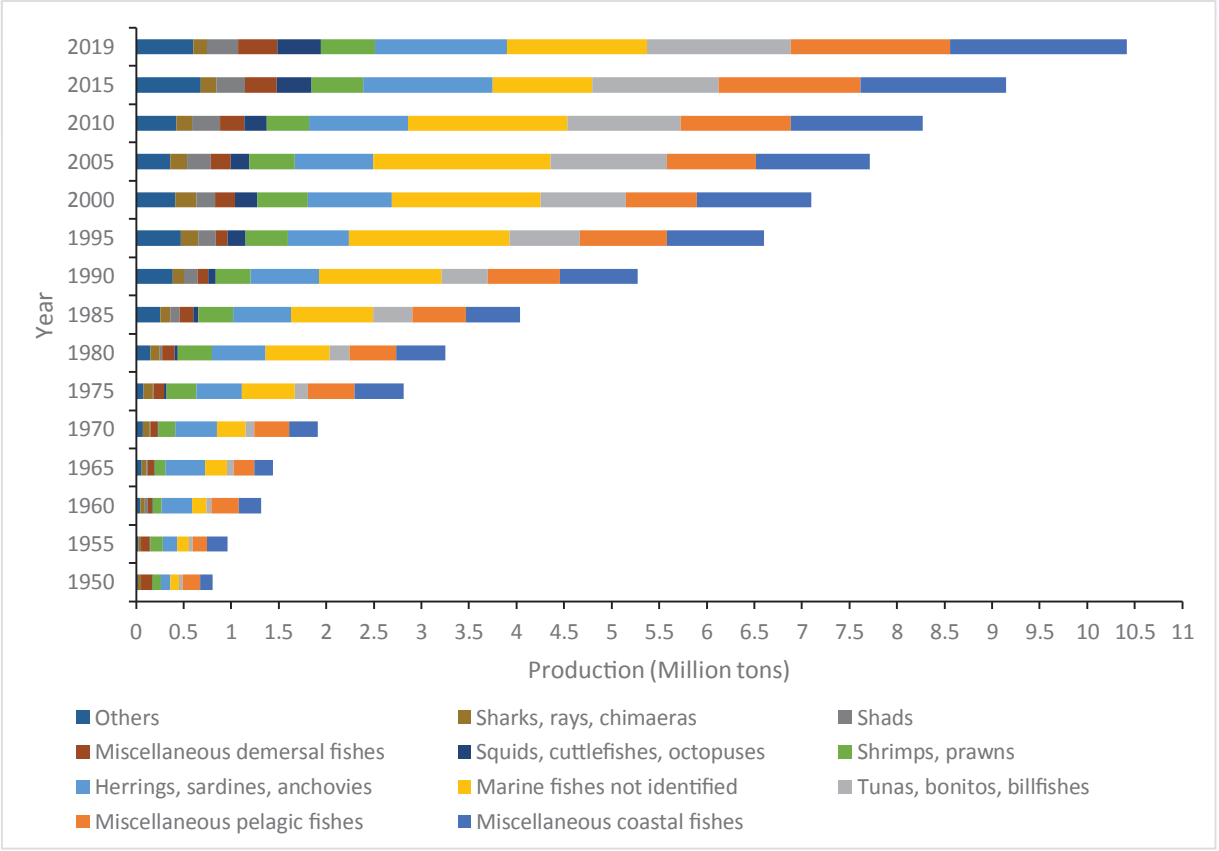

Figure 9: Total capture production (million ton) by ISSCAAP species group in 2019.

The miscellaneous coastal fishes group is dominated by by croaker and drums with an average production of 172651 tons during the period 1950-2019 (Figure 10). The production of croaker and drums started to increase from mid of 1970s with a sharp increase started from mid of 1980s reaching maximum in 1997 with a production of 375848 tons and then started to decrease till 2019. The second largest species in this group is Bombay-duck with an average production of 134430 tons during the period from 1950-2019. The production of this species in fluctuated during this period with general increase in the periods of mid-1950s, mid-970s, late 1990s and late 2000s.

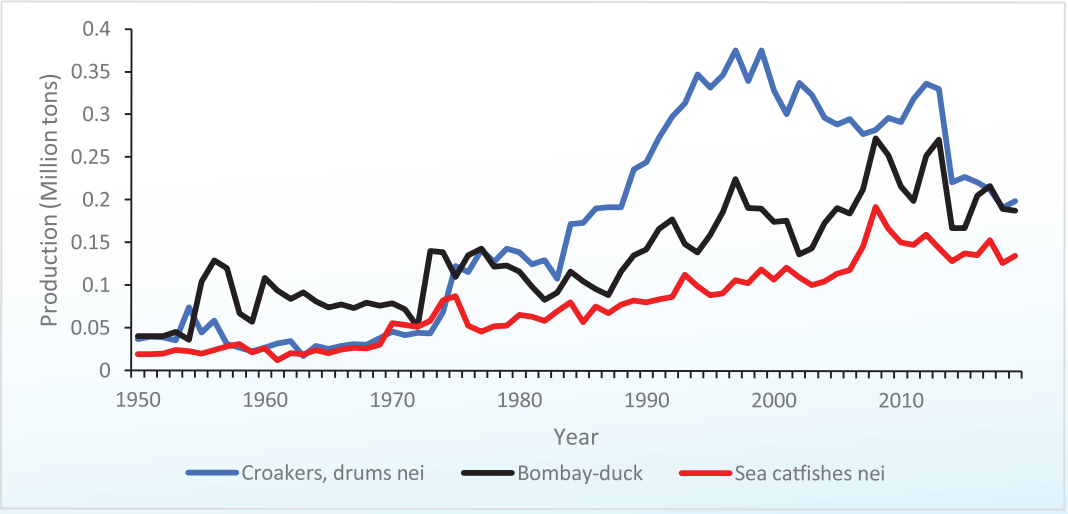

Figure 10: Total capture production of selected species in Group 33 (miscellaneous coastal fishes) of ISSCAAP during the period 1950 2019

The miscellaneous pelagic fishes group is dominated by Indian mackerel (Rastrelliger kanagurta) with an average production of 124381 tons during the period 1950-2019 (Figure 11). The production of this species fluctuated during this period with three notable increase; in 1971 with 213800 tons, in 1996 with 329188 tons and in 2017 with 342570 tons which was the maximum production during the period from 1950 -2019.

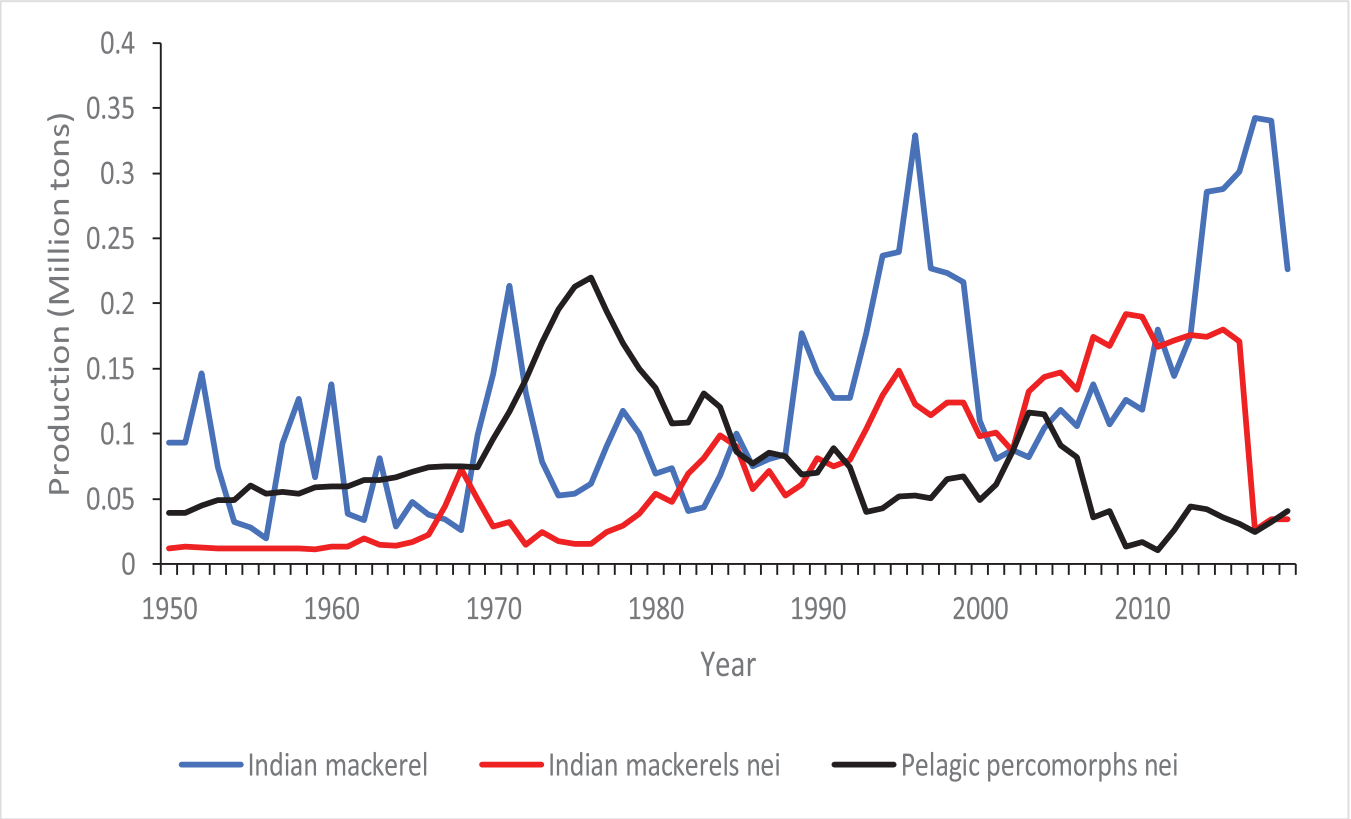

Figure 11: Total capture production of selected species in Group 37 of ISSCAAP (miscellaneous pelagic fishes) during the period 1950 2019.

The Tunas, bonitos, billfishes group is dominated by skipjack tuna (Katsuwonus pelamis)) with an average production of 159082 tons during the period 1950-2019 (Figure 12). The second largest species in this group is Yellowfin tuna with an average production of 111971 tons, followed by Narrow-barred spanish mackerel with an average production of 55106 tons during the period 1950-2019. In general, the production of these species increased sharply after early 1980s and reach maximum for skipjack tuna in 2006 with a production of 479524 tons and maximum for yellowfin tuna in 2003 with a production of 332307 tons. The maximum production for narrow-barred Spanish mackerel was 144950 tons in 2016.

There were about 45 countries fished for tunas, bonito, billfishes group in 2019 in the Indian Ocean including the IORA member countries. The total production was 1.8 million tons in 2019. Spain and Taiwan were the only non IORA member countries in the list of top 10 producers for the group 36 (Tuna, bonito, billfish). Indonesia ranked as biggest producer with a production of 388343 tons, which represent about 20% of the total production, followed by Iran with a production of 248429 tons (13.3%) and Spain with a production of 182588 tons (9.7%)

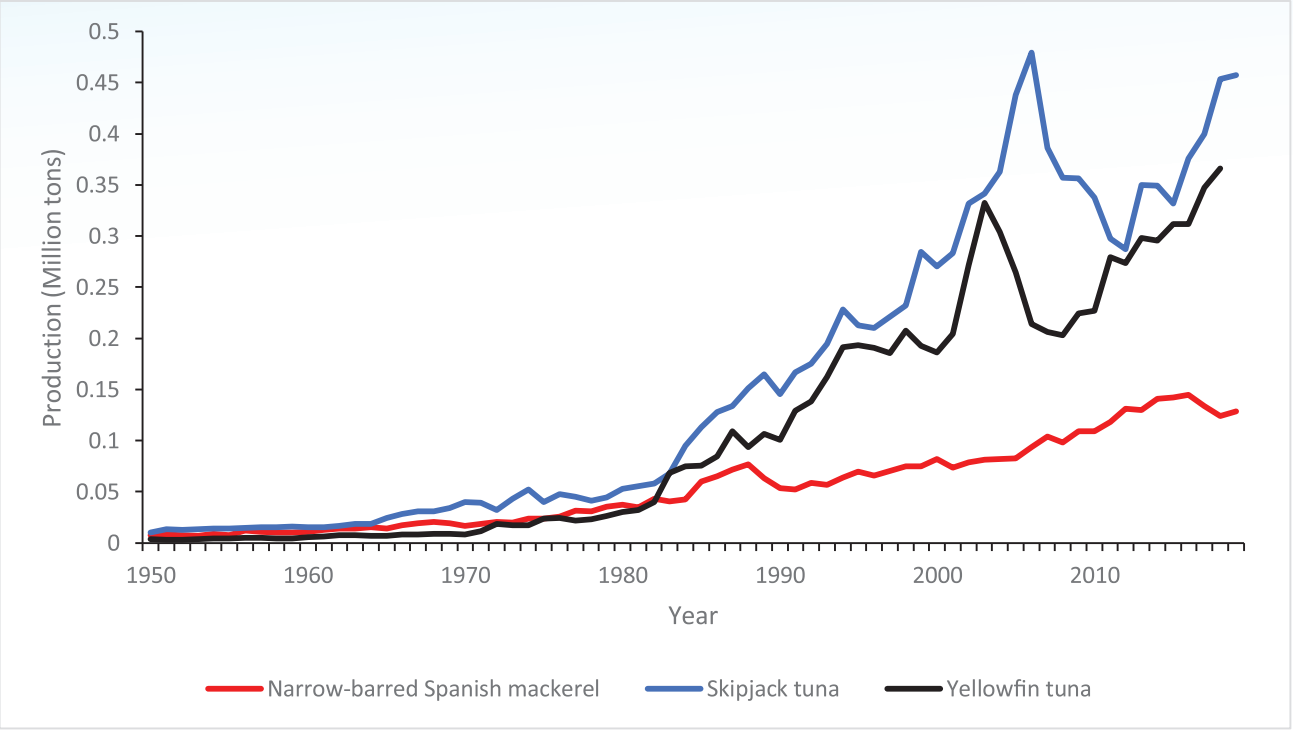

Figure 12: Total capture production of selected species in Group 36 of ISSCAAP (Tunas, bonitos, billfishes) fishes) during the period 1950 2019.

In 2019, about 47 countries fished in the Indian ocean areas including the 23 IORA member countries with a total capture production of 12.4 million tons (FAO, 2021). The total production from Area 57 was 6.9 million tons and from Area 51 was 5.5 million tons. The 24 non IORA member countries contributed about 2 million tons in the capture production. Among the non IORA member countries, Myanmar and Pakistan were the first and second in term of production with a production of 1.1 million tons and 0.34 million tons respectively.

According to FAO (2020), around 68.6 % of the assessed fish stocks in the Eastern Indian Ocean were fished within biologically sustainable levels. There are many fish stocks in Eastern Indian Ocean were likely to be overfished such as toil shad, croaker and drums, hairtails, catfish, sardinellas and Indian oil sardine, while anchovies, hilsa shad, Indian mackerel, scads, banana prawn, giant tiger prawn, giant tiger prawn, squid and cuttlefish are being fished sustainably.

For Western Indian Ocean, around 66.7% of the assessed stocks were fished within biologically sustainable levels, while 33.3 % were at biologically unsustainable levels.

4. Aquaculture

The total aquaculture production in IORA member countries increased from 0.23 million tons in 1950 to 28.5 million tons in 2019. The inland production dominated aquaculture production in IORA countries with an average of 2.7 million tons during the period 1950-2019, followed by marine and brackish water with an average production of 1.7 million tons and 0.84 million tons respectively. In 2019, the production of aquatic plant in 2019 was 10.1 million tons. The production from inland waters sharply increased after 1980s reaching 14 million tons in 2019 (Figure 13). In 2019, the aquaculture production in IORA countries represent about 24% of the total world aquaculture production (Figure 14). The total value of aquaculture production in 2019 was 43.9 billion US$

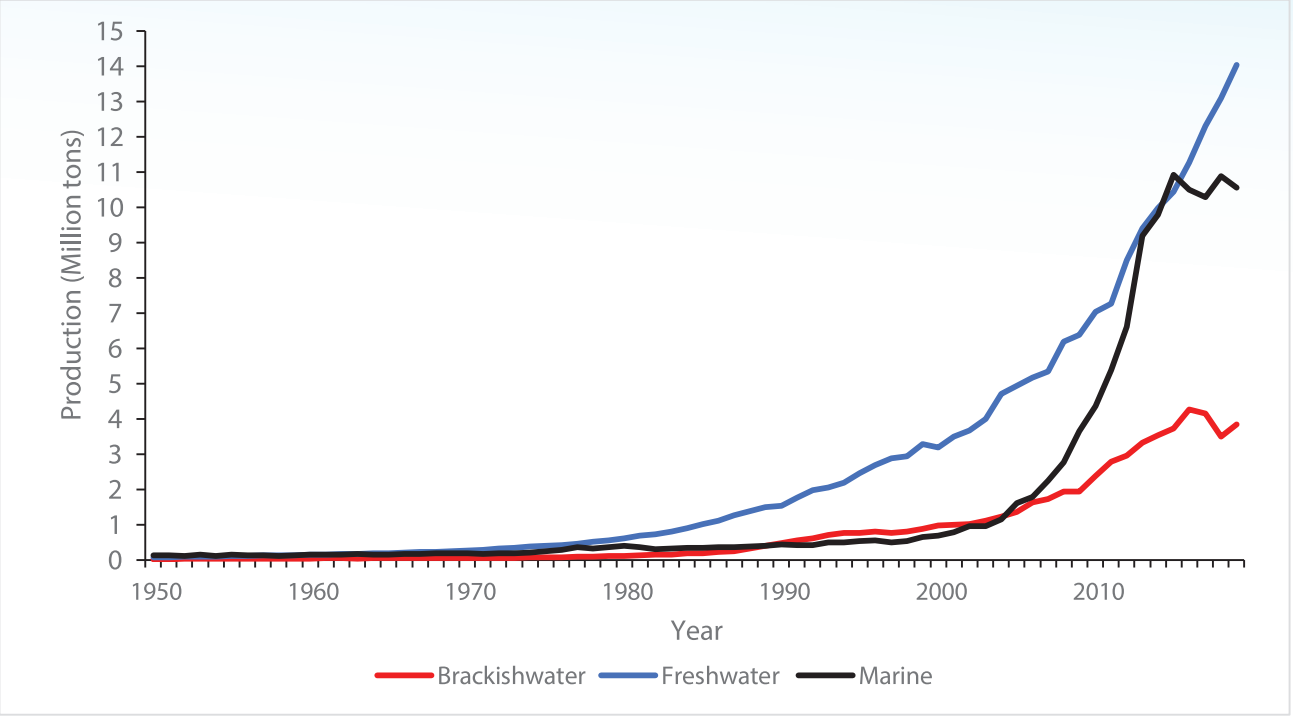

Figure 13: Total aquaculture production by environment in IORA region during the period 1950-2019.

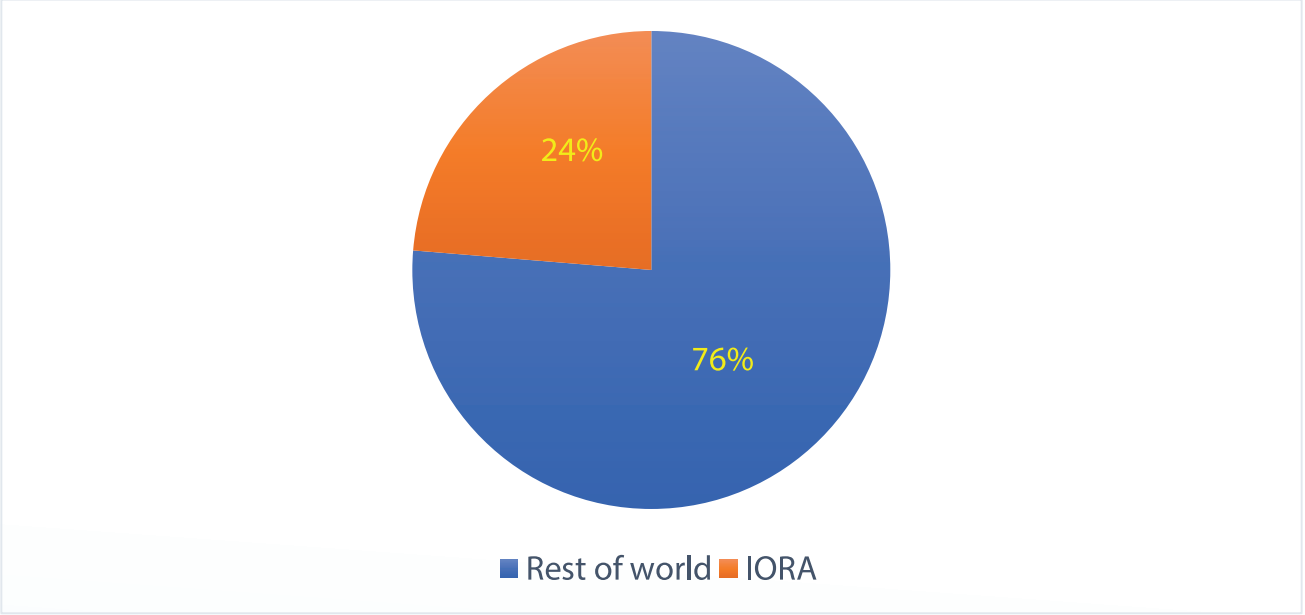

Figure 14. Aquaculture production in IORA countries compared to the world aquaculture production in 2019.

Figure 15 showed the total aquaculture production for IORA member countries from 1950 to 2019. Indonesia and India dominated the aquaculture production in IORA region since 1950 (FAO, 2021). Table 8 shows the ranking of production in term of producing countries in 2019. Indonesia dominated the production in 2019 with 15.9 million tons which represented about 55.8% of the total aquaculture production in IORA area. India was second after Indonesia with a production of 7.8 million tons representing about 27.4% of the total production. The production from these 10 countries represents about 99% of the total aquaculture production in IORA area in 2019. There are nine IORA countries that have a share of aquaculture in their total fishery production more than 20%. Four of these nine countries have a share more than 50%, they include Bangladesh, India, Indonesia and Singapore (Table 9).

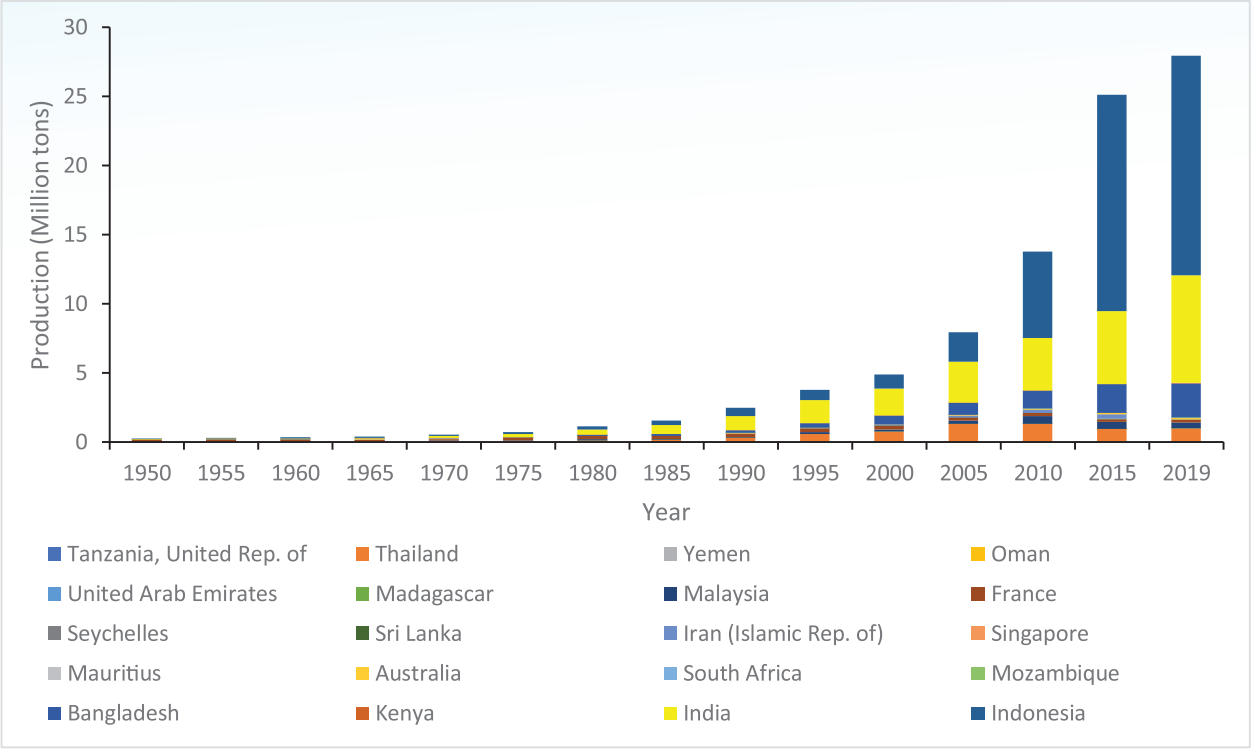

Figure 15: Total aquaculture production by IORA member countries in 2019.

Table 8: Top 1.0 producers for aquaculture in 2019.

Country	Aquaculture production (tons)	% of total aquaculture production
Indonesia	15893400	55.8
India	7800300	27.4
Bangladesh	2488600	8.7
Thailand	964266	3.4
Iran	505000	1.8
Malaysia	412281	1.4
France	196151.4	0.7
Australia	89453.28	0.3
Sri Lanka	34087.49	0.1
Kenya	18950	0.1

Table 9: Share of aquaculture in the total fisheries production of the country in 2019

Country	% ofaquaculture
Australia	33.9
Bangladesh	56.8
Comoros	0.0
France	26.9
India	58.7
Indonesia	67.9
Iran	39.3
Kenya	13.1
Madagascar	10.9
Malaysia	22.0
Maldives	0.0
Mauritius	8.7
Mozambique	0.6
Oman	0.2
Seychelles	0.0
Singapore	80.4
Somalia	0.0
South Africa	2.0
Sri Lanka	6.3
Tanzania	3.7
Thailand	38.5
United Arab Emirates	4.2
Yemen	0

Table 10 shows the top 10 species in term of aquaculture production. The Eucheuma seaweed dominated the production in 2019 with a production of 1.8 million tons (34.5 %), followed by Catla (11.4 %) and Whitleg shrimp (6.6 %). The production from these 10 species represent about 81.7 % of the total aquaculture production in 2019. The total number of culture species in IORA countries is around 228 species (FAO, 2021).

Table 10: Top 10 species groups for aquaculture production in 2019

Species	Total capture production (tons)
Eucheuma seaweed (Eucheuma spp)	1862975
Catla (Catla catla)	1675816
Whiteleg shrimp (Penaeus vannamei)	1508170
Roho labeo (Labeo rohita)	1474601
Nile Tilapia (Oreochromis niloticus)	1384070
Torpedo shaped Catfish (Clarias spp)	571392.3
Freshwater fishes nei (Osteichthyes)_	457512.2
Milk fish (Chanos chanos)	409856
Striped catfish (Pangasianodon hypophthalmus)	332329.1
Silver carp (Hypophthalmichthys molitrix)	143165.9

In term of production by species division, the species were aggregated according to FAO International Standard Statistical Classification of Aquatic Animal and Plants (ISSCAAP). In 2019, the freshwater fishes dominated the production with 1.9 million tons which represent about 48% (Table 11 and Figure 16), followed by aquatic plants with 10 million ton (36%) and crustaceans with 2.4 million tons (9%). The freshwater division dominated by Catla, Roho labeo and Nile tilapia, while the aquatic plants was dominated by Eucheuma seaweed, Elkhorn sea moss and Gracilaria seaweed. The third group crustaceans dominated by whiteleg shrimp, Giant tiger shrimp and Giant river prawn.

Table 11: Aquaculture production by species groups in 2019

Species	Total capture production (tons)
Freshwater fishes	13675643
Aquatic plants	10125308
Crustaceans	2439515
Diadromous fishes	1461706
Molluscs	369719
Marine fishes	358503
Miscellaneous aquatic animal products	25000
Miscellaneous aquatic animals	4372

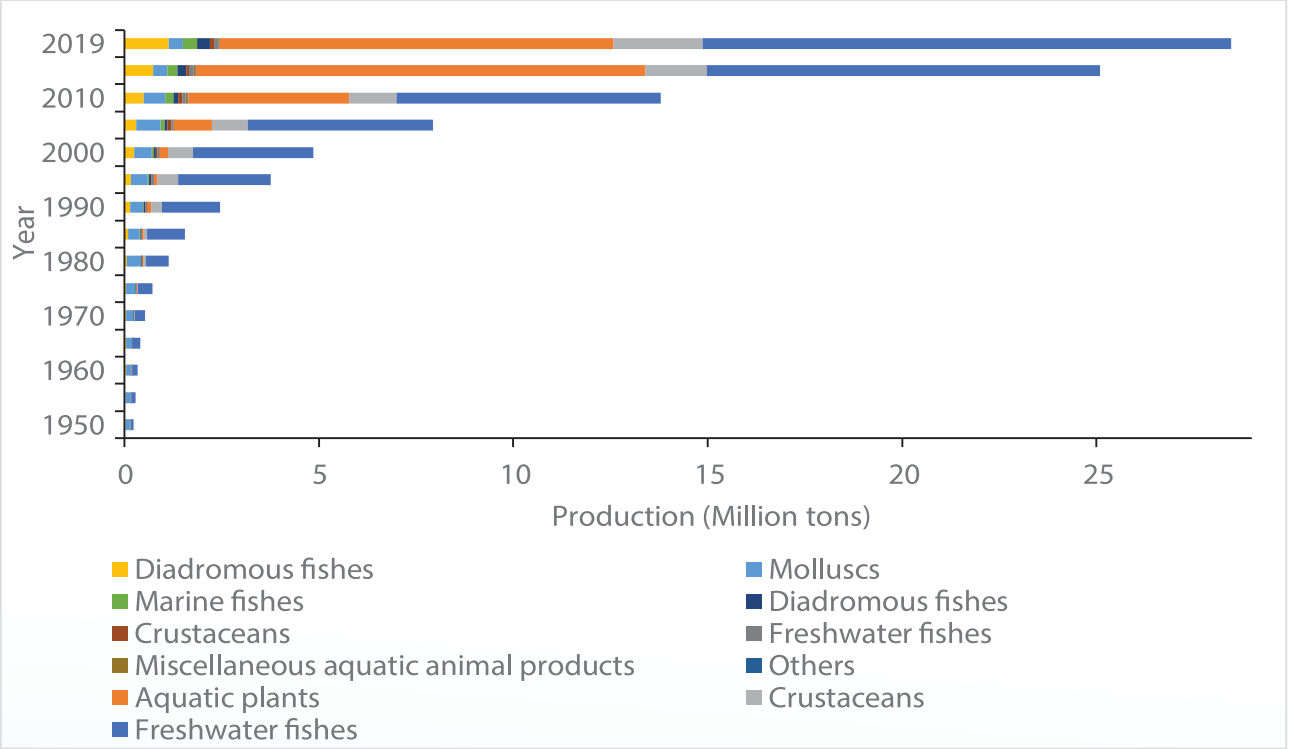

Figure 16: Aquaculture production by species groups during the period 1950-2019.

5. Conclusions

Fisheries sector is an important sector in the economy of the IORA member countries and millions of people in these countries depend on it as source of food and income. This article shows the status and trends in capture and aquaculture productions. We can conclude the following from this article:

- General trend of increase in both capture fisheries and aquaculture in the period of 1950-2019.
- The aquaculture production started to increase dramatically after 1980 with more sharp rate of increase after 2000.

- Aquaculture production become more than capture production from year 2013 till date with a percentage of 53.4 % in 2013 and 55.7 % in 2019. This reflects the importance of aquaculture as an important source of fish for food in the IORA region
- India and Indonesia dominated the total fisheries production (capture and aquaculture) since 1950.
- The Western Indian Ocean region (Area 51) dominated the production during the period 1950-1980 with an average percentage of 62.5%, while Eastern Indian Ocean region (Area 57) dominated the period from 1980 to 2019 with an average percentage of 55%.
- There are certain group of marine fishes that is usually dominated the marine capture production in Indian ocean and these include miscellaneous coastal fish group (dominated by red-toothed triggerfish and croaker and drums), miscellaneous pelagic fish group (dominated by Scad, Jack and Indian mackerel), Tunas, bonitos and billfishes group (dominated by skipjack tuna and yellowfin tuna) and small pelagic fish group (Herring, sardine and anchovies).
- In addition to the 23 IORA member countries, there are 24 non IORA member countries that also fished in the Indian Ocean in 2019.
- Around 68.6 % of the assessed fish stocks in the Eastern Indian Ocean and 66.7% in the Western Indian Ocean were fished within biologically sustainable levels.
- The inland production dominated the aquaculture production in IORA countries with an average of 2.7 million tons during the period 1950-2019.
- In 2019, the aquaculture production in IORA countries represent about 24% of the total world aquaculture production.
- Four of IORA member countries have an aquaculture share more than 50% in the total fisheries production and these include Bangladesh, India, Indonesia and Singapore.
- Freshwater fishes dominated the production with 1.9 million tons which represent about 48% (Table 8 and Figure 15), followed by aquatic plants with 10 million ton (36%) and crustaceans with 2.4 million tons (9%). The freshwater division dominated by Catla, Roho labeo and Nile tilapia, while the aquatic plants was dominated by Eucheuma seaweed, Elkhorn sea moss and Gracilaria seaweed. The third group crustaceans dominated by whiteleg shrimp, Giant tiger shrimp and Giant river prawn.

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THE INDIAN OCEAN NEEDS A REGIONAL MECHANISM FOCUSED ON ENVIRONMENTAL SECURITY

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In coming years, the Indian Ocean will face many environmental security threats driven by climate change and other human activities. For many Indian Ocean states these threats could be more important than traditional state based threats or maritime crime. Moreover, environmental security threats can t be properly understood or addressed in isolation from each other, but can combine and cascade into geo-environmental challenges that can affect the entire region.

These challenges are often beyond the ability of individual states to respond and frequently require a collective response. IORA has made some good progress in recent years in its eight priorities and focus areas. Some of these are highly relevant to environmental threats, such as Maritime Safety and Security, Fisheries Management, Disaster Risk Management, Academic, Science and Technology Cooperation and Blue Economy. But in broad terms there is scope to make IORA s work in environmental security more coherent and effective than is currently the case. This article argues that IORA, and the Indian Ocean region generally, needs to give greater focus to developing mechanisms to facilitate a collective response to environmental security threats.

Growing environmental threats

Significant disruptions in the natural environment are likely to give rise to a range of security threats in the Indian Ocean region (IOR) in coming years.

The IOR has long been an epicentre for a range of natural occurring hazards, including cyclones and droughts and tsunamis. But it is also one of the regions with the least capacity to respond.

The natural environment in the IOR is now being strongly affected by climate change. Among other things, this could bring sea level rise and increasing the severity of cyclones and other severe weather events as well as the salinisation of ground water and agricultural land. Other threats to the natural environment may arise more directly from human activities such as unsustainable fishing and shipping accidents.

Indeed, shipping accidents, particularly those involving oil and chemical spills, may represent one of the biggest immediate threats to the maritime environment of several island states. It also provides an excellent example of why the region could benefit from mechanisms that facilitate a collective regional response.

There are up to around 100,000 international shipping movements per annum across the northern Indian Ocean. There are many more across the

Footnote:

1. This paper expands on comments made in Geo-environmental Security Challenges in the Indian Ocean Region: Setting a Regional Agenda, Emirates Diplomatic Academy, 2019. https://www.agda.ac.ae/docs/default-source/Publications/e-da-insight_indian-ocean_en.pdf?sfvrsn=4

western and central Indian Ocean from the Cape route, and in the eastern Indian Ocean, to and from Australia. It is estimated that roughly around one third of these ships are VLCCs or other tankers carrying crude or other petroleum products. This includes tankers carrying around 16 million barrels of crude and petroleum products per day between Hormuz and Malacca.[2] The volume of shipping traffic, particularly of tankers, makes the risk of a serious shipping incident is very high.

At the end of July 2020, the Japanese-owned bulk carrier MV Wakashio became stranded on a coral reef off the Mauritius coast. By 10 August, around 1,000 tonnes of fuel had spilled from the ship, threatening the Blue Bay Marine Park, one of the marine treasures of Mauritius and a sensitive ecology site. The spill was an environmental catastrophe for Mauritius with dire consequences for the economy, food security, public health, and the environment.[3] Although several countries (including France, India, Australia and Japan) provided assistance to Mauritius, a regional response appears to have been largely absent during the incident, leading to duplication of resources and a much less effective response than could have been the case. The Wakashio disaster demonstrated that weak regional and international security mechanisms prolonged the site oil spill management and mitigation, despite millions being spent on capacity building.

In October 2020 following closely the Mauritius spill, an explosion and fire occurred on board the 270,000 tonne supertanker MT New Diamond off Sri Lanka. A joint team from Sri Lanka and India put out the fire and secured the cargo of 270,000 tonnes of crude oil, averting a potentially catastrophic disaster. Local authorities commented: If the ship capsized, that would have been one of the worst marine environment disasters[4] to occur, considering the amount of oil it was carrying... We consider this an eye-opener for Sri Lanka and identify our need to strengthen its capacities to address major oil spills. [5]

Footnote:

2. *US Energy Information Administration, 2020.*

3. *https://www.orfonline.org/expert-speak/mauritius-oil-spill-reveals-weakness-of-maritime-security-architecture-in-the-western-indian-ocean/?amp*

4. *https://www.lowyinstitute.org/the-interpreter/tackling-environmental-security-threats-indian-ocean*

5. *https://news.mongabay.com/2020/10/oil-tanker-fire-in- sri-lankas - rich-waters-highlights-need-for-preparedness/*

Only months later, in May 2021, the MV Express Pearl, a container ship, caught fire and subsequently sank off Colombo. The sinking released chemicals and plastics from several containers, which covered Sri Lanka s tourist beaches, causing much of the damage that had been averted from the MT New Diamond episode.

The heavy reliance of Indian Ocean coastal states, particularly island states, on maritime-based tourism and fishing means that a major oil spill could have a devastating economic impact. All these disasters and near disasters noted above were beyond the ability of the most immediately affected state to respond. They required considerable assistance from neighbouring states and other partners indeed large-scale disasters such as these require a collective response from the region.

The interaction of geo-environmental and geo-strategic challenges

In addition, the potential significance of environmental security threats to the region is far more than the need to deal with isolated events or disasters. Many environmental security threats can t be properly understood in isolation from each other, or in isolation from conventional security threats. In practice future environmental disruptions in the IOR have the potential to go far beyond what is normally understood as discrete environmental challenges.

For example, it would be a mistake to plan for or respond to environmental disruptions individually (e.g. a decline in fish stocks, or the salinification of groundwater). They do not necessarily occur as isolated events, but can often occur in combination or as a cascading or compounding series of events. One environmental disruption can contribute to or exacerbate the occurrence of another. One event might significantly reduce a community s resilience or its ability to respond to subsequent, unrelated, events. This potential for magnification or cascading influences can make it difficult to predict the consequences of what may individually appear to be moderate or manageable threats.

Climate change, in particular, can lead to the

cascading/compounding of natural hazards.[6] What may begin as what appears to be an isolated natural hazard can also combine with industrial accidents to significantly magnify their normal individual impacts. For example, cyclones or storm surges could trigger accidents in petrochemical plants or nuclear power plants that are often located in coastal areas. We saw such a combination of events in the Japanese earthquake and tsunami of 2011, that also triggered the Fukushima nuclear disaster.

The impact of environmental disruptions in the Indian Ocean can also be complicated by other factors. The high population density of parts of the region and the location of many large cities on the coast can significantly magnify the impact of maritime-related disruptions. Threats and disruptions in the maritime domain also tend to be more international in nature than those that occur only on land. Many environmental threats occur outside of national jurisdictions. Even where maritime-related disruptions initially occur within national EEZs or national waters, they will likely have interrelated impacts elsewhere. This means that maritime-related environmental disruptions will often require a regional response.

Responding to Geo-environmental Challenges in the Indian Ocean

The likely growth in the incidence and severity of environmental disruptions in the Indian Ocean in coming years, particularly due to climate change, will require a collective response, preferably one that is organised by the Indian Ocean region itself, through IORA and/or new special-purpose mechanisms

Despite the progress that IORA has made in recent years, the IOR still suffers from deficits in regional governance, particularly in environmental security. The region currently has relatively few mechanisms to promote cooperation in respect of geo-political or geo-environmental challenges. There is currently no forum within the region devoted to creating shared understandings among civil and military agencies and non-governmental groups in respect of environmental security threats. Nor is there any mechanism for regional cooperation among agencies such as coast guards, that are often on the front line of these issues.

For these reasons, like-minded Indian Ocean countries should consider working together to establish a regional mechanism or partnership devoted to Indian Ocean environmental security. An Indian Ocean environmental security forum or partnership, for example, could bring together representatives from military and civilian agencies and non-governmental organisations across the IOR to create shared understandings on environmental security threats and help establish habits of dialogue in the field of environmental security.[7] This could draw from the experience of the US-sponsored Pacific Environmental Security Partnership which was established in 2012.[8] Such a forum or partnership could also work to help establish practical mechanisms to coordinate regional responses to environmental threats.

Consideration should also be given to establishing a regional centre for environmental security that could act as an information and knowledge hub to support and strengthen regional environmental security affairs. This could be a means of focusing expertise from around the Indo-Pacific and targeting it at Indian Ocean environmental security issues. The scope of an information and knowledge hub could include professional development training in the area of environmental security.

Conclusion

In coming years, the Indian Ocean will face a growing number of environmental security threats driven by climate change and other human activities. Importantly, environmental security threats can t be properly understood or addressed in isolation from each other, but can combine and cascade with other threats into challenges that can affect the entire region. These challenges are often beyond the ability of individual states to respond and generally demand a collective response. This will require building new mechanisms to facilitate a collective response to environmental security threats.

Footnote:

6. Glasser, R., Preparing for the Era of Disasters, ASPI Special Report, March 2019.

7. *Oil on troubled waters: coordinating responses to environmental disasters in Indian Ocean island states ASPI Strategist, 27 November 2020. https://www.aspistrategist.org.au/oil-on-troubled-waters-coordinating-responses-to-environmental-disasters-in-indian-ocean-island-states/*

8. *Originally called the Pacific Environmental Security Forum.*

BUILDING RESILIENCE TO THE THREAT POSED BY PLASTIC WASTE: THE EXPERIENCE OF LA RÉUNION, A FRENCH ISLAND TERRITORY IN THE INDIAN OCEAN

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University of Reunion Island, Institute of Business Administration

Summary: Plastic waste is a significant source of vulnerability for islands and coastal territories. This problem does not spare the countries of the Indian Ocean which must strengthen their resilience at every level. It is the case for the French island of La Réunion. This article studies the actions undertaken by the island to handle waste management and to foster international cooperation with its neighbouring regions. Reducing the impact of waste on the oceans first and foremost requires each territory to review how waste management is organized at home, while remaining aware that this objective cannot be reached alone, but rather by working together on producing solutions. In doing so, beyond understanding the challenge of waste, it is the ability of island states to strengthen their resilience which is supported by this case study.

Acknowledgements: The author would like to thank the departments of the French Ministry for Europe and Foreign Affairs (Environment and Climate Department) for their support in producing this article.

Islands are some of the most vulnerable territories on the planet, especially due to their frequent exposure to natural disasters and risks exacerbated by climate change. This vulnerability does not spare the island areas of the Indian Ocean and affects all aspects of these territories functioning: their population, natural ecosystem, economy and governance. Simultaneously, the high vulnerability of island and coastal territories in the Indian Ocean raises the question of their resilience. The concept of resilience has appeared in the past few decades to characterize the functioning of ecosystems and is defined as the ability of an ecosystem to withstand disturbances and recover its equilibrium as a stable state following a shock[1] (Holling, 1973). Taking a more proactive perspective, Davoudi (2012), Martin (2012) and Scutarri and Corradini (2018) describe territorial resilience as the inherent qualities that enable their development, adaptation and transformation. In other words, the resilience of a territory is based on its ability to effectively manage a disturbance in order to converge towards another, more desirable avenue for growth.

Footnote:

1. *Gunderson and Holling (2002) developed this concept by replacing the idea of resistance to disturbances by that of absorption, thereby enabling a beneficial approach based on the aspects of adaptation and flexibility. Based on an analysis of complex ecological systems, they then defined resilience as the extent of the disturbances that an ecosystem can withstand before changing its structure (see also Walker et al (2004), Carpenter, Walker, Anderies and Abel (2001), Bodin and Wiman (2004), Smit and Wandel (2006), Gallopin (2006)).*

These concepts are very useful in analyzing the vulnerability of islands and coastal territories in the Indian Ocean. This is particularly true when we examine the case of plastic waste which, by threatening natural marine and land-based ecosystems, is a source of vulnerability. On the French island of La Réunion, for example, not a year goesby without turtles being treated at the dedicated centre, Kélonia, following plastic ingestion. Plastic degrading coastlines also reduces the attractiveness of tourist activities and therefore jeopardizes a key sector of the functioning of Indian Ocean islands and coastal countries economies, diminishing a portion of blue economy potential[2,3]. Plastic particles deposited on shores also pose a risk of health pollution for the local residents in these areas. Plastic-related pollution also raises the question of environmental justice, because small island territories are subjected to deposits of waste from plastic produced elsewhere in the world and that has crossed the ocean.

This analysis focuses on the practical experience of the French island of La Réunion as a case study for the resilience of Indian Ocean territories to plastic waste. This issue of course raises other questions: how can we tackle the extent of this threat? What is the scale of these territories vulnerability to this type of shock caused by pollution? How will the authorities of the affected territories strengthen their capacity to adapt to this danger? Should the management of pollution risks be solely analyzed from the perspective of obligation or can it also be seen as a way for the affected territories to learn to develop innovative responses? These questions are especially relevant as knowledge of the pollution caused by plastic to the Indian Ocean remains at its beginnings, unlike other maritime spaces on the planet. The infamous plastic gyre , or plastic island, in the Indian Ocean is not currently clearly identified.

To shine light on these issues, our analysis will be conducted as follows: the first section draws up an assessment of the situation in the territories concerned by our analysis. Secondly, the study will examine the conditions and paths engaged (internally and externally) to strengthen the resilience of one island in particular: La Réunion. Lastly, the third section will offer a new perspective: these vulnerabilities linked to plastic pollution and often considered a fatalism could also be envisaged as an opportunity to develop exportable sustainable solutions in risk prevention and management.

I Plastic pollution has not spared the Indian Ocean and is reducing the potential of the blue economy

Globally, some 14 million tonnes of plastic are dumped in the seas and oceans every year, according to the IUCN. Plastic now makes up almost 80% of all marine debris recovered and litters the coastlines of all continents. This presence is even more noticeable near popular tourist destinations and densely populated areas (see Derraik (2002) and Jambeck et al. (2015).

The majority of plastic debris in the oceans comes from land. This debris comes from either the flow of waste into the sea or poor production processes that generate untreated waste. These include urban and rainwater runoff, sanitary sewer overflow, litter, inadequate waste disposal and management, industrial activities, tyre abrasion, illegal dumping, etc. Ocean-based plastic pollution originates primarily from the fishing industry, nautical activities and aquaculture.

This plastic waste affects marine ecosystems, the health and livelihood of coastal and island communities, tourism and exacerbates the vulnerability of

Footnote:

2. *The blue economy refers first and foremost to the sustainable use of resources from aquatic ecosystems, and more specifically from the oceans. As the World Bank indicates, these are not only sources of employment and food but they also support economic growth, regulate the climate and contribute to the livelihood of coastal communities . Another conception of the blue economy moves away from the reference to the aquatic aspect to expand the perspective to include the regeneration of different forms of ecosystem. For G. Pauli (2016), the blue economy is about ensuring that ecosystems can maintain their evolutionary path so that all can benefit from nature s endless flow of creativity, adaptability and abundance .*

3. *The health of oceans, coasts and freshwater ecosystems is crucial to economic growth and food production, but it is also essential in the fight against global warming. As such, anything that damages this good health reduces the potential of the blue economy.*

coastal areas to the impacts of climate change[4].

This scourge does not spare the Indian Ocean. The coasts of IORA Member States are all affected by plastic debris in varying volumes washing up on their shores. Among the research that has studied this form of pollution in the Indian Ocean, we can cite, as examples, the work of Shankar et al. (2002), Barnes (2004), Hamylton et al. (2010), Van Sebille et al. (2012), Duhec et al. (2015), and Lavers et al. (2019) . Their work strives to analyze the composition, origin and circulation of plastic waste in this maritime area. While knowledge of the famous plastic continents receives special attention in other regions of the world, that of the Indian Ocean remains for the most part unknown. The data available allow us to grasp the extent of the phenomenon, however. Lavers et al. (2019) estimate that around 413 million tonnes of plastic debris are polluting the Coco Islands (Keelings) in the northeast Indian Ocean. The islands in the western Indian Ocean are also affected. Examples include the Aldabra Atoll, analyzed by Lavers et al. (2019) and Alphonse Island in the Seychelles studied by Duhec et al. (2015). The same is true for the French islands of Mayotte and La Réunion. In Mayotte, the newspaper Mayotte Hebdo published an article in January 2022 stating that almost 3.2 tonnes of waste had been collected in just a few hours at the end of a pipe entering the sea as part of an experiment on installing waste traps. Similarly, the stakeholders in La Réunion regularly observe significant quantities of waste degrading the coasts and riverbanks, flowing into the lagoon and ocean, thereby jeopardizing the wellbeing of local residents and the potential associated with the blue economy.

Faced with this pressure on the ecosystems, how can the resilience of these vulnerable island territories be strengthened? How can their capacity to adapt be reinforced? To answer these questions, we will carry out an anlalysis of the French island of La Réunion. It is an appropriate choice because it is an island located in the Indian Ocean. In addition, France, a member of IORA through La Réunion, has, thanks to this island, Mayotte, the Scattered Islands, the French Southern and Antarctic Territories and the associated exclusive economic zones, a position that gives it an important role and responsibilities in the preservation of ecosystems and the protection of biodiversity as well as in relation to the other Member States of IORA.

II Taking action to strengthen islands resilience to plastic pollution: the experience of local communities on the island of La Réunion

La Réunion island, a region of France, is located in the southwest Indian Ocean, 700 kilometres east of Madagascar. It has 860,000 inhabitants, mainly residing on the planèze, or volcanic plains, and in coastal areas. The island is characterized by mountainous terrain, and its population exerts significant pressure on its sensitive environments and drainage basins. The issue of waste management has become essential in the resilient development of this island society. The authorities are highly committed to the topic. First, the application of European and national environmental directives forces La Réunion to adopt sound waste management that reduces its impact. Second, the local authorities have increased initiatives to tackle the issue of waste.

There is now certainty across the island that the pollution produced by plastic debris in the ocean is intrinsically linked to human activities. Therefore, reducing the quantity of this waste firstly involves reducing waste production on the island and stopping it

Footnote:

4. *The impact of marine debris on marine fauna has been documented, and the consequences of this impact are alarming (see for example Coe and Rogers, 1997, Laist, 1997, Boerger et al., 2010, Derraik, 2002, Gregory, 2009, Murray et Cowie, 2011, Duhec et al. 2015 Under the influence of solar UV rays, wind, currents and other natural factors, plastic breaks down into tiny particles called microplastics (measuring less than 5 mm) and nanoplastics (measuring less than 100 nm). The small size makes them easy for marine life to ingest accidentally. Microplastics have been found in more than 100 aquatic species, including fish, shrimp and mussels destined for human consumption. In many cases, these tiny morsels travel through the digestive system and are expelled without causing harm. But there have also been cases where plastic blocks the digestive tracts or pierces organs, causing death. Stomachs filled with plastic reduce the desire to eat, causing famine. With regard to the climate, degradation caused by pollution of coastal environments (for example mangroves and other plant habitats) render the coastline more exposed to storms and flooding. These species (which can absorb 25% of carbon emissions) which are put under strain are also blue carbon sinks that are disappearing.*

from flowing into the sea. In other words, one of the key solutions to the external problem is found within the island itself. This involves firstly tackling the challenge of production and management of waste generated by its entropic functioning. This may seem like an arduous task in an island territory with multiple restrictive features: small size, craggy terrain with several drainage basins, isolated location, and small domestic market. However, this ambition appears to be within reach of the territory as soon as it commits to it. This is what La Réunion has undertaken in the past ten years, at the instigation of the European, national and local authorities, by drafting waste management strategies and plans for the island as a whole and in an operational manner at the level of the districts. This is the challenge addressed by the Regional Waste Management and Prevention Plan drawn up by the Regional Council of La Réunion[5]. In particular, this document establishes the measures that quantify and process industrial, dangerous and household waste, as well as waste of natural origin (managing biomass). The determination of local government bodies[6] can also be seen in the growing interest in the circular economy, which specifically identifies waste as potential resources for other uses, a desire supported by the work on the Regional Plan for Action supporting the Circular Economy. This prospect obviously cannot take shape without awareness-raising and continuing education and training for the population, and equipping the regions with the instruments and tools conducive to these changes, such as investments in infrastructures for waste sorting and recycling and events that mobilize the population. Similarly, private sector involvement is growing and is reflected in the many initiatives in increased waste sorting and recycling, ecodesign and efforts to create short supply chains[7]. This virtuous trend is also spreading across society thanks to initiatives launched by several associations, often supported by public authorities, working to recycle equipment and supporting households in their capacity to give a second life to goods and equipment.

Having established the action taken at home, La Réunion does not neglect the role it plays beyond geographical borders. This external commitment takes shape at several levels. La Réunion, expanding France s diplomatic action, is engaged in international cooperation in order to mobilize countries in the region, and to disseminate and benefit from best practices. This is the meaning given to the agreements signed between the islands of the southwest Indian Ocean highlighting their respective roles in climate action, the preservation of biodiversity and sharing of best practices. It also fulfils this role through the participation over several years of the Regional Council of La Réunion in the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) and the Convention for Biological Diversity (CBD), and in the actions of major NGOs such as Regions4 Climate Group, Under 2, WWF, and Oru-Fogar, which are dedicated to the climate and biodiversity. La Réunion is also represented through the French State, in multilateral instances like the Indian Ocean Commission and the Indian Ocean Rim Association (IORA). The mobilization of several European funding programmes (Interreg-OI) is another example of La Réunion's involvement, and they cement regional scientific cooperation for the preservation of the environment, the fight against climate change and the ecological transition (Université de la Réunion, IRD). France, building on this basis established by La Réunion, also mobilizes its institutions (Tamarun national park, the institution responsible for protected maritime areas, the action of the Office de la Biodiversité, the French Armed Forces in the Southern Zone of the Indian Ocean (FAZSOI) etc.) to work with neighbouring States (South Africa, Comoros, Madagascar, Mauritius, Seychelles, etc.) to protect marine

Footnote:

5. *According to the NoTRe Act of 2015, the Regional Council is responsible for writing the strategic planning document. Intercommunal structures which group together municipalities are responsible for implementing this plan. The economic sectors are also involved in processing their own waste in accordance with the strategy.*

6. *Local governments also receive support from central state services or agencies such as ADEME. ADEME supports capacity-building for local governments in a performance contract for regional momentum around waste and the circular economy (CODREC).*

7. *Cluster Green brings together private stakeholders to support the organization and actions of businesses in all areas of the circular economy. ADEME (a state agency for the environment) also assists businesses with the implementation of their initiatives.*

environments. Meanwhile, this commitment by the authorities cannot reach its full potential without the awareness and support of the population and the training of stakeholders. Protecting nature, finding alternative methods of waste management, and capitalizing on the circular economy cannot be done without boosting human capacities and talents. La Réunion s local authorities also regularly support initiatives launched by non-profit groups to clean rivers and coastlines, and by researchers conducting expeditions to the Indian Ocean gyre, and this contributes to the positive momentum in addressing the danger of plastic debris in the ocean. In the past five years, two scientific projects (in 2018, the Ekopratik expedition and in 2022 that of the University of La Réunion) in this field were conducted in the southwest region of this maritime area.

In sum, these initiatives focused on the island and its surrounding area seek to build its adaptation capacities in managing the scourge that is plastic waste. More generally, this posture illustrates a mindset change. Far from remaining inactive faced with these threats, and refusing to settle for a stalemate, La Réunion fully realizes the opportunities offered by this immense challenge. It is a genuine opportunity to mobilize the capacities to unleash original and innovative solutions that may be seen as new drivers of growth and sustainable development.

III Transforming vulnerabilities into fertile ground for exportable innovative solutions in sustainable development

Plastic waste management requires prioritizing the actions that reduce the sources of pollution and the vulnerability of land-based island ecosystems. However, in addition to, or alongside the emergency aspect, a change in perspective should also be undertaken. In the attempts to overcome these challenges in practice, such as the management of plastic waste in isolated and restricted areas, designing innovative responses in this area also comes into play. In many fields, islands do not have solutions that are tailored to their geographical context, because these responses, generally designed to be implemented on a large scale in continental countries, do not correspond to the small dimensions of the vast majority of islands. The same is true for continental coastal territories relegated to the outskirts of their capital cities, and as such faced with the fragmentation of supply chains and extra costs linked to isolation. The examples of La Réunion, Mauritius and many other islands, in the fight against climate change and the preservation of biodiversity, may be qualified in their field as success stories. By developing local solutions, originating in initiatives that bring together stakeholders and populations, and by capitalizing on the momentum of regional innovation ecosystems, these small islands or isolated continental territories can become platforms that produce solutions for resilience. These solutions, developed in small geographical areas due to their isolation, remoteness or small size, could then be rolled out in all regions of the planet characterized by similar situations. This could apply to the hundreds of islands in the intertropical zone confronted with identical problems, and also the isolated parts of continents that experience the constraints of land-based insularity . These exportable solutions could be drivers to be mobilized, like links entering the value chains that produce international responses that are tailored to the needs expressed by other regions of the planet. This would therefore improve the integration of these small areas into international trade.

Ultimately, this paradigm shift calls for consideration to be given to the island territories and local communities as important crucibles for building their own tailored solutions, and secondly, to strengthen their positioning on the international value chains and thereby consolidate their resilience by allowing them to increase their adaptation capacity in the sound management of the damage caused by plastic waste. This prefiguration is perfectly aligned with the efforts of France and the declarations of the President of the Republic in La Réunion in 2019, aiming to mobilize the Indo-Pacific strategy in order to build this resilience in the space within IORA s scope.

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IORA: ESTABLISHMENT, EVOLUTIONAND THE WAY FORWARD FOR FUTURE

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ABSTRACT

The main objective of the chapter is to analyze IORA s Journey to sustainable development, inclusive and balanced growth through Open Regionalism . During the last 25 years- a momentum has been generated through its projects; training programs and technical cooperation, especially through the implementation of its action-plan: 2017-2021. The Action-plan for 2022-2027 has been adopted in the 21st COM meeting on 16-17 November 2021 in Dhaka, Bangladesh.

IORA s significance is growing at global level in contemporary Geo- strategic; Geo- economic and Geo- political issues. The future of IORA seems to be bright with the ongoing structural changes in its organization and strengthening of the Secretariat; through Systematic Thinking . It is highly recommended that the Mechanism(s) of efficient coordination are evolved and IORA Project Implementation Index (IPII) is designed and implemented. In addition to this, evidence-based policy frames need to be strengthened through Indian Ocean Rim Academic Group (IORAG); working group on Science Technology and Innovation (WGSTI), Indian Ocean Rim Business Forum (IORBF) and different Working Groups and Core groups.

The IORA s collaborations with other regional economic groupings needs to be strengthened; and the long term vision of IORA may be evolved. The paper recommends that IORA s position on Indo-pacific may be finalize and adopted soon as it is expected to affect positively, the future course of Sustainable, balanced and Inclusive development in the Indian region(IORA).

INTRODUCTION

The formation of the Indian Ocean Rim Association for Regional Cooperation (IOR-ARC) at Port Louis, Mauritius on March 6-7, 1997 marked the formal beginning of one of the world's largest regional groupings. The IOR-ARC (IORA) has been established to "promote sustained growth and balanced development and to create a common ground for regional economic cooperation. This paper provides the historical development of IOR-ARC and two of its major challenges to the implementation of the IOR-ARC programs. A systemic approach is required to achieve sustainable development and balanced and inclusive growth.

HISTORICAL DEVELOPMENTS IN IORA:

India and South Africa have played a key role in visioning the IOR-ARC (IORA) in the Indian

Footnote:

1. This paper does not have any institutional views. These views are of the author

Ocean Rim from its inception; and even before Jawahar Lal Nehru is on record as having discussed the commonality of the people of the **region[2].** The concept was first seriously mooted in November 1993 by former South African Minister for Foreign Affairs, Role of PIK Botha. He identified the IOR as an area of great mutual importance to both South Africa and **India[3]**

In January, 1995, during the visit to New Delhi, President Nelson Mandela Put forward the proposal to form an Indian Ocean Trading Alliance , and it was enthusiastically received. He expressed the opinion that growing business ties between Africa and India could help shape what he termed a Trading Bloc among Indian Ocean Rim **nations[4]**. President again visited India on March 27-29, 1997; but this time what was but a dream only two years ago has materialized. The concept of Indian Ocean Rim community become a reality on March 6-7, 1997 with the establishment of the Indian Ocean Rim Association for Regional Cooperation **(IOR-ARC)[5]** now IORA (2013). John F. Burns, in The New York Times on January 30th, 1995 published president s Mandela s news with photo. Mandela Visiting India Discusses Arms Exports and Indian Ocean Trading **Bloc[6]**.

Kenya, Mauritius, Oman, Singapore and South Africa which have taken the prime initiatives for fostering the


Mandela, Visiting India, Discusses Arms Exports and an Indian Ocean Trading Bloc

Source: Photo from The New York Times, January 30, 1995

A series of meetings have already been organized both at the governmental level and at the levels of the academic and business circles. The first formal meeting of tripartite nature was held in Mauritius on 29-31, March1995 essentially at the initiative of the governments of the seven core countries, viz. Australia, India,

Footnote:

2. *David Burrows, The Indian Ocean Rim Initiative: A Comparative Indian and Southern African Perspective .*

3. *Gwyn Champbell & M Scerri, The Prospects for an Indian Ocean Rim (IOR) Economic Association; South African Journal of International Affairs, 2,2, Winter 1995 P-11.*

4. *Denis Venter, The Indian Ocean Rim Initiative: A Vehicle for South-Cooperation , a paper distributed at the Indian Ocean Research Network (IORN) meeting in Durban, March10-11, 1997, P-1*

5. *Mandela Set for official visit to India, Business Day March 13, 1997.*

6. *John F. Burns, The New York Times on January 30th, 1995*

IOR community. Another meeting, organized at the initiative of Australia, which is now being called as a second -track approach, was held in June 1995 in Perth , Australia, at which the government representatives, academic experts and businessmen met in their individual capacities to discuss the various aspects of the process of cooperation. The third meeting on the subject was again held in Mauritius in August 1995 in a tripartite framework. In the last meeting, discussions were held on the preparation of a Charter for the Indian Ocean Region Economic Association, and India has been entrusted with this task. An Indian Ocean Region Academic Group(IORAG)was also established with a view to promoting effective linkages among the academicians and the academic institutions of the region. The charter of the Indian Ocean business forum was also discussed and debated. As a follow-up of the Perth meeting, a conference of the academicians engaged in studies on Indian Ocean Region is scheduled to be held in India in December 1995. A business forum meeting is also scheduled to be held in India in December **1995**[7].

In other interesting and relevant paper entitled South Africa and Indian Ocean Rim David **Burrows**[8] discusses the history of the Indian Ocean Rim Initiative (IORI), problem facing the IORI, the process thus for as well as the issues related with its membership etc. In this paper it is stated that From 9-11 September 1996, an inter-governmental meeting will be held in Port Louis, Mauritius, during which, some parties hope, a charter will be adopted, bringing an Indian Ocean Rim Economic Association officially into being. This meeting will be followed by another in Durban early next year. It is therefore important for South African business to be aware of these developments and to consider and make provision for the implications of the creations of this new regional **organization**[9] **,**

The above extract from the paper is a testimony of the attempts made by the core countries, Academicians and businessmen in establishing the IOR-ARC. The role of the experts group of Indian Ocean Rim Initiative (IORI) has been important.

After the First-ever IORA Leader Submits on 7th March, 2017 in Jakarta, Indonesia the momentum has been created to strengthening Tripartite Structure of IORA. India along with South Africa and Australia played an important role in the establishment IORA

On March 29, 1995 the Indian Ocean Rim Initiative (IORI) International Meeting of Experts was convened at the International Conference Centre in Grand Bay, Mauritius, with governmental delegates from Australia, India, Kenya, Mauritius, Oman, Singapore, and South Africa (M7), and private sector and academic representatives from Australia, India, Mauritius, and South Africa to discuss the possibility of increasing economic cooperation among Indian Ocean Rim countries. Minister of Finance for Mauritius Ramakrishna Sithanen set the tone for the conference by emphasizing the need for regional economic cooperation and downplaying unstated issues that threatened to divide the **region**[10] **.**

The three-day meeting, chaired by Paul Berenger, the Minister of Foreign Affairs Minister of Mauritius, followed Sithanen's lead with the adoption of several general principles including the adoption of a "multi- track" approach. This enabled states to participate or opt out of the programs depending on their level of interest. The idea behind an evolutionary approach to membership was to permit an orderly growth to eventually include all Indian Ocean Rim states, and to hold back on the creation of a formal supranational authority in favor of a loose and flexible organization consistent with existing sovereignty and bilateral and multilateral **obligations**[11]**.**

`A supranational organization is a multinational union or association in which member countries cede authority and sovereignty on at least some internal matters to the group, whose decisions are

Footnote:

7. *V.R. Panchamukhi, Indian Ocean Region: Prospects of Economic and Scientific Cooperation , RIS digest , June 1996, ISSN 0971-1104, page 8-9.*

8. *The Asia-Pacific Researcher at the South African Institute of International Affairs, International update 17/96*

9. *International update, the South African Institute of International Affairs, South Africa and the Indian Ocean Rim 17/96*

10. *V.N.Attri (CIOS), IORA s Past, Present And Future Published by University of Mauritius Press Reduit, Mauritius, September 2021. P-2*

11. *ibid*

binding on its members. In short, member states share in decision making on matters that will affect each country's citizens. The EU, United Nations and WTO are all an example of such type of organizations to one degree or another. In such organizations, each member votes on policies that will affect each member **nation**[12] .

Thus, IORA was conceived to be a loose and flexible organization consistent with existing sovereignty, bilateral and multilateral obligations. The main challenge of such an organization is to seek a balance between bilateralism and multilateralism; regionalism and sub regionalism; and to ensure hub and spoke agreements within the region, by minimizing the high costs of administration and transparency and **efficiency**[13] .

In addition to this, as emphasized as Fred Hirsch in his book, Social Limits to Growth (published in 1976), We need to augment the supply of Positional goods vis-à-vis private and public goods. There are types of positional goods: the supply of first set of goods was limited by their natural scarcity. In second category, we include goods like Power and Status whose supply was limited by their social security. Good governance - including institutional infrastructure is inevitable for the restoring symmetry in the expected outcome of IORA s six priority areas and two focused areas (present) and new emerging priority areas as well as focused areas (future) to make it more people welfare oriented as envisaged by Nelson Mandela, the father of **IORA**[14] .

Vision of IORA March 1997

On the basis of the study of the statements made by the honorable Prime Minister of Mauritius; and the Foreign Ministers and the senior officials of the Member States of IORA who participated in the first COM/CSO meeting in Mauritius on 5th-7th March 1997, the CIOS has made an attempt to formulate the vision of IORA which is Endogenous and Inclusive , incorporating all the expectations of the Member States. In the first COM/ CSO meeting 108 persons including Foreign Ministers and senior officials participated in the inaugural meeting in March 5-7,1997 in Mauritius. COM expressed hope that the upcoming IOR-ARC (now IORA) will focus on Regional Integration/ trade and foreign investment/ globalization; restoration of ancient linkages/ cultural diversity etc.; setting up of Secretariat/ working groups; tripartite nature of IOR-ARC(IORA) ; productive employment; Maritime and tourism; and biological preservation etc. The vision-1997 seems to be Inclusive and Sustainable . The issues raised in the first meeting of COM appear to be determined by contemporary global economic issues of the **decade**[15].

Tripartite Structure of IORA

The tripartite struct.ure of the association will allow all of us to capitalize on the expertise of our business and academic communities. But we need to find ways of making these structures more effective and strengthening the contributions they can make. I look forward to some creative exchanges on how we can help bring this about. There is a need for the inter-governmental process to be challenged from time to time in a positive way by strong and independent inputs from the business and academic **group**[16].

Evolution of Economic Development in IORA: 1997-2021

Since its inception, the development patterns of IORA Member States have been changing due to the pragmatic and progressive economic policies adopted by the national governments. The IORA is based on the Principles of Open Regionalism (1997) on the pattern of Asia-Pacific Economic Cooperation (APEC, 1989). Over the last twenty -three years, as reflected in the income classifications of the years 2017 and 2021 from The World Bank. The development levels of the Member States have significantly changed.

The change in development levels in IORA is unlikely to be attributable to the ongoing project- based regional cooperation as a vision in its establishment. The

Footnote:

12. *ibid*

13. *ibid*

14. *ibid*

15. *CIOS: IORA s Past, Present and Future , published by University of Mauritius Press, Reduit, Mauritius, September,2021;*

16. *Opening statement by Mr. Tim Fisher, Deputy Prime Minister of Australia and Minister for Trade, to the first ministerial meeting of the Indian Ocean Rim Association for regional cooperation, 6 March 1997*

Regional Integration/ Trade and Foreign investment/Globalization, emphasized by the 12 representatives of the Member States in 1997 (one of the six priority areas of IORA in terms of trade and investment facilitation) that has not been given due importance and recognition, as a central theme to the process of regional integration to boost inclusive economic growth and sustainable development in IORA, which is one of the main objectives.

As on 1st July 2021, The World Bank released new list for GNI Per Capita in current USD, ATLAS method. Ten economies have been affected due to COVID-19. In IORA, Indonesia and Iran moved from upper middle (1st July, 2020) to Lowe middle income group (Ist July, 2021).Mauritius moved from High income (1st July, 2020) to Upper middle income group (1st July, 2021). IORA as an organization since 1997 has made a significant improvement into income classification released by World Bank. The Population of IORA was 3.083 billion in 2020.

The percentage of Lower Middle Income group was 23.80 percent in 1997 which has significantly increased to 34.70 percent in 2021. In IORA, the Low Income countries group has been reduced substantially- its pert was 42.88 percent in 1997 which has been greatly reduced to 17.39 percent in 2021.

IORA s Income Classification: Comparison with ASEAN and APEC

In ASEAN 60.50 percent of its members are low middle income group (LMI) 20.00 percent upper middle income group (UMI); and 20 percent are High income group (HI) as per 2021 income-classification of The **world Bank[17].**

Low Middle income members in ASEAN are; Indonesia, Cambodia, Leo PDR; Myanmar, Philippines, and Vietnam, upper middle income are Malaysia and Thailand, and High income are: Singapore, asked Brunei Darussalam.

Asia Pacific Economic Cooperation (APEC)

Asia Pacific Economic Cooperation (APEC) was established on 6-7 November, 1989 on the principal

Table1: Income Classification of IORA Member States in 1997 and 2021

1997			
High-Income Countries	**Upper- Middle Income Countries**	**Lower- Middle Income Countries**	**Low-Income Countries**
Australia• Singapore• United Arab Emirates•	Malaysia• Mauritius• Oman• Seychelles• South Africa•	Indonesia Iran• Maldives• Sri Lanka• Thailand•	Bangladesh Comoros• India• Kenya• Madagascar• Mozambique• Tanzania• Yemen• Somalia
2021			
High-Income Countries	**Upper- Middle Income Countries**	**Lower- Middle Income Countries**	**Low-Income Countries**
Australia **France** **Oman** **Seychelles** **Singapore** **United Arab Emirates**	Malaysia Maldives Mauritius South Africa Thailand	Bangladesh Comoros Indonesia India Iran Kenya Sri Lanka Tanzania	Madagascar Mozambique Somalia Yemen

Source: Compiled by Chair in Indian Ocean Studies (CIOS): the World Bank data.

Footnote:

17. Low middle income countries in ASEAN: Indonesia, Cambodia, Leo PDR; Myanmar, Philippines and Vietnam. Upper middle countries are : Malaysia and Thailand: and high income countries are Singapore and Brunei Darussalam.

of open regionalism. It is a group of 21 countries. As on 1st July 2021, 57.14 % of its members are high income group (HI); 28.57% belongs to the category of low middle income group; and 14.28% were under the category of low middle income **group[18].**

The comparative analysis of IORA; ASEAN and APEC which are founded on the principal of Open Regionalism Shows that in IORA the process of Economic transformation seems to be more inclusive as indicated by the income classification of these three groupings of July 2021 of The world Bank. If IORA sets the Long term vision like ASEAN and APEC; the process of Economic transformation may be more faster and sustainable Development oriented as well as inclusive by 2035 or even beyond.

IORA: An Overlapping of Regional Economic Grouping

IORA is an "Overlapping" organization of many regional Economic groupings. Four of its members from ASEAN; again four term SAPTA; seven from SADC; Turkic from EAC; five from COMESA; and Two from GCC; and one from EU Two are member of Arab League. The total may be more than 23 as most of the member states of IORA are also members of ASEAN, SAPTA,SADC; EAC; COMESA, **IOC and EU[19].**

Growing strength of IORA

Since its inception, IORA has been growing in terms of its size reflected in the growth of population as well as its rising share of GDP in global GDP. The share of IORA s exports in world s exports; the share of IORA s imports in world s imports as well as its share of FDI inflows and outflows in the world s inflows and outflows have significantly increased during the last twenty-two years. It seems that the principle of Open Regionalism seems to have worked very well due to the overlapping of the membership of IORA countries in several other regional groupings. It is further recommended that bilateral regional trade agreements among the Member States of IORA be further initiated and strengthened; leading to the enlargement of attributes of regional trade agreements within IORA. The growing strength of IORA is shown by the following snapshot in table and figure below:

Year	Population as a % of World Population	GDP as a % of World GDP	Exports as a % of World Exports	Imports as a % of World Imports	FDI Inflows as a % of World FDI Inflows	FDI Outflows as a % of World FDI Outflows
1997	29.47	6.07	9.47	9.57	9.9	5.2
2002	30.07	5.69	9.28	8.33	6.7	2.67
2007	30.55	7.59	10.3	9.73	9.0	4.89
2012	30.87	9.51	12.3	12.4	13.2	5.99
2017	31.00	9.74	12.2	12.3	11.5	7.19
2018	31.03	9.84	11.8	11.9	17.6	8.91
2019	30.15	9.79	11.5	11.7	20.290	12.698
2020*	31.04	12.21	14.30	16.87	24.883	18.892

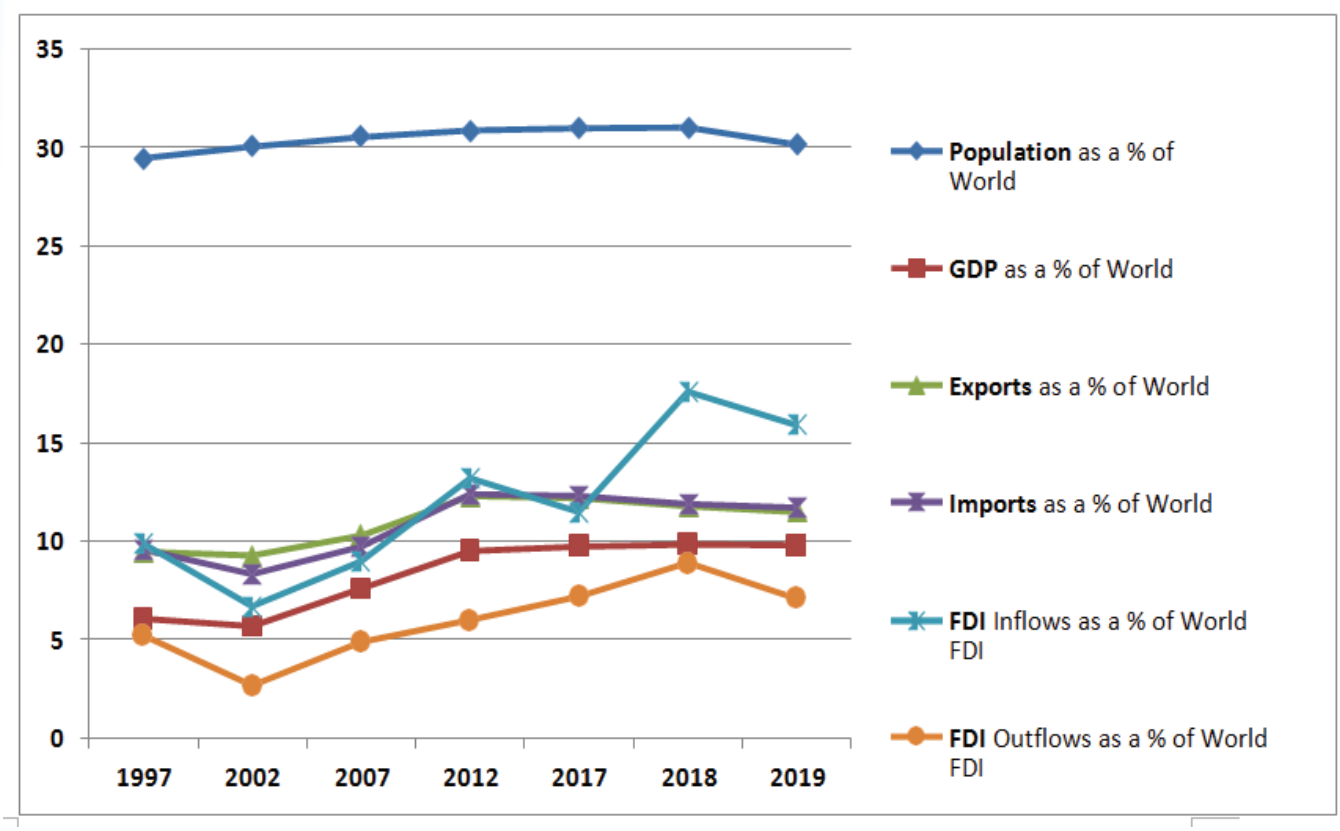
Source : UNCTAD Statistics, WDI and Author s Calculation compiled by Author, UNCTAD World Investment report 2021.
*Includes France as 23rd member state of IORA.

Footnote:

18. *Complied by the author*

19. *The Total is more than 23 member states as most of its Member states are simultaneously members of many regional Economic groupings in the region.*

Fig. 1 IORA Snapshot (1997-2020)



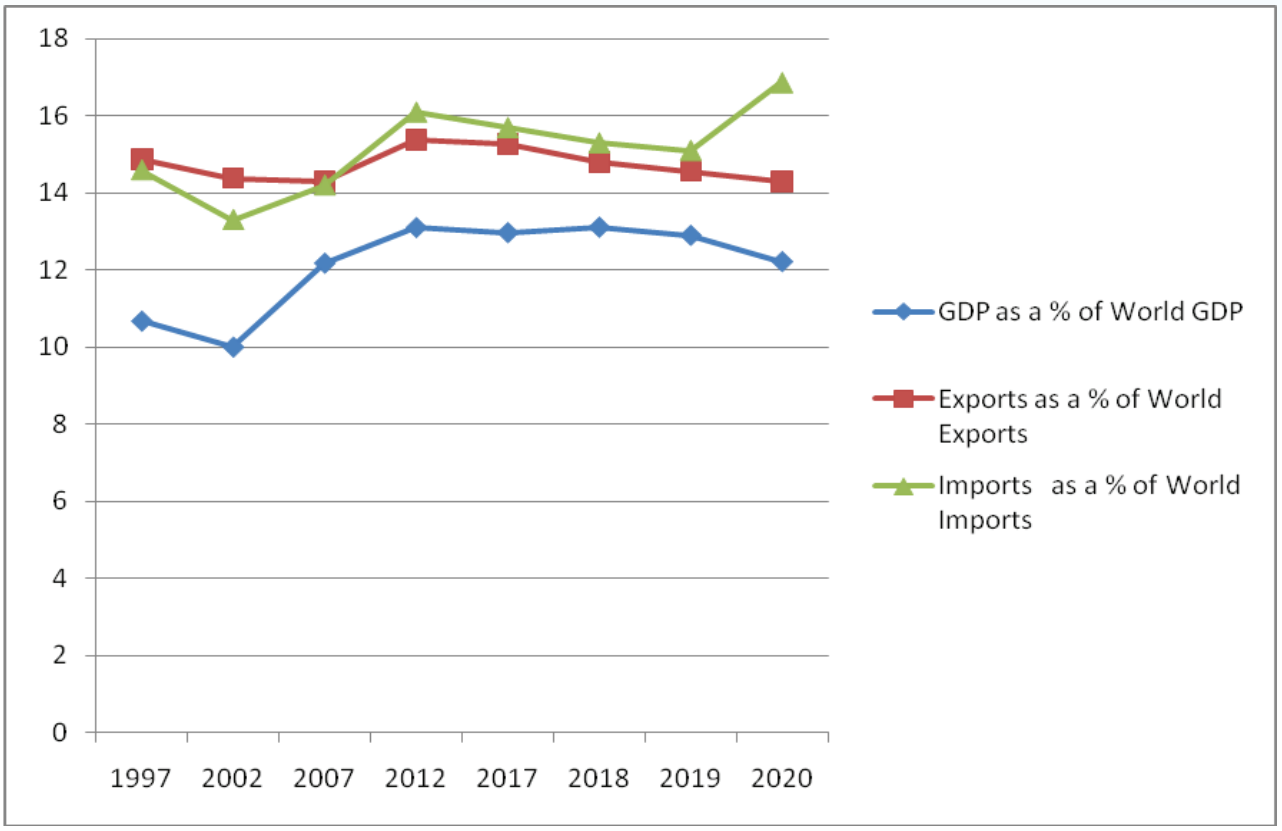
We have also calculated the total share of IORA s GDP; IORA s Exports and Imports in worlds GDP; Export and Imports since 1997 including Republic of France as its Member State.

Table 3: IORA s Behavior of GDP, Exports and Imports 1997-2020.

Year	GDP as a % of World GDP	Exports as a % of World Exports	Imports as a % of World Imports
1997	10.67	14.86	14.6
2002	9.998	14.38	13.3
2007	12.17	14.29	14.2
2012	13.09	15.37	16.1
2017	12.96	15.25	15.7
2018	13.1	14.79	15.3
2019	12.89	14.56	15.1
2020	12.21	14.30	16.87

Source: UNCTAD Statistics and World Development Indicator WDI. Author s on Calculation.

Fig. 2 IORA s Behavior of GDP, Exports and Imports Including France 1997-2020



We have also calculated the total share of IORA s GDP; IORA s Exports and Imports in worlds GDP; Export and Imports since 1997 including Republic of France as its Member State.

Economic Growth and Trade Facilitation in IORA: 1997-2026

According to IMF World Economic Outlook (October, 2021), the global economy is projected to grow , (-)5.9 percent in 2021 and 4.9 percent in 2022, whereas it grew by 3.1 percent in 2016 and increased to 3.5 percent in 2018. The GDP growth rates in IORA have been more than global growth rates during the period 1997-2007.

During the year 2020, as a consequence of COVID-19 , IORA s average annual growth rate has been (-) 4.86 percent whereas World s GDP growth rate was (-)3.1 percent. The Advanced economies growth rate has been (-) 4.5 percent and Emerging Market and developing economies growth rate was (-) 2.1 percent.

IORA s expected average annual GDP growth rate is likely to be 4.4 percent in 2021; 4.88 percent in 2022; and 4.51 percent in 2026. IORA s population as a percentage of world s population was 29.0 percent in 1997; which increased to 30.3 percent in 2010; and further to 30.9 percent in 2016; and increased to 31.04 percent in 2020. AERO s population was 3.083 billion in 2020.

The IORA s GDP as a percentage of world s GDP was 6.4 percent in 1997; which rose to 9.3 percent in 2010 and fell to 8.7 percent in 2016. Imports as percentage of World s imports has been 9.5 percent in 1997; which rose to 11.5 percent in 2010; and fell to 11.2 percent in 2016 ; which increased to 16,87 percent in 2020 (including France). IORA s exports as a percentage of world s exports were 9.7 percent in 1997 which increased to 11.9 percent in 2010; and fell to 11.4 percent in 2016 which increased to 14.30 percent in 2020 (including France).

FDI inflows as a percentage of World s FDI inflows were 12.3 percent in 1997; which rose to 16.0 percent in 2010; and fell to 14.4 percent in 2016 whereas FDI outflows as percentage of World s Outflows were 5.2 percent in 1997; increased to 7.2 per cent in 2010; and fell to 4.3 percent in 2016. Trade- openness index of IORA was 54.0 in 1997; which increased to 59.0 in 2010; and then fell to 55.0 in 2016.

Growth of Volume of Worlds Merchandise Trade: 2010-2020

According to new estimates from WTO, the volume of World Merchandise trade expected to increase by 8.0% in 2021 after fallen to 5.3% in 2020. The growth in the volume of world s merchandise trade was 1.9% during 2010-2020, 0.3 percent in 2019. The table below provides an insight to the growth of volume of exports and imports from 2020-2020 by region/country:

Table 4 : Growth in the volume of World Merchandise trade by selected region and economy, 2010-2020

Exports				Imports		
2010-2020	**2019**	**2020**	**Region/ Country**	**2010-2020**	**2019**	**2020**
1.9	0.3	-5.0	**World**	1.8	0.0	-5.6
2.0	0.3	-8.5	**North America**	2.1	-0.6	-6.1
1.2	-0.5	-10.3	**USA**	2.4	-0.5	-3.9
0.6	-2.2	-4.5	**South**	-0.3	-2.6	-9.3
2.4	-2.0	0.0	**Brazil**	-0.1	2.4	-1.7
1.0	0.6	-8.0	**Europe**	0.8	0.3	-7.6
1.1	0.2	-7.7	**EU**	0.8	0.2	-7.2
1.3	-0.3	-12.7	**CIS**	1.3	8.5	-4.7
-0.8	-0.6	-8.1	**Africa**	1.6	2.6	-8.8
1.4	-2.5	-8.2	**Middle East**	0.9	0.8	-11.3
3.4	0.8	03	**Asia**	3.4	-0.5	-1.3
2.6	0.5	-3.9	**Australia**	2.2	-1.4	-1.4
4.5	2.0	2.4	**China**	4.5	0.0	4.4
2.7	3.0	-11.6	**India**	2.4	-0.8	-14.9
0.1	-1.9	-8.1	**Japan**	1.4	0.4	-4.0
3.0	-1.1	3.1	**Six East Asian Traders**	2.4	2.1	-0.4

Source: The study on Bilateral and Regional Trade and Investment Related Agreements and Dialogue between Member States (2017)
WTO: World Trade Statistical Review 2021

India and IORA

India has demonstrated its strong commitment to the IORI since its inception in 1995. In the first official meeting of the IOR Countries in Mauritius on March 29, 1995, V.K. Grover, Secretary in the Ministry of External Affairs of India, India is inseparable from the Indian Ocean for more than physical or etymological reasons. We are at the heart of the Indian Ocean region and constitute junction between its eastern and western rim. Our contribution to , and participation and the larger Indian Community has been substantial. Over the ages,. In the Present contest, given the six and importance of a globalizing outward looking and dynamic economy like India, we can be a positive-if not in alienable element of any viable Indian Ocean rim cooperation **grouping**[20]

Prior to India, becoming IORA Chair for the period ,2011-2013 the contemporary issues in the global level, and the isues the National and bilateral importance were discussed related with Economy and Environment and other issues , India revitalized IORA during its Chairmanship; 2011-2013 and six priority areas were identified and adopted by IORA are Maritime Safety and Security; Trade and Investment facilitation; Fisheries Management ; Disaster Risk Management; Academic Science and Technology Cooperation; and Tourism and Cultural Exchange. Two focused areas were adopted namely women Economic empowerment (2013) and Blue Economy (2014), Perth during Austrlia s Chairmanship of IORA from 2013-2015). India played in an important role in the identification of Blue Economy as focused areas by Australia in (2014).

It has contributed USD two million to IORA s Special Fund and completed maximum number of projects/conferences /workshops of IORA till to date (November 2020) since its **inception**[21]**.** India Contributed USD one million to the IORA s Special Fund in 19th Council of Ministers meeting held on 7th November, 2019 in Abu Dhabi UAE; earlier to this India has contributed USD one Million-when India assumed IORA Chair during 2011-2013.

India s Foreign Trade with IORA

The value of merchandise exports of India decreased substantially by 14.8 percent to reach 275.5 billion USD, while its merchandise Imports decreased substantially by 23.2 percent to reach 368.0 billion USD in **2020**[22]**.**

The Table below shows India s share of Exports and Imports in IORA during the period 1997-2021. The share of Exports in IORA was 17.72 percent in 1997 which increase to 30.38 percent in 2014, which decreased to 26.62 percent in 2020; and marginally increase to 26.84 percent in 2021. Similarly, the share

Table 5: India s Share of Exports and Imports in IORA : 1997-2021

Year	Exports	Imports
1997	17.72	16.81
2002	21.84	15.82
2008	29.90	24.33
2014	30.38	21.38
2020	26.62	23.75
2021	26.84	24.44

Source:

Footnote:

20. *Hari Sharan Chhabra "Economic cooperation: The Indian Ocean Rim concept", Indian Digest, Volume 2/96, February/March 1996-P-7*

21. *CIOS; IORA's Past Present and Future , Published by University of Mauritius Press, Reduit , Republic of Mauritius , September, 2021.*

22. *UN, "International Trade Statistics Year book (2020) Volume I Trade by Country"*

of imports in IORA was 16.81 percent in 1997; which increase to 21.38 percent in 2014; and further increased to 23.75 percent and 24.44 percent respectively in 2020 and 2021. This implies that the importance of IORA in India s foreign trade has significantly increase during the last 24 years.

CIOS, "The study on Bilateral and Regional Trade and Investment Related agreement and Dialogues between member states" (2017) paper 398-413 5.004 percent total trade of India 2020-2021

Compiled by the author. Minister of commerce, Industry Department of Commerce: Export-Import Data Bank. Government of Indians, New Delhi, January 22, 2022.

The data for 2021-2022 (April-November)
India's Economy counteracted 7 percent 2020; and in expected to grow 7.2 percent in 2021. FDIs in flows were USD 64 billion in 2019 which fell to USD 51 billion in 2020. UNCTAD's investment trends shows that global FDI inflows increased by 77% in 2021 surpassing then pre-and- covid19 levels and reaching and estimated USD 1.65 Trillion.

Indian Ocean Rim Academic Group (IORAG)
The Indian Ocean Rim Academic Group (IORAG) was established to promote and enhance the crucial role that academia plays in regional institutions. One of the mechanisms created during the establishment of the IORA is the Indian Ocean Rim Academic Group (IORAG). IORAG has been positioned as the primary vehicle for academics, universities, think tanks and scientific and technological centers to formulate policy and project recommendations to IORA Member States

The role set out for the Academic Group has been both advisory and catalytic, with the principal objectives: (1) to service the needs of Government and Business; (2) to promote intellectual dialogue amongst the participating Member States; (3) to serve as a vehicle for the development and dissemination of the Indian Ocean Rim Concept; (4) to serve the region through coordinated and rigorous research

India chaired First meeting of Indian Ocean Rim Association (IORA) Working Group on Science, Technology and Innovation (WGSTI) which was held on 13th September, 2021 in virtual mode. The meeting took note of the status of implementation of WGSTI work plan 2020-21 and considered specific proposals from Member States.

Under the Jakarta Concord s Action Plan (2017-2021), IORA seeks to further strengthen the IORAG through the sharing of information and knowledge by fostering a more dynamic link between policy and projects in IORA work programmes. To this end, the 24th Meeting of the IORAG in South Africa established a Sub-Committee to lead the institutional, operational, and administrative reform of IORAG within IORA. The establishment of working group on Disaster Risk Management (WGDRM) is a welcome step. The IORA guidelines for Human Assistance and Disaster Risk (HADR) will play an important role in Disaster Risk Management cooperation.

WORKING GROUPS IN IORA
The WGTI is the main body tasked with improving trade and investment policies in IORA and was established in 1999.The Working Group on Trade and Investment (WGTI) exists to explore possibilities and avenues for IORA Member States to cooperate to promote trade liberalization to remove impediments to, and lower barriers towards, freer and enhanced flow of goods, services, investment, and technology within the region. The WGTI is a functional body of IORA. The overarching goals of WGTI during 2022-2027 IORA Action Plan are related with improving with the production capacity, competitiveness; enhancing intra-IORA flow of goods, services, Investment; increasing connectivity and strengthening regional cooperation for promotion of SMEs.

The Work Plan for the WGWEE involves a series of initiatives by Member States to facilitate Women's Economic Empowerment in the Indian Ocean region, such as ensuring that gender is mainstreamed in all priority areas of IORA, improving women s participation in IORA events, improving the financial inclusion of women, supporting and promoting the training of women entrepreneurs, using Innovation and Technology in advancing women s economic empowerment, conducting research-based initiatives for enhancing women s

economic empowerment, and adopting the Women Empowerment creation and Principles (WEPs). The Launching of working group on Disaster Risk Management is a welcome step. (21st IORA Council of Ministers) (COM)[23]

Random Survey on IORA

A random survey was conducted on the basis a questionnaire by the office of the CIOS with the different stakeholders closely related to IORA. The outcome of the survey maybe classified in two categories: Conservative view and Optimistic view on IORA. While the greater number of respondents raised doubts about the efficiency of the IORA as it lacks coordination; rule-based system, ambitious visions at the time of formulation; no mechanism for project based corporation, lack of impetuous on trade and investment facilitation in the region; lack of people oriented projects, lack of quantifiable targets in the action plans of IOR of 2008 and 2017 , lack of research activities; overlapping structures; lack of integrating the action plan to the sustainable development goals; lack of efficient structures like ASEAN and APEC; weak financial and administrative structures etc.

The others having the optimistic view about the future of IORA focused on concentrated and consolidated approach, identifying few projects per year to be implemented successfully and create a momentum for success. Also, the action plan 2017-2021 has been successful top a great extent and whatever is not completed may be taken in the next action plan. IORA made a good progress during a period and particularly during COVID 19, it was able to host all the meetings through webinars, the creation of different working groups and the growing recognition with the member states to link the IORA objectives with the UN SDGs in the forthcoming action plan 2022-2027, emphasizing the socio economic development of the region; leading to shared destiny and prosperity for all in the region may be the indicators for sustainable and inclusive IORA 2030 provided systems thinking which implies Systems thinking is a holistic approach to analysis that focuses on the way that a system's constituent parts interrelate and how systems work over time and within the context of larger systems , is adopted for evidence based policy formulations.

The member states should take inclusive and sustainable development-oriented initiatives for making IORA as a dynamic and vibrant association and ensuring peace, stability and sustainable development for inclusive IORA as per six priority areas and two cross-cutting focused areas of IORA.

Action Plan of IORA

Background information on IORA Action Plan

The IORA has two Action Plans that were developed since its launch in March 1997 in Mauritius (a) 3-4 Year Plan of Action Cycle (completed); (b) 2017-2021 Action Plan (under progress); (c) 2022-2027 Action Plan (Adopted in 21st IORA council of Ministers 17 November 2021 held by People s Republic of Bangladesh)

A. 3-4 Year Plan of Action Cycle

The first one was formulated following the decision of the Council of Ministers (COM) at its 7thMeeting in Tehran, March 2007, which directed the Secretariat to develop a 3-4 year Plan of Action cycle, having in mind, the recommendations of the 9th Meeting of the Committee of Senior Officials as reflected in its Medium to Long Term Vision statement, wherein the following six priority areas were identified: i. Trade, Investment and Finance; ii. Education and Technology; iii. Fisheries; iv. Tourism; v. Natural Disasters; vi. ICT based on a clustering approach.

The 3- 4 Year Plan of Action Cycle was adopted by the 8th COM meeting in Tehran on 4 May 2008. A copy is attached below (Annex A). After its expiration in 2011, the following were achieved:

a) the setting up and the operationalization of a Regional Centre on Science and Transfer of Technology (RCSTT) - established on 28 October 2008 pursuant to the recommendation of Academic Group of the Indian Ocean Rim Association for Regional Cooperation (here inafter referred to as IORA or Association),

Footnote:

23. *Meeting on 17 November 2021 in a hybrid format has welcomed the establishment of working group on Disaster Risk Management (WGDRM).*

approved in the 7th meeting of the IOR Council of Ministers, held on 7-8 March, 2007 in Tehran, Islamic Republic of Iran, and MOU dated 23 June 2008 between Islamic Republic of Iran and the IORA.

b) Support Cultural Cooperation among Member States - Core Group established in 2010 and on 2 April 2012 - 1st Meeting of the Core Group on Promoting Cultural Cooperation Among IORA Member States, Port Louis, Mauritius

c) Support the existing Feasibility Study on Tourism - Phase I of the Feasibility Study on Tourism Promotion and Development was completed in 2011

d) Modeling of effect of Tsunami in the Gulf of Oman study completed

e) Optimization of the iornet.com website - at that time it was managed by FICCI, India

B. IORA Action Plan 2017-2021

It was in 2017, 6 years after that another Action Plan, a five year action plan (2017-2021) was formulated encompassing the six priorities of IORA and the two IORA special focus areas; aspiration to further enhance the role of Dialogue Partners; as well as efforts to strengthen the IORA Secretariat. The idea came in 2016 during the First Ad-Hoc Committee (AHC) Meeting of the IORA Concord13 held in Bali, Indonesia, March 2016 where the Committee agreed to a Plan of Action / Work Plan which will be developed to be annexed to the Concord (the document developed by Indonesia for the 20th Anniversary of the IORA in 2017).

In 2017, at the Leaders Summit held on 7 March 2017, the Leaders welcomed the IORA Action Plan for the period 2017-2021 which was adopted by the COM meeting held on 6 March 2017. This was the very first Action Plan ever developed for IORA based on those six priority areas agreed in 2011. It served as a tool to implement the historic Jakarta Concord and has short, medium and long-term initiatives and provided clear guidelines of where the Ministers wanted IORA to be in.

(C) IORA ACTION PLAN: 2022-2027

Second IORA Action Plan 2022-2027 was adopted by the 21st Council of Ministers (COM). 17th November, 2021 the sets overarching goals in priority-Area divided into strategic short-term (0-2years); medium term (2-4years); and long term (4-6years). It is imperative that the end of 2 years period an evaluation of the action plan is undertaken so as to make necessary changes if required in the sub-goals. The action plan 2022-2027 seems to promote inclusive sustainable and equitable IORA by the end of 2027.

Position of IORA on Indo-Pacific

The 19th IORA meeting of the Council of Ministers, Abu Dhabi Communiqué on 7th November 2019 states that, We note the importance of convening the sixth edition of the Indian Ocean Dialogue in New Delhi on 13th December 2019 as a part of the IORA s endeavors to ensure Indo- Pacific Collaboration in maritime Security, Economic Cooperation, Disaster Risk Management, and Blue Economy . The deliberations on adoption of IORA s position on Indo-Pacific are going on in the meetings of the CSO since 2019; and concept paper was submitted to the Chair of IORA in October 2019[24]. There is no final outcome of the deliberations on the Indo-Pacific. It is expected that IORA will soon finalize its position in Indo-Pacific focusing on development oriented Agenda in lines with IORA s Economic Declaration (2013) and the decision of the 19th COM (2019). Accelerated technology cooperation viz. Artificial Intelligence (AI) Digitization Robotics etc, Security and Growth For All in the Region (SAGAR)- Collaborative, Cooperative inclusive and Development oriented Architecture may be evolved by consensus. IORA s position in Indo-Pacific may help IORA to achieve sustainable Development and UN Sustainable Development Goals (SDG s) in IORA and to enhance prosperities, decent employment generation, Gender Equity and Inclusive Growth.

Way Forward for the Future of IORA

The way forward for the inclusive and Sustainable IORA in the future are closely linked with the decision of the COM to adopt the six priority areas

Footnote:

24. CIOS prepared and completed the concept note on "IORA's position on Indo-Pacific concept", on the direction of CSO in October, 2019.

of IORA, namely; Maritime Safety and Security; Fisheries Management; Academic, Science and Technology Co-operation; Trade and Investment Facilitation; Disaster Risk Management and Tourism and Cultural Exchanges in 2011- 2013 when India became the Chair of IORA.

In addition to this, IORA Economic Declaration (2014) of the Indian Ocean Rim Association on shared principles for building sustainable and inclusive economic growth in the Indian Ocean region adopted in Perth, Australia 9 October 2014, provides detailed principles for achieving sustainable growth pathways.

During Australia chairmanship 2013-2015, Women Economic Empowerment and Blue Economy were adopted as cross cutting focused areas of IORA. Strengthening Maritime Cooperation in a Peaceful and Stable Indian Ocean , 2015-2017 Indonesia Chairmanship; Uniting the Peoples of Africa, Asia and Australasia and the Middle East through Enhanced Co-operation For Peace, Stability and Sustainable Development , 2017-2019, South Africa Chairmanship, and Promoting a Shared Destiny and Path to Prosperity in the Indian Ocean , 2019-2021, UAE Chairmanship. All these events seem to have laid down during the present times; the foundations for inclusive and sustainable IORA in future. Bangladesh Chairmanship (2021-2023) Their Vs sustainable "Harnessing the opportunities of the Indian Ocean for inclusive development."

Reiterated that IORA is the apex regional forum linking countries of the Indian Ocean Rim, its objectives are to promote the sustained growth and balanced development of the region and of Member States, and to create common ground for regional economic co-operation. Further, it was pledged to promote cooperation and collaboration between IORA and other regional stakeholders, including Dialogue Partners, who play a significant role in the prosperity of the Indian Ocean region. The understand principle at guide the member states are:

1. The private sector is an essential driver of sustainable economic growth and prosperity.
2. The blue economy marine economic activity including fishing, renewable energy, mineral exploration and coastal tourism is emerging as a common source of growth, innovation and job creation for the Indian Ocean region.
3. Increased trade and investment will boost growth, create employment and help to reduce poverty.
4. Reducing measures that restrict trade and investment will enable goods, services and capital to flow freely between countries.
5. Facilitation of trade, including efficient customs and border procedures, will allow for freer trade and investment flows.
6. The pre-eminence of the global, rules-based, WTO trading system is the best means for increasing trade and investment and fostering economic opportunity.

ASIA- pacific Economic cooperation (APEC) was established 1989 on the Principle of open Regionalism" cooper ship 21 diverse pacific economic the APEC leaders already to policy-actions designed to respond to Covid-19 and commitments in accusation.

Since May 2015 to September 2020, several conferences, workshops, dialogues as well as IORA ministerial conferences on Blue Economy have been organized. IORA seems to be totally committed to the Blue economy and its implementation. It is recommended that a project on the measurement and assessment of IORA Blue Economy may be initiated to assess the full potential of ocean resources in the exclusive economic zones of IORA.

Open Regionalism in ASEAN; IORA; and APEC

In a paper Bergstern (1997) suggested the concept of Open Regionalism involves at least five possible definitions: (I) Open Membership; (II) Unconditional MFN; (iii) Conditional MFN; (IV) Global Liberalization; and (v) Trade Facilitation. IORA seems to follow definitions (II) and (v) of open-regionalism. Economic recovery and achieving rest able and inclusive growth (2022) The APEC focus of 2022 is:" open, connect, Balance .

ASEAN has been successful over the last 50 years

to reap the economic advantages of Open-Regionalism . The strength and success of the Association of South East Asian Nations (ASEAN) as it passes its fifty year anniversary will be measured by its ability to continue to promote and encourage deeper regional integration into global economy. The political and security distraction over troubles in the South China Sea is not the test of economic and political security on which ASEAN integrity and coherence will finally stand or fall[25] .

There has been consistent discussions and development of principles of Asian Economic Integration in ASEAN from 1976-2015 and thereafter. In IORA , the discussions and deliberations on Ordering and Sequencing of Indian Ocean Region Economic Integration has not been Deep regular and consistent and continuous, although, we do find references to such an attempt in various CSO/ COM Meetings[26].

Need For Long Term Vision For IORA: 2050

During the last 24 years, IORA has grown into a dynamic and vibrant intergovernmental organization focusing on regional economic cooperation through project-based strategy and multilateral cooperation. It is based on the principle of Open-Regionalism . It has 23 Member States and 9 Dialogue Partners[27] . The Federation of Russia has become 10the Dialogues partner of IORA in 21st COM meeting on November,16-17, 2021 in Dhaka, Bangladesh.

Trade and Environment

Trade and Environment in view of COP26 in Glasgow needs to be linked with all the Working groups in IORA. The initiative of association/ linkages with W.T.O. Was undertaken in 2017 by the CIOS through a proposal through WTO Chairs in the Universities of Member States . It is suggested that these WTO chairs may be linked with the Working Group on Trade and Investment (WGTI) . It is imperative that Environmental Goods Agreement (EGA) which was suspended at the end of 2016; may be adopted by the member states of IORA. An IORA -23 group may be created in WTO.[28]

There seems to be a big potential for Marine Tourism in IORA in future, provided it is linked with Sustainable Blue Economy. A comprehensive IORA s Marine Tourism Policy- incorporating environmental protection; sustainability; inclusiveness; Accelerated Technological Change and tourism; and the impact of Artificial Intelligence (AI) on Marine tourism needs to be evolved. This will help in transforming the economies of IORA on path of Sustainable Development in future.

Impact of COVID 19 on IORA s Economy;

COVID-19 has adversely affected the economic growth in IORA in 2020. Out of 23 Members states; only three had positive GDP growth rates; whereas 20 member states registered negative GDP growth rates varying from (-) 0.7 percent to (-) 32.0 percent. The average annual GDP growth rate of IORA has been (-) 4.86 percent in 2020; higher than the world s GDP growth rate of (-)3.1 percent and advanced economies GDP growth rate of (-) 4.5 percent ; and emerging markets and developing economies GDP growth rate of (-) 2.1 percent respectively. The growth scenario of IORA in 2022-2026 seems to provide boost to trade and investment flows in future. The likely rising trend of net-inflows of investment in IORA member states will encourage and provide momentum to sustainable development and inclusive growth in the region.

IORA needs to deliberate and debate in its forthcoming COM/ CSO meetings like ASEAN and APEC in evolving a long-term vision- 2050: Open, Sustainable, Inclusive And Resilient IORA . This may be achieved through utilizing the oceanic resources sustainably and fulfilling the targets set in the different Working Groups of the priority Areas and focused areas of IORA.

Footnote:

25. *Peter Drysdsle, " ASEAN: The Experiment in Open Regionalism that Succeeded. ASEAN@ 50. Volume 5/ The ASEAN Economic Community into 2025 and Beyond.*

26. *Prof V. N. Attri(CIOS) , " IORA's Past, Present And Future", published by University of Mauritius Press, Reduit, Mauritius, September, 2021, page 128-134.*

27. *Russia became the 10th Dialogue Partners of IORA, November,2021.*

28. *Recommended by CIOS, " The Study on Bilateral and Regional Trade and Investment Related Agreements And Dialogues Between Member States ", November,2017. Approved by the CSO, October,2018.*

This will also provide thrust to the strengthening of " Systems Thinking " . The action plans and themes of the chairmanship(s) May be linked to the Long- Term Vision of IORA-2050 approved by the COM/ CSO after debates and discussions in future meetings .

The Way Forward For IORA

1. The above developments in IORA indicate a clear-cut commitment to environment, marine life and ecosystem as reflected in the Perth economic declaration in Perth 2013, Australia, and further strengthened by the meetings in Maritime Safety and Security and Blue Economy by the Member States of IORA. The measurement and assessment of IORA Blue Economy, on the pattern of EU Blue Economy; comprising economic and environmental assessments of EEZ in the Member States is lacking50. This needs to be undertaken by the experts in Blue Economy in the Indian Ocean Region.

2. Further, the IORA's Action Plan 2022-2026 may incorporate such realistic projects on Blue Economy leading to inclusive and sustainable development in the region, as well as, the mitigation of climate change and accelerated technological change to make the economic strategy for regional cooperation effective and feasible, adopted in 2014.

3. The Maritime safety and Security, along with Disastrous Risk Management and emerging challenges of Ocean governance aspects of the Blue Economy need to be integrated with the future projects, ensuring healthy ocean by incorporating marine pollution and Illegal, Unreported and Unregulated (IUU) Fishing, which are serious threats to the blue Economy in the region.

4. The 'Continuity Element' is very important to accomplish the objectives of IORA such as sustainable development and balanced growth in the region; quantified in terms of gainful employment generation; higher growth; increase in intra-regional trade; increase in foreign direct investment inflows; women economic empowerment; climate change mitigation; low carbon economy; empowerment of communities in coastal regions of IORA, as well as fulfilling commitments to UN sustainable goal 14: Life Below Water, by making sustainable use of oceanic resources.

5. During the 6th Indian Ocean dialogue (IOD) the discussions were held on the positioning of IORA on Indo-Pacific. Earlier to this, IORA has discussed the need for IORA for bringing the position paper on Indo-Pacific during the CSO meetings held in Durban and Abu Dhabi. The Indo-Pacific region is key to shaping the international order in the 21st century and many European countries are anxious that instability will impact its economic ties.51 The EU trade with Asia has reached a very significant level. The EU trade with ASEAN in 2019 was EUR billion 190.6; in which there share of imports was EUR billions 125.1 and exports EUR billion 85.5. The rising share of EU and other continents with Asia reveals that the Indo-Pacific concept is going to be a reality; being a functional and multipolar in nature based on inclusive and equitable rules of law. It seems to be the best example of multilateral cooperation in post Covid-19 period, leading to sustainable and inclusive growth within IORA and beyond. It is expected

6. The theory of Building Blocs seems to have been validated with the achievements of IORA in the past and present. The IORA projects are on longer term and are thus considered as building blocs when there implemented.

7. It is imperative that revitalization of IORA may be initiated by constituting a high- level task force (HLTF) as it was done in 2001 with the approval of the CSO. The same needs to be replicated to make IORA Sustainable and inclusive by 2030 or even beyond.

8. It may be pointed out that APEC (1989) decided in 1994, in Bogor, Indonesia hen APEC Leaders gathered in Bogor, Indonesia in 1994,

and committed to achieve free and open trade and investment by 2010 for industrialized economies and by 2020 for developing economies. APEC members agreed to pursue this goal by further reducing barriers to trade and investment and by promoting the free flow of goods, services and capital and ASEAN (1967), on 22 November 2015 decided to achieve the ASEAN Economic Community 2025 (AEC 2025) based on five principles: (i) A Highly Integrated and Cohesive Economy; (ii) A Competitive, Innovative, and Dynamic ASEAN; (iii) Enhanced Connectivity and Sectoral Cooperation; (iv) A Resilient, Inclusive, People-Oriented, and People-Centred ASEAN; and (v) A Global ASEAN.

9. Generally, it is suggested in the meeting that IORA should learn from the experiences of AEAN and APEC and may follow best practices to promote Sustainable development in the region. Hence it may be recommended that the long-term vision of IORA 2050 may be prepared during the discussions on the next action plan of IORA 2022-2026. IORA will be completing 25 years of its establishment in 2022.

10. IORA can be transformed as a geo-strategic and geo-economic organization since most of its members are interconnected by the ocean. This might be the reason why the development of the Blue Economy is much stressed out as it represent a huge potential for the region. Besides, many IORA member countries are surrounded by the sea, which may be a strategic place for port construction and enhancement of the maritime sector. Many IORA Member States are emerging economies, having a good prospect for economic progress and raising the standard of living of its people. The advanced nations may help in financing the technological innovations which may help IORA achieve its sustainable goals.

11. IORA at number of times has expressed its desire to follow the path of strategic dialogue on the pattern of ASEAN with its dialogue partners.

12. IORA's Future Ocean initiatives may include Ocean's Governance and Marine Spatial Planning {MSP} in Member States.

13. Technology led Sustainable development in IORA has been a much discussed topic since long. Industry 4.0 refers to a new phase in the Industrial Revolution that focuses heavily on interconnectivity, automation, machine learning, and real-time data. Industry 4.0, also sometimes referred to as IIoT or smart manufacturing, marries physical production and operations with smart digital technology, machine learning, and big data to create a more holistic and better-connected ecosystem for companies that focus on manufacturing and supply chain management.52 Technology led Sustainable development in IORA- IR 4.0, is a crucial matter as this revolutionary takeover will allow IORA to be a more innovation oriented organization, having the opportunity to carry out economically beneficial activities while achieving its sustainable goals.

14. Indian Ocean Region (IOR) past history needs to be deliberated and discussed to evolve an inclusive, equitable, strategic, functional and sustainably oriented IORA in future to enhance the prosperity in the region.

15. It is also recommended that Indian Ocean strategic dialogue on the pattern of ASEAN may be initiated. IORA's position on Indo-Pacific like ASEAN may be further deliberated and finalized in the forthcoming meeting of CSO. ASEAN OUTLOOK ON THE INDO-PACIFIC on 2019 focuses on ASEAN centrality principle. Washington Centric Indo-Pacific and IORA's emerging position on Indo-pacific may be overlapping in nature-needs to be deliberated in future in IORA on realistic and geo- strategic and geo-economic grounds in view of the fact that most of the world's developed and influential countries are showing key interest in becoming dialogue partner in IORA.

16. The collaborative and corporative mechanism- IORA being APEC's body in Indian

Ocean region in accordance with the principles of Jakarta concord (2016) may further be elaborated to build sustainable and inclusive IORA in future- bringing prosperity in Indian ocean region during post COVID 19.

17. IORA was created in 1997 on the basis of the principle of open regionalism. It is imperative to understand whether regional economic corporation in IORA is two- dimension of three dimension. ASEAN is a political and economic association; democracy, infrastructure, energy provision, among other areas. Apart from the South American regional integration initiative, which emerged as a political alliance, all these regional blocs are economic associations.

18. An overview of the recent development on regionalism during the period 2011-2020 seems to suggest that IORA is strengthening and promoting regional cooperation by "Market Mechanism" approach instead of "Policy- led Approach".

19. IORA is deliberating on the assessment of the existing action plan 2017-2021 which has been by and large successful in creating required structure in terms of setting up of working groups in the IORA's priority areas and two cross-cutting focused areas. Some of the working groups have already been created, the other are in pipelines- this is a very positive development which may lead to the introduction and adoption of systemic thinking in IORA which seems to be in deficiency at present.

20. IORA is a unique organization aiming at sustainable development and balanced growth in the Indian ocean region by focusing on regional cooperation as discussed in chapter one of the book, through project based approach. Recent developments in IORA are indicative enough that in future IORA will be more successful in implementing its policy and programmes for creating a prosperous, peaceful, sustainable and inclusive IORA.

CONCLUSION:

The above recommendations based on the Theory of Continuity as a dynamic process; and the evaluation of the IORA's performance in accordance with theory of Building Blocs (BB) suggest that IORA seems to be "Sustainable", and "Inclusive" and balanced in the long run by incorporating "Systems Thinking" ; Accelerated Technological Change and Evidence Based Policy Frames.

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OCEAN ACCOUNTING FOR WESTERN INDIAN OCEAN SUSTAINABLE DEVELOPMENT

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Abstract Ocean resource-uses are expanding across the world as nations foster the economic growth and resource security provided by their ocean economies. Market and non-market ocean goods and services are obtained as ecosystem services, that are dependent on ecosystem health, or as abiotic services independent of ecosystem function. Ocean resource-use activities may lead to pressures on the ocean environment and compromise the supply of ecosystem services. The multifaceted use of ocean resources and space requires adaptive evidence-based governance dependent on trade-off decisions to balance diverse and frequently competing interests, and conflicts between ocean health and human use. Such decisions require valuations that have, in the past, been largely estimated as ocean contribution to national accounts, including GDP. Such economic metrics exclude sustainability or inclusivity that are critical within ocean sustainable development approaches and models. Developments in ocean accounting provide more holistic values of ocean wealth (including metrics of natural capital), ocean health, ocean resource uses and associated pressures and ocean-related economic production, by including economic, social, and environmental data in a more integrated approach to evidence-based policy development.

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Introduction

The world's ocean plays a considerable role in enhancing the lives, welfare, and well-being of human populations through the delivery of ecosystem and Earth system services. Amongst other benefits, oceans a) supply resources that are fundamental to sustaining life on Earth; b) contribute to the economic supply and resource-use security of coastal and inland nations (while receiving numerous residual and externality impacts of such resource uses); c) regulate the world's climate and many Earth system service provisions; and d) underpin numerous cultural values and value systems. Ocean environments that vary in scale from Earth systems to ecosystems (Halpern et al., 2015; 2019; Halpern & Kappel, 2013; Halpern et al., 2012; Nash et al., 2017; Rockström et al., 2009; Steffen et al., 2015), ocean resource-uses

(Colgan, 2018; Mohanty, Dash, Gupta, & Gaur, 2015) and ocean measurement sciences (Pendleton et al., 2020) are currently undergoing marked changes. Ocean resource-uses and associated ocean economies are expanding because of the increased economic growth pressures (for food, energy, water, employment, and other security requirements), and the saturation of certain terrestrial economic activities, and the emergence of new technologies extending production boundaries into the ocean realm.

Africa's oceans are viewed as a New Frontier for economic development (for example, as an African Renaissance opportunity by the African Union's African Integrated Maritime Strategy – AIMS, 2050), or by the UN Economic Commission for Africa (UNECA, 2015). Numerous coastal nations across the globe are advancing ocean economies within their Exclusive Economic Zones (EEZs) to bolster national economic growth and ensure food, energy, and job security. Recent advances in oceans economies have suggested that these activities will play an increasingly significant role in supplying the future needs of global populations (Colgan, 2018; Costanza et al., 1999; Doyle, 2018; Mohanty et al., 2015; OECD, 2016; Pauli, 2010). Such advances result in unprecedented pressures on marine and coastal ecosystems necessitating new approaches to decision making processes that accommodate the economic, social, and environmental information underpinning ocean wealth, health, and the inclusive (in terms of equitable distribution of economic opportunities and benefits) and sustainable uses (in terms of allocating opportunities and resources for future resource-use opportunities). Fourth Industrial Revolution technological advancement is also changing the way we monitor, and research ocean resources and their supporting environments, resulting in unprecedented volumes of ocean data availability for evidence-based ocean policy development processes.

The reliance of human populations on oceans makes effective ocean governance essential (UNDP 2012). This is particularly true for the Indian Ocean (Larik, 2017), where millions of people depend on ocean resources for food and other needs. The Indian Ocean covers some 50.56-million square kilometres and has been the backdrop of cultural exchanges and trade for more than 4 000 years (Gupta 2010; Doyle 2018a). It is currently home to some of the world's busiest and most valuable trade routes, abundant fisheries and hosts a variety of ocean-based industries. Its economic significance to the Indian Ocean Rim Association (IORA) Member States is enormous (Doyle 2018a; Fatima & Jamshed 2015; Gupta 2010). The coastline of IORA Member States extends some 122 281 kilometres, stretching from South Africa, in the Southwest, to Australia, in the Southeast (CIESIN 2013). The combined population of the IORA Member States in 2010 was estimated at over two-billion people and projected to grow to 3 billion by the year 2100. However, the IORA website (IORA 2018) places this future estimate at almost 2.7 billion people. Of this, nearly 400-million people (22.9%) live in the coastal zone (below 20m above mean sea level), a number projected to grow to 608 million by the year 2100).

Ocean governance and policy development in expanding ocean economies often require trade-off decision making processes that balance conflicts to the environmental, social and / or other economic sector domains. Trade-offs are inherently dependent on valuation processes. In the past, ocean decision-making with respect to ocean sectoral expansion and investment, and strategic planning, have often been driven by macro-economic valuation measures such as the ocean contribution of economic sectors to national accounts such as Gross Domestic Product (GDP). While such economic metrics are fundamental for strategic economic planning and investment decisions, they provide little or no information on the allocation of future resource use opportunities (in terms of natural capital accounts and resource-use sustainability), the distribution of income, benefits and costs of such uses (in terms of economic or welfare inclusivity), the non-market or non-use values of the ocean environments (for example the existence or bequest non-use values), or the variety of non-market ecosystem services supported by the ocean.

Cicin-Sain and Knecht (1998) identified three core ocean governance objectives, including (1) economic development that improves the quality of lives, (2) environmentally sustainable development that protects natural systems, and (3) socially equitable development providing intersociety and

intergenerational equity. A key lesson garnered from evaluations of South East Asia's ocean governance practices is that the complexity of managing oceans in a sustainable manner requires comprehensive, integrative, and coordinated approaches in terms of the policy, legislation, institutional arrangement, financial investment, management measures, stakeholders support, and participation (Chua 2013a). Effective ocean governance also needs to be cooperative and inclusive, ensuring that efficient partnerships are established across all stakeholders, including governmental and non-governmental organizations, the scientific community, industry and local communities and populations (Larik 2017). As noted by Chua (2013b), ineffective management, resulting in overfishing, unregulated expansion of industries and poor coastal planning, accounted for the gradual decrease in ecosystem health and the loss of biodiversity in the large marine ecosystems of South East Asia.

The inclusion of natural capital and sustainable resource-uses, as well as inclusivity and social domains within ocean policy development requires a paradigm shift in evidence-based decision-making processes. The integration and linking of large volumes of economic, social, and environmental data through consistent frameworks led to the development of holistic ocean accounting that draws on both recognized and novel national accounting structures to develop integrated indicators that go beyond GDP. It is not the intention of ocean accounts to measure absolute ocean value; however regular compilation of consistent and comparable metrics allow the development of benchmarked relative metrics as indicator measures.

An Introduction to Ocean Accounts - Bridging the Gap Between Ocean Economies and Sustainable and Inclusive Ocean Development.

Ocean accounts offer a powerful instrument for compiling and integrating transdisciplinary information across sectors. Comprising a framework of discrete but linked systems of stocks and flows, ocean accounting boosts the power of ocean data by linking flows between systems (e.g., the supply of ocean natural resources and their use within economic sectors to advance wealth and well-being) in standardized and temporally regular accounting systems resulting in knowledge products, statistics, and indicators that are essential to inform ocean governance and adaptive policy cycles that are supported by reporting, review and evaluation in standardized fashions. Nations recognize such a holistic approach as they move beyond economic information alone to drive informed ocean decision making and governance processes. Ocean accounting is attaining significant traction across the world's coastal nations. Many countries are introducing ocean accounting pilot approaches to investigate the efficacy of ocean accounting systems in meeting their ocean information needs. The 15 Member Nations of the High-Level Panel on Sustainable Ocean Economies (www.oceanpanel.org), for example, have committed to introducing ocean accounting into their ocean governance processes by 2025. Accessible and consistent data will allow IORA to track the impacts of policies and programs aimed at increasing the ocean economy and ocean-based industries (Attri 2016).

An Ocean Accounts Framework (OAF) enables the integration of information across and between ocean resource-use sectors, ecosystems and environments and the assets and services provided by them, the social conditions, and impacts of their resource-uses through a consistent and standardized system of accounting that is aligned with relevant and internationally recognized statistical standards. As a framework of discrete (although integrated and connected) systems, ocean accounts provide measures of often spatially and always temporally defined stocks within, and flows within and between, systems. An OAF can consequently advance integrated decision-making and policy implementation across social, economic, and environmental domains; ensure sustainable and inclusive development within expanding ocean economies; accommodate large volumes of data and information arising from new ocean monitoring technologies; and identify data gaps and needs for prioritization in governance and research arenas. Initially an OAF appears a daunting process in transdisciplinary research. However, given that an OAF links different discrete systems, the inclusion or exclusion of both systems and data can be based on information needs to address specific policy questions. Thus, compilation of the entire framework simultaneously is not essential. It is however essential to ensure that data is accommodated in an established broader framework to allow account

expansion as needs arise in the future.

Inherent within an OAF are the following account domains and systems:

The Environmental and Ecosystem Domain
Natural Capital Accounts include both Ecosystem Accounts (along with their associated Ecosystem Services as outlined in the System of Environmental Economic Accounts (SEEA) Ecosystem Accounts frame) and Abiotic Service Accounts.

Marine Ecosystem Accounts include spatial interpretations of ecosystem typologies, extents and condition, identifications of ecosystem services and associated assets arising from final ecosystem services, adapted for the ocean space. Ecosystem services are inherently dependent on ecosystem structure, function, and productivity. Notably, intermediate or supporting ecosystem services may extend across ecosystems, so final ecosystem services may be indirectly dependent on several linked ecosystems. Fishery production in terms of the provisioning ecosystem service of a fish catch, for example, may depend on various ecosystems utilized by the asset species during its life history. A myriad of ocean natural capital benefits also arises from activities that are not ecosystem dependent (mining or oil and gas extraction, for example) - referred here as abiotic services. Accounting for abiotic services include spatial interpretations of abiotic assets linked to ocean economy sectors. It is important to spatially link such abiotic assets and services to ecosystems, particularly in terms of competitive resource uses and pressures of resource uses on ecosystems.

The Economic Domain
An oceans economy is defined as the sum of several discrete and or interlinked market production and consumption activities, sectors and industries supported by marine and coastal areas, their assets, goods, and services physically in (e.g., fishing), on (e.g., shipping) or under (e.g., mining) the ocean or associated with the ocean (e.g., shipbuilding or support services) regardless of the sustainability or inclusivity of such use. The term "blue economy" is used in several ways, that describes ocean economies both including or excluding sustainability and inclusivity and consequently remains a relatively unclear definition. As noted by Gupta (2010) and Cicin-Sain and Knecht (1998), the Indian Ocean Rim Association recognizes the "blue economy" as an integration of ocean economy development with the principles of social inclusion, environmental sustainability, and innovative, dynamic business models.

Regardless of the definitions used, the economic pillar of an ocean economy remains critical in Ocean Sustainable Development as it often drives strategic economic planning, investment decisions and ocean macroeconomic policy. Estimation of the significance and economic potential of oceans to the economies of IORA Member States is important, and there is a clear need for reliable, standardized, economic statistical metrics that can be applied across the Member States of the organization (Gupta 2010; Mohanty et al. 2015; IORA 2017).

Many ocean-bounded countries have estimated accounts of their respective "ocean economy" sectors. Estimations of the value of ocean economies are most often carried out for monitoring the state of the ocean economy and associated industries and the illustration of the importance of the utilized resources in the justification of ocean or coastal policy development and management (Kildow et al. 2009). Such estimations are often calculated as the national contribution of oceans to the economy derived from gross value add of ocean-associated economic sectors (Kildow and Colgan, 2004; Donahue Institute, 2006;), within Ocean Satellite Accounts models. However, the disaggregation of sectoral contributions and the potential exclusion and / or double counting inclusion remain challenges in these processes.

Linking the Environmental and Economic Domains and Sustainability
Ecological and environmental assets (as natural capital) are supplied (produced as natural inputs) for value-add use in ocean economic sectors. Consequently, it is critical to link environmental assets, resources, and their uses to economic accounts. Such links are best described in the SEEA Central Framework (SEEA – CF), which provides guidance on the valuation of renewable and non-renewable natural resources (natural inputs) within the System of National Accounts (SNA) asset boundary. However, assets and related flows beyond values already included in the SNA are not accommodated. The SEEA - CF consequently allows for the coherent integration of environmental information (often measured in

physical terms) with economic information (often measured in monetary terms) in a single framework.

The SEEA- CF recognizes both from the economy to the environment as residuals (e.g., solid waste, air emissions and return flows of water) , although falls short of accommodating all pressures of economic activities on the environment (including unsustainable extraction, pollution, habitat modification, climate change or the translocation of invasive species all of which have the potential to significantly impact ecosystem condition measured under the SEEA marine ecosystem accounting process). We argue that it is critical for all these pressures to be accommodated in an ocean accounting framework (OAF) so that anthropogenic drivers of condition change may be disassociated from natural change.

Lastly, the SEEA - CF recognizes environmental protection and resource management as "environmental" economic activities, namely those activities aimed at reducing or eliminating pressures on the environment or increasing the efficacy of natural resource input into the economic sectors.

The Social Domain and Inclusivity

Whilst Ocean Economy Satellite Accounts may provide employment statistics by sector, it is important that the distribution of benefits of economic sectors by demography be incorporated into an OAF if inclusivity is to be accommodated in the accounting process. Social accounting matrices centred on ocean resource use require research investigation in this area. However, it must also be realized that such metrics only accommodate market resource use values and non-market values or non-use values (that may have cultural significance for discrete demographic groups) require interpretation if ocean welfare is to be considered, including the challenging task of assigning values to non-market uses.

Furthermore, it is crucial to recognize that inclusivity accommodates the distribution of costs and benefits and that demographic groups are not disadvantaged by environmental-economic resource use costs (e.g., pollutants, environmental degradation, or resource overexploitation).

Novel Risk and Governance Accounts

As noted above the SEEA - CF recognizes residual flows from economic sectors to the environment. However, if ocean accounts are to be used along with other ocean governance tools such as marine spatial planning (MSP) for both descriptive and analytical ocean governance processes, it is important that all economic pressures on the environment are accommodated. Failure to do so greatly limits the interpretation of anthropogenically or naturally induced ecosystem condition changes. Given that the impacts of such condition changes permeate throughout environmental, economic and social domains (consider the compromising of a fish habitat ecosystem resulting in reduced fish populations, reduced catch allocations, reduced catches, reduced fishery economies and ultimately reduced benefits to fishers), the measurement of ocean risk (for example in a DPSIR framework) and associated governance instruments (including through taxes or subsidies) becomes and important novel pillar in ocean governance processes.

We re-iterate that it is not the objective of an OAF to estimate absolute ocean values, which, as identified by Fenichell, et al. (2020) may approach the under-estimation of infinite values as certain ocean values cannot be monetarised (for example existence or bequest values). However, as a regularly and consistently compiled exercise, ocean accounts provide relative metrics (and therefore trends) of consistently measured ocean values and through the development of benchmarked indicators (see Table 1), of stocks or flows and therefore ocean chance. Such indicators (of trends) are considered critical in both hindcasting (to measure against previous values) and forecasting (to measure against proposed targets) that are critical in informed and evidence-based ocean governance processes. Indicators such as these also have important ramifications in assessing country's attainment of required convention targets and in strengthening national statistical databases.

The Global Ocean Accounts Partnership

The Global Ocean Accounts Partnership (GOAP)

(www.oceanaccounts.org) is an international, multi-stakeholder partnership established to enable countries and other stakeholders to go beyond GDP to measure and manage progress towards sustainable development of the ocean. Co-Chaired by the United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP) and Fisheries and Oceans Canada, GOAP brings together governments, international organizations, research institutions, and the private sector to build a global community of practice for ocean accounting in pursuit of a sustainable and inclusive ocean economy.

The GOAP aims to measure and manage nations' or regions' progress towards sustainable ocean development through the inclusion of environmental, social, and economic domain metrics in ocean accounting frameworks that are in accordance with international standards and aligned with the 2030 Agenda for Sustainable Development. GOAP through the development of a shared technical guidance for ocean accounting to supports the achievement and monitoring of sustainable ocean development to ensure that oceans' values and benefits are recognized and accounted for in policy development and decision-making processes. Furthermore, GOAP coordinates and communicates a common interest in ensuring that the oceans' values and benefits are recognized and accounted for in social and economic policy development decision-making processes. The Partnership also prioritizes collaborative capacity-building activities that support holistic ocean accounts development, maintenance, and ongoing use in decision-making. GOAP has consequently been driving stakeholder awareness and supporting the development of ocean accounting pilot studies worldwide.

With these aims in mind, the GOAP has embarked on an international programme of pilot study projects aimed at creating ocean accounting legacies and capacity development in host countries. Within the Western Indian Ocean these are being proposed in South Africa, Mozambique and Kenya and are initially aimed at the use of remote sensing applications for the identification of marine ecosystems and their extent under the SEEA Ecosystem Accounting framework. Once established and verified through ground-truthing, such ecosystem accounts will be followed by the identification of ecosystem condition, ecosystem and abiotic service assets and associated natural input into local economies as resource-uses.

Conclusion

Many countries have developed estimates of ocean contribution to GDP through gross value add and ocean sector disaggregation. However, relatively few countries are developing holistic, dedicated, and standardized ocean accounts frameworks. Comparisons of ocean economies across nations are often thwarted by scale, definition, classification standards and scope or type of ocean economic data that are packaged into ocean economy valuation estimates (Kildow & McIlgorm 2010; Park & Kildow 2014; Colgan 2003; Mohanty et al. 2015). The inclusion or exclusion of particular sectors result in different estimations, and the extent of non-market values, geographic range and upstream / downstream sectoral inclusions or exclusions within the estimates means that regional or national comparisons are non-comparable (Kildow 2014; OECD 2016; Seo Park 2014). There is a clear need for consistent standardized frameworks for the estimation of oceans economies, including ecosystem asset and service input flows from natural capital to economies, output flows of economic impacts to ecosystems, social costs and benefits and governance contributions that estimate ocean contribution to societal well-being rather than metrics that account for GDP contribution alone. The complimentary underpinning of other ocean governance tools such as MSP by ocean accounting in terms of ocean valuation metrics is imperative to draw transdisciplinary information into informed ocean policy development that focuses on national ocean wealth metrics. IORA Member States could benefit from a consistent Ocean Accounting System, based on the GOAP OAF.

Table 1. Indicators that may be provided by ocean accounting with respect to the different domain areas identified in the text.

Ocean Accounts' Domains	**Potential Indicators**
Environmental and ecological Domain	Ocean Health Ocean Environmental Wealth Critical Natural Capital Environmental Depletion and Degradation Blue Carbon Accounting MPA Efficacy
Economic Domain	Sector GVA / GDP Ocean Production and Income Consumption, Investment, Imports and Exports Labour and capital requirements Environmental demand Resource Rents in association with Supply
Social Domain	Human Capital Employment Opportunities Resource Access Inclusion Ownership Well-being Benefit and Cost Equity
Governance Domain	Regulatory Instrument Deficiencies Compliance and Enforcement efficacy
Multidomain or Interdomain	DPSIR Sendai Framework Indicators Ecosystem-based adaptation to risk Anthropogenic Risk Modelling across Systems Sustainability of Environmental Supply Sectoral Drivers of Environmental Decline Costs and Efficacy of Ocean Management

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Strengthening the Partnership between Germany and IORA

Dr. Tobias Lindner
Minister of State at the Federal Foreign Office, Germany

Dear Readers,
25 years after its creation, IORA is the key regional organisation for the Indian Ocean. With its 23 Member States, IORA unites almost all riparian countries in a spirit of mutually beneficial cooperation. It thus has a positive impact on the lives of nearly 2.7 billion people.

Germany is proud to have been an active IORA Dialogue Partner since 2015. We deeply value our partnership with IORA, its Member States and other Dialogue Partners, a partnership that has always aimed at strengthening the Association and fostering regional cooperation. A cornerstone of our work as Dialogue Partner is our ongoing effort to strengthen the IORA Secretariat in Mauritius through a special project with a dedicated expert.

The German partnership with IORA is based on our commitment to effective and inclusive multilateralism. Germany has consistently played an active role in shaping the rules-based international order and has been working to ensure that multilateral institutions are fit for purpose. In view of the global challenges of the 21st century, multilateral cooperation is more crucial now than ever before.

Our response to the COVID-19 pandemic demonstrates our multilateral commitment. Germany co-founded the ACT-A distribution platform and is its second-largest donor. To date, Germany has provided 2.2 billion euro, the largest part of which has gone to the global COVAX vaccination campaign. Germany is also providing at least 175 million doses of vaccines, primarily to countries in transition and developing countries. IORA Member States have already received more than 20 million of those doses as well as other substantial COVID-19-related aid such as ventilators and masks from Germany.

Germany believes in the immense potential of the Indian Ocean region. With our 2020 Policy Guidelines on the Indo-Pacific, we have acknowledged that the international order of tomorrow will be decisively shaped right here. As an internationally active trading nation, Germany has a great interest in participating in growth dynamics and in being involved in shaping the Indo-Pacific region, as well as in upholding global norms in regional structures.

Germany is also committed to a rules-based international maritime order in the Indo-Pacific region. This is why we are deepening our cooperation with IORA in this field. In close cooperation with the Government of Sri Lanka, a future series of training courses by the German Max Planck Foundation for International Peace and the Rule of Law will focus on the effective implementation of the United Nations Convention on the Law of the Sea into national legislation.

The Federal Government has climate action high on its agenda: we plan to reduce emissions by 65% by 2030 and 88% by 2040 and to become climate-neutral by 2045. In order to accomplish this ambitious goal, we plan to increase the use of renewables from roughly 40% to 80% within this period. As 92% of global greenhouse gas emissions are currently produced outside the European Union, we intend to strengthen climate and energy diplomacy. The climate crisis is a key issue of our G7 Presidency in 2022, focusing on the global energy transition and the COP26 call for pre-2030 ambition. In addition, we will initiate an open and inclusive international climate club to develop common high standards for ambitious global climate action.

Climate change will drastically affect the Indian Ocean Region with rising sea levels and an increase in extreme weather events. International cooperation is crucial to mitigate the impact of this existential threat. Therefore, climate change should be accorded a prominent role within IORA in future. As an active Dialogue Partner, Germany stands ready to contribute and cooperate in this area.

My hope is that the IORA Silver Jubilee will stimulate discussion among Member States and Dialogue Partners on how to strengthen IORA as an organisation and how to harness regional opportunities more effectively through concrete action. IORA is the beacon of multilateralism in the Indian Ocean, may it shine even brighter in the years to come.

IORA Economic Integration: Developments and Way Forward

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Abstract
As an important regional cooperation organization, one of the important aims for Indian Ocean Rim Association (IORA) is to deepen inter-regionalism and economic integration in Indian Ocean through offering a well-positioned platform for its members. In doing so, the key of advancing economic integration is to achieve trade liberalization and investment facilitation among member countries. For many years, trade and investment connections among the littoral states in Indian Ocean have lagged behind what might be expected based on geography, population and markets. Since the IORA covers the major economies in Indian Ocean Rim, its success means the glory and importance of the Indian Ocean. Promoting economic integration requires IORA to look beyond Indian Ocean. Besides expanding the key economies' role in IORA to revitalize the regional economy by means of further facilitating greater regional flows of goods, services and people, it is argued that opening IORA to cooperation with extra-regional powers such as China, Japan and the United States can possibly help the Indian Ocean emerge as the 'center of growth' through catalyzing trade and stimulating investment. It concludes that the degree of economic integration in short-term is low, but long-term prospects are favorable.

I. Introduction

IORA, celebrating 25 years in 2022, marks a new orientation since its establishment of the Indian Ocean Rim-Association of Regional Cooperation (IOR-ARC) in 1997, which is the only pan Indian Ocean economic grouping and brings together 23 countries including Australia, Bangladesh, Comoros, France/Reunion, India, Indonesia, Iran, Kenya, Madagascar, Malaysia, Maldives, Mauritius, Mozambique, Oman, Seychelles, Singapore, Somalia, South Africa, Sri Lanka, Tanzania, Thailand, the United Arab Emirates and Yemen as well as 10 dialogue partners including China, Egypt, Germany, Italy, Japan, Republic of Korea, Russia, Turkey, the United Kingdom, and the United States of America. Its influence was limited at the beginning of its founding until IOR-ARC was renamed as the Indian Ocean Rim Association (IORA) in 2013 and more efforts were made by key members (such as India, South Africa, Indonesia, Australia, Mauritius) to revitalize it. In particular, Australia took up the position of chair from India in 2013 and intended to represent a substantive effort by the 21 member states to break with the organization's underwhelming past (Alex Benkenstein, 2018).

It is well known that the Indian Ocean is rich in natural resources. Its great potential has become more apparent after 25 years of rapid development.

Today, IORA, which includes major economies in the Indian Ocean Rim, is a significant regional association with huge potential to contribute to enhanced collaboration within the Indian Ocean based on the principle of open regionalism through promoting trade liberalization and investment facilitation. It is through more than two decades of hard work that IORA has progressed to a new stage with achievements in many aspects such as expanding the number of members from its original 7 to current 23, achieving a productive cooperation in maritime safety and security as well as identifying six priority areas of cooperation: (i) maritime safety and security, (ii)trade and investment facilitation, (iii)fisheries management, (iv)disaster risk management, (v)academic, science and technology cooperation, and (vi)tourism and cultural exchanges. Since Australia became the chair of IORA during 2013-2015, another two focus areas including Blue Economy and Women's Economic Empowerment were identified. On the economic front, IORA's cooperation is partly to develop the blue economy through better utilizing the natural resources, and partly to quicken economic integration through promoting trade liberalization and investment facilitation within the Indian Ocean Rim. It is worth mentioning that the Blue Economy is advocated to realize the great potential for higher and faster GDP growth in the Indian Ocean Region (V.N Attri,2016). Compared to the main objectives of the Association for promoting sustainable and balanced development of the region and member states through economic cooperation, there is a big gap between the total GDP and economic needs with huge population in the Indian Ocean Rim. In recent years, the international situation is changing rapidly, the trend of anti-globalization is accelerating, both trade protectionism and unilateralism are becoming major obstacles to enhancing the economic cooperation between countries. In addition, the global spread of the coronavirus pandemic has hit the economies of various countries, its negative impact on the economic growth of various countries has exceeded that of the 2008 financial crisis. The Indian Ocean Rim is no exception. Meanwhile, thanks to the intensification of great power's strategic competition, the Indian Ocean is now coming under the strategic spotlight. There is no doubt that the Indian Ocean Rim is of vital strategic, economic and maritime importance along with the emerging strategy among geopolitical actors, such as the Indo-Pacific Strategy led by the USA, the Belt and Road Project put forward by China and the Sagarmala project envisioned by India (Chaudhury and Basu, 2016).

Since the IORA is a huge economic organization in the Indian Ocean, its success means the glory and importance of the Indian Ocean. As a huge economic organization that tries to connect the five littoral sub-regions including Australia in Oceania, Southeast Asia, South Asia, Middle East in west Asia and Africa in the east, a stronger IORA will inevitably contribute to the economic integration in the Indian Ocean Rim. But to what degree has IORA advanced the economic integration of the Indian Ocean Rim in the past years? In this regard, this paper aims to examine the impacts of IORA on economic integration in the Indian Ocean Rim through looking at the characteristics of economic development in the Indian Ocean from the perspective of both trade and investment, and further explore if IORA can really help the Indian Ocean to emerge as the 'center of growth' through propelling economic integration and its prospects to achieve this goal.

II. The Characteristics of Economic Development in Indian Ocean Rim

The Indian Ocean Rim embraces 38 economies in five sub-regions with the population of about 3.2 billion. Most of the Indian Ocean Rim states joined the Indian Ocean Rim Association. Regional cooperation organizations in this region also include the Indian Ocean Commission (IOC), and a sub-regional cooperation organization named The Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC). However, the level of integration of these international organizations is generally low. This can be confirmed to a certain extent from the economic development of the Indian Ocean Rim in recent years.

Table 1: 38 Indian Ocean Rim Economies

subregion	Economies
Southeast Asia	Indonesia, Malaysia, Myanmar, Singapore, Thailand, Timor-Leste
South Asia	Bangladesh, India, Maldives, Pakistan, Sri Lanka
Middle East in West Asia	Bahrain, Iran, Iraq, Israel, Jordan, Kuwait, Oman, Qatar, Saudi Arabia, the United Arab Emirates, Yemen
Africa in the East	Comoros, Djibouti, Egypt, Eritrea, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, Somalia, South Africa, Sudan, Tanzania Reunion (island), Mayotte (Island)
Oceania	Australia

Source: Cuiping Zhu,ㄴ Indian Ocean and China ㅏ, Social Science Academic Press (CHINA),2013

Economic cooperation among countries in the Indian Ocean Rim aims to eliminate both trade and investment barriers to advance economic growth of the member countries. By analyzing the main indicators such as GDP, per capita GDP, international trade and FDI, we find that the Indian Ocean Rim economies does not contribute much to international trade and the world economy relative to its land area and population. According to the statistics of the Word Bank and UNCTAD, in 2020, the total GDP of the Indian Ocean Rim was $10.51 trillion, accounting for 12% of the global GDP. But the population of this region accounts for 40% of the world's total population. In 2020, the total import and export volume of the Indian Ocean economies was $5.85 trillion. Among them, the total import value was $2.4 trillion, accounting for 13.5% of the global total, and the total export value was $2.5 trillion, accounting for 14.3% of the global total. At the same time, in 2020, FDI flows to the region was $265 billion, accounting for 26.5% of total global FDI flows, and OFDI flows was $112.6 billion, accounting for 15% of total global OFDI flows.

The countries along the Indian Ocean generally have a relatively fast economic growth rate, which means the growth potential is huge. Among them, there are developed countries such as Singapore, Australia and Israel. India is the largest population country and largest economy in the Indian Ocean Rim, it is also the sixth largest economy in the world. Meanwhile, there are some emerging economies such as Singapore, Malaysia and Indonesia, and oil-rich Gulf countries such as Saudi Arabia, the United Arab Emirates and Oman. Of course, there are also the least developed countries in the world, such as Comoros and Somalia. Judging from the dynamic development trajectory we have studied, in the past 20 years, the economic scale of the Indian Ocean Rim has grown slowly thanks to the development foundations remain weak, the level of intraregional trade cooperation has been low, and the endogenous driving force for economic growth has been insufficient. The main features of the current economic development in this region are as follows.

First, the economic foundation of the Indian Ocean Rim is relatively weak, and the economic levels of the five subregions are quite different. In addition to Australia in Oceania, the economic and trade levels of subregions including Southeast Asia, South Asia, the Middle East in west Asia, and Africa in the east have large differences. In particular, the economic and trade development level of African coastal countries is relatively backward. In terms of GDP, India is the first largest economy with $2.7 trillion of GDP in 2020, the lowest is Seychelles with $1.1 billion of GDP in the same year. From the perspective of per capita GDP in 2020, Singapore is the highest with $59,800 per capital GDP. Also, the per capital GDP of both Qatar and Australia are also above $50,000. The lowest per capital GDP is Somalia at only $327. Even within the same region, the level of economic and trade development varies greatly. For example, Singapore is the richest country not only in Southeast Asian but also in the Indian Ocean Rim, but Timor-Leste is very backward in development. At the same time, in the Middle East in West Asia, we can find the wealthy Israel, Saudi Arabia and the United Arab Emirates, as well as war-torn and impoverished Yemen. In addition, the develop-

ment of African countries is generally poor, but some states have special advantages like Mauritius, which is relatively developed in finance. Of course, Comoros is the most backward in various development indicators.

Second, the level of intra-regional trade in the Indian Ocean Rim is relatively good. Except for 2020, intra-regional trade accounts for more than 30% of total foreign trade. However, each economy has a similar trade structure, and the trade complementarity within the region is not very strong. IORA, as an important economic cooperation organization in the region, also lacks a clear and coherent trade policy mechanism to push ahead trade liberalization, which restricts the improvement of the cooperative efficiency. In the past 10 years, the overall trade structure in the Indian Ocean Rim has not changed much. On one hand, the trade structure is similar, and its complementarity is not strong. On the other hand, the characteristics of the trade structure mainly based on primary products, especially raw materials and energy products, which have not fundamentally changed. With the increase in the overall trade value of the Indian Ocean Rim, the proportion of oil and fuel exports has declined, and the proportion of various manufactured goods exports has not changed significantly. The proportion of exports of spare parts, electrical equipment and mechanical equipment did not increase but declined, only the proportion of intra-regional trade in food and agricultural-based manufactured products increased. So far, a highly mature internal market with 38 economies in the Indian Ocean Rim has not cultivated, nor has it been formed a relatively complete intraregional industrial chain and production network.

Table 2 : 38 economies intra-regional trade volume and its share of total foreign trade volume (unit: billion, %)

year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
intra-regional trade volume	1880.1	1986.8	1993.5	1926.1	1538.6	1415.0	1645.44	1859.3	1726.9	1460.3
total foreign trade volume	5735.7	6003.4	6057.3	5904.7	4955.5	4070.2	5290.02	5852.8	5564.4	5751.5
%	32.8	33.1	32.9	32.6	31.1	34.8	31.1	31.8	31.0	25.4

Data source: UNCTAD

Third, the Indian Ocean economies have limited ability to attract investment, and the total amount of foreign investment is relatively small, but the growth rate is relatively fast. We found that the economies of the Indian Ocean Rim not only attract relatively few FDI, but most of the FDI in this region does not flow to themselves, but to the countries outside the region, especially to the developed economies. FDI in the Indian Ocean Rim is concentrated in only a few countries. As a whole, the Indian Ocean economies attract investment at a faster rate, but their total volume has been relatively small. According to the latest data released by UNCTAD, global FDI fell sharply in 2020 to only $859 billion, a drop of 42% compared with $1.5 trillion in 2019. FDI flows to countries in the Indian Ocean Rim in 2020 were about $265 billion with a reduction of $14.3 billion from $279.3 billion in 2019. As of the end of 2019, the FDI stock of Indian Ocean Rim states was $4.75 trillion, accounting for only 13.7% of the global FDI stock ($34.57 trillion), and most of them are also concentrated in the energy industry of India and the Gulf countries. From the historical trend, the FDI flow to the Indian Ocean Rim fluctuates greatly, while the stock ratio hovers around 13% all year round. According to the flow of investment, most investment attracted by the Indian Ocean countries has flowed to the industries of service, mining, quarrying and manufacturing in several concentrated countries including Singapore, Australia, India and Indonesia.

Fourth, despite the rapid economic growth in the Indian Ocean region, which has been increasingly embedded in the global value chain, the economic order in this region lacks in-depth institutional arrangements and the degree of economic integration is low. In recent years, although the economic

growth rate of the Indian Ocean Rim is lower than that of East Asia, the economic growth rate of many countries is relatively fast as I mentioned before. In 2020, the fastest growing country in the Indian Ocean Rim is Comoros, with a growth rate of 4.91%, and the slowest growing country is the Maldives, with a growth rate of -31.98%. The unsatisfactory degree of economic integration in the Indian Ocean Rim countries means that the interdependence of the countries in the region is low, the economic links between various geographical sectors are loose, and the relevant economic cooperation mechanisms still need to be improved in terms of density, breadth and depth.

As we know, Asia-Pacific Economic Cooperation (APEC) has higher levels of integration, 65%-70% of APEC's trade volume in the past 10 years has come from its member countries. In contrast, the figure of the Indian Ocean Rim is only 30-35%. In particular, the figure for the 23 IORA member states in the Indian Ocean Rim is less than 25%. In addition to the IORA, organizations with the main objective of regional economic integration in the Indian Ocean also include the South Asian Association for Regional Cooperation (SAARC), the Association of Southeast Asian Nations (ASEAN), the Gulf Cooperation Council (GCC), the Common Market for Eastern and Southern Africa (COMESA) as well as the Southern African Development Community (SADC). However, the functions of these organizations or mechanisms overlapp a lot, and the institutional arrangements for economic cooperation are characterized by low density and fragmentation, the existing mechanisms are not mature enough in almost all aspects.

III. IORA and China's Economic Engagement

The IORA is currently a major organization that seeks to promote economic cooperation within the region, including economic, political and security dimensions (Moses Onyango Ogutu,2021). But integration based on economic cooperation is of great significance for a stronger IORA. In Gurpreet Khurana's opinion, it is common fallacy that IORA's 'inclusive approach' only relates to involvement of extra-regional stakeholders, and not the role of sub-regional arrangements within the IOR (2018). But the facts show that stakeholders outside the region play a very important role in bolstering up the economy in the domain.

Due to the lack of a highly developed intraregional market, the region's rapid economic growth has been driven by trade and investment from countries outside the region including China. In 2019 before the COVID-19 pandemic, the main export partners of the 38 economies in the Indian Ocean Rim were China, the United States, Japan, India, and South Korea etc. The main import partners were China, the United States, Japan, the United Arab Emirates and India etc. Among them, China ranks first in both the proportion of import and export in this region. It can be seen that, whether it is import or export, the economies of the Indian Ocean region are more dependent on the huge market outside the region.

Table 3 : Top 10 Import and Export countries of the Indian Ocean Rim in 2019 (Unit: $10 billion, %)

Import Partner	Import	%	Export Partner	Export	%
China	506.53	18.6	China	440.78	15.50
U.S.	225.03	8.27	U.S.	245.75	8.64
Japan	144.42	5.31	Japan	208.12	7.32
UAE	108.40	3.99	India	175.51	6.17
India	104.85	3.86	Korea	129.57	4.56
Germany	100.85	3.71	Singapore	111.63	3.92
Saudi Arabia	89.65	3.30	Kongkong,China	107.40	3.78
Singapore	88.77	3.26	Malaysia	79.73	2.80
Malaysia	88.55	3.26	UAE	73.29	2.58
Korea	84.78	3.12	Taiwan, China	72.35	2.54

Data source: UNCTAD

In January 2000, China officially became a dialogue partner of the IORA and became a major partner of economic cooperation, especially in the field of trade. The total imports and exports between China and the countries in the Indian Ocean Rim account for 25% and 20% of China's total imports and exports, respectively, and 18% and 15% of the Indian Ocean Rim's total imports and exports. Moreover, over the years, the trade intensity between China and the Indian Ocean Rim has been greater than 1, which shows a clear upward trend. It shows that China has become the largest trading partner of 19 countries (Indonesia, Malaysia, Myanmar, Singapore, Thailand, India, Pakistan, Iran, Iraq, Kuwait, Saudi Arabia, Yemen, Egypt, Kenya, Madagascar, South Africa, Sudan, Tanzania and Australia) in the Indian Ocean Rim. However, China's investment in the Indian Ocean Rim is limited and the investment stock is not large. In 2019, the top five countries of China's OFDI in the Indian Ocean Rim include Singapore ($4.825 billion), Indonesia ($2.22 billion), Australia ($2.08 billion), Thailand ($1.37 billion), and the United Arab Emirates ($1.21 billion). As of 2019, the top five countries of China's OFDI stock in the Indian Ocean Rim include Singapore ($52.64 billion), Australia ($38.07 billion), Indonesia ($15.13 billion), Malaysia ($7.92 billion) and Thailand ($7.18 billion). China's OFDI flow and stock in the region accounted for 12% and 8% of China's total OFDI flow and stock, respectively.

With the advance of the Belt and Road Initiative, China will make an effort to strengthen trade and investment cooperation with countries in the Indian Ocean Rim. At present, China's geo-economic advantages in the Indian Ocean continue to be accumulated, its economic influence continues to rise, and there is huge potential for economic cooperation. China's Belt and Road Initiative towards the Indian Ocean will contribute to reshaping the trade prosperity of the ancient Maritime Silk Road and can help stabilize the world economy in the post-COVID pandemic.

Geographically, China is close to the eastern Indian Ocean, as well as the largest neighboring country of the Indian Ocean. As an external power close to the Indian Ocean, China can not only provide economic growth impetus for the region, but also can contribute to promoting the process of economic integration in the region. In the context of the current strategic competition among major powers, regional cooperation is easily obstructed by geopolitical factors, but economic cooperation is still an important factor in stabilizing political relations. In other words, although economic activities dominated by trade and investment may not necessarily become an anchor of political stability, it will certainly increase the cost of non-cooperation and will definitely bring benefits to the partners. After all, a prosperous, stable and secure Indian Ocean Rim is the goal which IORA pursues.

IV. Limitations and Prospects for Indian Ocean Rim Economic Integration

At the moment, the international political and economic situation is undergoing profound changes, there has been a clear trend for some countries to politicize economic issues due to increased strategic competition among major powers. Meanwhile, the rise of protectionism and unilateralism is impeding the progress of the economic integration. The sluggish global economy under the influence of the pandemic has become the huge external challenge for the economic recovery and development. In face of such threats and challenges, no country can avoid being affected or stay alone. Moreover, the pandemic hit the global economy heavily, and the trade and investment of each country are affected in different degree. The trade protectionism and anti-globalization will not be easily changed in the short run, but in the long run, regional integration and globalization is still the future trend as it is consistent with economic rules.

As one of the most important economic cooperation organizations, IORA has been working hard to promote the economic integration of the Indian Ocean Rim. This is not only because of the huge benefits that regional economic integration may bring to a single economy, but also because only regional economic integration can break away the Indian Ocean Rim from the status of a single 'energy channel' and become a truly important entity in the world economy. Moreover, the IORA. with high legitimacy has accumulated rich experience and achieved remarkable results in promoting cooperation on maritime issues. Regrettably, there are still two major limitations to the development

of the IORA.

On the one hand, there has been limited success in promoting regional integration. As mentioned above, the Indian Ocean Rim is more of a 'big geography' concept integrated by several scattered geographical areas including Southeast Asia, South Asia, the Middle East, Africa and Oceania, and it is far from playing a role in shaping economic geography. Either state or subregion in the Indian Ocean Rim really has closer economic relations with countries and organizations outside the region. For example, ASEAN has close relations with East Asian production centers, and African countries along Indian Ocean have close relations with other African countries or international organizations. In fact, most of the Indian Ocean economies are located on the fringes of the global production network, and they are also located in an economic circle outside the Indian Ocean. Their production, trade and investment are more dependent on extra-regional markets, and there is a lack of real economic centers in the Indian Ocean. If there is not enough force or impetus for connecting these loose economic areas more closely, it is hard for IORA to function and perform effectively in advancing economic integration and further forming a growth center of the world.

On the other hand, the institutional efficiency of the IORA is still not high, especially in terms of promoting trade liberalization and investment facilitation. Moreover, the lower manufacturing level of the Indian Ocean Rim countries has resulted in the region to remain on the edge of the world's major production networks. The limited level of production technology and smaller comparative advantages in production costs make it difficult to ascend the level of intra-industry trade and intra-product trade.

It is argued here that the IORA brings together major countries along the Indian Ocean, and there is a strong willingness to cooperate among them. Once the economic vitality of the region is stimulated, the huge potential will be released, and it will have a continuous impact on the entire Indian Ocean Rim and even the world economy. Since the beginning of regionalism, historical experience has taught us that only openness and inclusiveness, healthy competition and win-win cooperation can provide the greatest impetus for the economic integration of the region. The development effectiveness of the Indian Ocean Rim Association in the next decade will largely depend on whether it can stimulate the vitality of the organization through cooperation and whether it can promote economic growth based on both trade liberalization and investment facilitation.

This requires first of all a global vision and an adherence to open regionalism. That is to say, promoting economic integration requires IORA to look beyond Indian Ocean. By leveraging the power outside the region, vitality of economic growth in the Indian Ocean Rim can be indeed enhanced. It cannot be ignored that, in the context of intensified global geo-competition, economic cooperation is easily affected by uncertainty factors. Undoubtedly, countries have a need for cooperation, but their willingness to cooperate is easily affected by traditional geopolitical thinking and geo-competitive factors. When geopolitical considerations outweigh geo-economic considerations, countries will choose non-cooperation and opportunities for development will be lost. If countries put development and people's well-being first, attracting FDI, advocating multilateral trade as well as promoting connectivity will all be the main paths for economic recovery and prosperity.

Secondly, the IORA should pay attention to dealing with the relationship between market-driven and government-driven in order to form the interaction of industrial development between countries, and further promote the reconstruction and optimization of the international trade industrial chain. On the basis of promoting the free flow of factors, the extension of the value chain and the optimal allocation of production factors, the production network and trade industry chain between countries in the Indian Ocean Rim, economic integration will be sped up, developing open economies.

Thirdly, IORA should continue to pursue institutional building and capacity building. At present, the COVID-19 pandemic has brought an unprecedented impact on the world economy, international cooperation and international relations, which highlights the urgency of global governance and

the necessity of international cooperation. The Indian Ocean Rim is full of various challenges in terms of terrorism, various diseases, natural disasters (drought, flood, locust plague), refugee crisis, cyber threats as well as climate change, which should be addressed through cooperation between nations on the basis of institutional building and capacity building.

V. Conclusion

As an important regional cooperation organization, one of the important aims for Indian Ocean Rim Association (IORA) is to deepen intel-regionalism and economic integration in the Indian Ocean through offering a well-positioned platform for its members. In general, the IORA has achieved remarkable results in maritime cooperation and has also made efforts to promote the development of the blue economy in the Indian Ocean Rim, but the degree of economic integration in the region is still low. There were differences in the development foundations between countries in the Indian Ocean Rim. In particular, the degree of economic interdependence among countries is not deep and the complementarity is not so strong. The benefits obtained through regional economic integration arrangements have not been plentiful, it makes it difficult to mobilize the enthusiasm of member states. Also, it is hard to be sure that relevant policy and cooperative mechanism can be achieved. It can be said that up to now, there is no, in a very real sense, 'Indian Ocean economy' in the Indian Ocean Rim, and the economic integration based on trade and investment in the region is still relatively weak.

Presently, trade and investment connections among the littoral states in Indian Ocean lag behind what might be expected based on geography, population and markets. Since the IORA covers the major economies in Indian Ocean, its success means the glory and importance of the Indian Ocean. Beside expanding the key economies' role in IORA to revitalize the regional economy by means of further facilitating greater regional flows of goods, services and people, it is argued that opening IORA to cooperation with extra-regional powers such as China, Japan and the United States can possibly help the Indian Ocean emerge as the 'center of growth' through catalyzing the trade and stimulating investment. It concludes that the degree of economic integration in short-term is low, but long-time prospects are favorable. As a subsystem under the global system, no region, including the Indian Ocean Rim, can exist in isolation, external parties are often critical in promoting inter-regionalism in a complex world. However, to achieve the potential to emerge as a 'center of growth', IORA needs to intensify open regionalism efforts through promoting trade liberalization and investment facilitation, establish a stronger organization through capacity building and institution building, explore all possibilities of promising markets and cooperation opportunities for economic cooperation through combining market-driven integration and government-driven integration. Also, China has a strategic opportunity to make a lasting impact on IORA through supporting a stronger organization in order to enhance effective regional cooperation in the Indian Ocean Rim.

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REGIONAL CONNECTIVITY IN THE INDIAN OCEAN RIM– A CASE FOR IORA CLIMATE ACTION?

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ABSTRACT
This paper outlines some thoughts for IORA to consider getting engaged in climate action. It is argued that in particular the requirement for regional connectivity, which relies on cross-border aviation and maritime transport, contributes to global warming, but is not considered by the emission reduction efforts at the individual country level. With the maritime and coastal space as common denominator for the Association, carbon sequestration and emission reduction action focusing on this space may be a particularly suitable means for IORA to make a substantial contribution against the climate crisis as a common and global threat.

Introduction

Over its 25 years of existence, IORA has evolved from humble beginnings, centering around the improvement of trade relations in the Indian Ocean neighborhood, to a regional body encompassing 23 member states that are differing widely with respect to their socio-economic conditions, population size, culture, religion, climate, natural habitats, and exposure to natural and human-made hazards. The thematic areas the Association has been focusing on by now encompass the priority areas Maritime Safety and Security, Trade and Investment Facilitation, Fisheries Management, Disaster Risk Management, Tourism and Cultural Exchanges, Academic, Science and Technology Cooperation, as well as the two cross-cutting issues Blue Economy and Women's Economic Empowerment. These topics are addressed, to varying degrees, through working group sessions and special events, such as international conferences, workshops, and to some extent training programs. However, during its 25 years of existence, there has been hardly any tangible action on the ground which would have made the presence – and relevance - of the Association felt among the wider population in its Member States. And while the global climate crisis has become ever more important to deal with at the international and regional levels, and climate change related extreme weather events have become more and more frequent everywhere, it has still not yet received the attention required for addressing it adequately by IORA.

Therefore, this paper tries to outline some ideas on how this issue could be addressed in line with the IORA philosophy, building upon the strengths of the organization and the common interests of its Member States. The one common element that is linking all Member States of the Association, rich

ar and poor alike, is the Indian Ocean with its shores, beaches, and coastlines. While this Ocean is certainly the common link, it is at the same time also separating the Member States, as cross-border connectivity is heavily depending on air and sea routes, and land transport alternatives even among neighboring Member States are almost negligible.

Connectivity and Transport

According to statistics compiled by the World Resources Institute and the International Energy Agency transport accounts for roughly one fifth to one fourth of global greenhouse gas emissions[1]. Globally, three quarters of these emissions are attributable to road transport, and a negligible 1% to rail transport and another 2.2% for the movement of liquids such as water and oil through pipelines. But this picture looks different for the Indian Ocean Region, where a significantly higher share is stemming from air and sea traffic.

When looking at the importance of the region, IORA prides itself with the fact that two third of the world´s container freight and 80% of global oil transports are passing through the shipping lanes of the Indian Ocean.[2] Although sea freight, in terms of CO2 emissions per ton/km has by far the lowest footprint, container ships in general still use the highly polluting heavy fuel oil.

In terms of CO2, the aviation sector "only" accounts for 11.6% of transport emissions and 2.5% of global emissions. However, due to the cloud forming effects of the contrails of aircrafts, and the emission of other particles in the higher atmosphere, aviation is in fact responsible for 5.5% of the human-induced warming of the planet.[3] And the percentage of people who are actually flying at all, and thereby contributing to this, is growing, but still remains very small, restricted to a minority of wealthy global (and regional) citizens and leaders. This uneven distribution is certainly due to the prices of air tickets, with the cost for the damage this mode of transport causes to the global climate not even being included. But the unbalanced level of climate justice becomes even more apparent if we look at different countries: while UAE, Oman, and Australia have an average CO2 footprint of more than 15t of CO2 per person per year, South Africa is – similarly to Dialogue Partners China, Germany, and Italy - at around 7, while India is at 1.7, Bangladesh at 0.6, and Madagascar at just 0.15t per person per year.[4] While these are just country averages, international travelers should be aware that a single return flight from Mauritius to Singapore in economy class has a climate impact of 2.5t CO2 emissions, and if this flight is routed via Dubai, even 4.7t CO2.[5] This contrasts to a climate compatible annual emissions budget of just 1.5t per year for every global citizen, if we want to see the 1.5° goal of the Paris Agreement achieved.

Nevertheless, air connectivity for the Indian Ocean Region is and remains of high importance, not only for the inter-regional connectivity, but also for the transport of international tourists on which quite a number of IORA Member States depend to a substantial degree.

Especially in 2020, the Covid-19 pandemic interrupted the steadily rising CO2 emissions from aviation and shipping, but only temporarily. According to estimates by the International Air Transport Association global aviation passenger numbers should be back at 2019 figures in 2023, but the demand is expected to resume its growth path for decades to come, while air cargo volumes already exceeded pre-crisis levels by almost 10% in 2021.[6] Similarly, even global sea freight was already again slightly higher in 2021 than it was in 2019.[7] Although energy efficiency gains are expected to some degree, the constantly increasing

Footnote:

1. *Including land use emissions, the World Resources Institute calculated 21% in 2016, while the IEA, looking at CO2 emissions from energy generation alone, comes to 24%: See: https://ourworldindata.org/co2-emissions-from-transport*

2. *See, e.g., Attri, V.N./Bohler-Muller, N. 2018: The Blue Economy Handbook of the Indian Ocean, Pretoria: P.3*

3. *See, e.g. Fliegen und Klima (fliegen-und-klima.de), quoting calculations by the Öko-Institut, Freiburg*

4. *Data from: https://worldpopulationreview.com/country-rankings/carbon-footprint-by-country*

5.*Calculated via the flight emission calculator at: https://www.atmosfair.de/en/offset/flight/*

6. *IATA - Recovery Delayed as International Travel Remains Locked Down*

7. *IEA (2021), Tracking Transport 2021, IEA, Paris https://www.iea.org/reports/tracking-transport-2021*

volumes are most likely preventing any net reduction in emissions for aviation and ships. And unlike road and rail transport technologies which are comparatively easy to de-carbonize through battery electric solutions, these solutions are only feasible for near shore and coastal maritime transport or short-haul flights.

Because of this, both, the International Air Transport Association as well as the International Maritime Organization which have assumed the responsibility of defining net-zero targets for their respective industries have been very conservative in making any commitments in this respect. But for a lack of international agreement, the emissions caused by cross-border air and sea traffic is not accounted for under the Nationally Determined Commitments (NDCs) of the parties under the 2015 Paris Agreement, and remain with these international bodies and their industry lobby instead.[8] In 2010, the 191 members of the specialized UN Agency, the International Civil Aviation Organization IATA, committed themselves to achieve 2% fuel efficiency between 2020 and 2050, accompanied by a carbon-neutral growth as from 2020 onwards. This is to be achieved through a series of measures, such as aircraft technology, operational improvements, the use of "sustainable aviation fuels" (plant oil, including used vegetable oils, and a Carbon Offsetting and Reduction Scheme for International Aviation CORSIA)[9], but achievements so far are showing very limited prospects for reduction, and in particular when the pre-pandemic flight patterns resume.

Similarly, the International Maritime Organization also reported some - modest - progress with respect to the regulations they adopted for improving the energy efficient of ships (energy efficiency design for new ships, and an energy management plan for the existing fleet). Yet, they do not commit to substantial reductions before 2050, by when emissions should have come down to 50% of 2008 levels.[10] By adopting a set of measures combining alternative fuels (such as biofuels, electro-/synthetic fuels such as hydrogen or ammonia, produced from renewable energy), supported by wind and electric propulsion add-ons, improved energy efficiency of ships through hull design improvements, air lubrication and bulbous bows, as well as through operational improvements such as slower ship speeds, smoother ship-port co-ordination and use of larger, more efficient ships, more than 80% of current emission projections could potentially be avoided by 2035.[11] But for the time being, all such solutions at scale for both, aviation as well as shipping, are – in the absence of international regulations and effective carbon emission pricing - so much more expensive that substantial progress is not in sight.

On the basis of the considerations above it is concluded that aviation and shipping play a much bigger role for the IORA Member States than for the rest of the world. But while these modes of transport are responsible for a substantial contribution to global warming, which is difficult to reduce within the next two decades, individual countries are not made accountable for these emissions, and do not take responsibility for working on their reduction. On the other hand, the Indian Ocean region in general is particularly vulnerable to the adverse effects of climate change, with an especially high and increasing exposure to hazards such as sea water rise, ocean acidification,

Footnote:

8. *See: UNFCC: Emissions from fuels used for international aviation and maritime transport; accessed through: https://unfccc.int/topics/mitigation/workstreams/emissions-from-international-transport-bunker-fuels; and: International Transport Forum (ITF), 2021, "Decarbonising Air Transport: Acting Now for the Future", International Transport Forum Policy Papers, No. 94, OECD Publishing, Paris; accessed through: Decarbonising Air Transport | ITF (itf-oecd.org)*
9. *Cf. ICAO 2019: Submission to UNFCC Subsidiary Body for Scientific and Technological Advice; accessed through: https://www4.unfccc.int/sites/SubmissionsStaging/Documents/201912011815---SBSTA51%20ICAO%20submission_Final.pdf*
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11. *International Transport Forum 2021: Decarbonising Maritime Transport by 2035; accessed through: Decarbonising Maritime Transport by 2035 | ITF (itf-oecd.org)*

cyclones, droughts, and forest fires. This calls for joint action under the auspices of a regional body like IORA.

The Case for Climate Action under IORA

It is seen that aviation and shipping are particularly important means of transport for ensuring the connectivity in the Indian Ocean region. But at the same time, they are responsible for a significant and increasing contribution to the global climate crisis. While there is technological progress with both, aircraft and ships, becoming constantly more energy efficient, this progress is relatively small and dwarfed by the expected increasing volumes in terms of passengers and freight – at least in the short to medium term for which solutions are indispensable in order to stay "well below" the 2°C increase in global warming to which the parties to the Paris Agreement committed themselves in 2015.

For the time being, the only option left for climate conscious air travelers is to compensate their share of the GHG emissions through carbon sequestration projects of specialized NGOs and companies. Some airlines, such as Emirates, Quantas, Virgin Australia, and Lufthansa have already started their own carbon sequestration programs and ask passengers to voluntarily pay a surcharge to support their blending of kerosene with sustainable aviation fuels.[12] However, can we trust airlines to truly use these additional funds to reduce or off-set their emissions, or is this just some sort of "greenwashing"? Are dedicated NGOs not the better choice, especially if they channel these funds to Gold Standard certified sequestration projects? For example, the German NGO Atmosfair offers such compensation services, using the funds for carbon sequestration projects in various countries.[13] At the moment, some of the projects in IORA Member States which receive funding include the construction of household biogas digesters for rural households in Kenya, agro-solar farms, or solar-powered rural electrification in Madagascar, solar-powered desalination in Komodo/Indonesia, electric public transport in Kenya, power generation from coconut wood residues on Mafia Island, Tanzania, and decentralized solid waste management (compost) in several cities in Java, Indonesia. In Assam as well as in West Bengal, India, Atmosfair also supports the introduction of wood gas stoves. These stoves save 50% of the firewood that is mainly chopped in the mangrove forests in the Bay of Bengal. All these projects have received Gold Standard certifications in accordance with the regulations of the UN Framework Convention on Climate Change (UNFCCC). In line with UNFCC requirements, these projects are regularly monitored for their CO2 emission reduction impacts, which is very cumbersome and costly and still may leave some doubts with respect to the actual savings, especially if the impacts require behavioral change of a large number of households, such as for the improved cooking stoves. Nevertheless, these kinds of projects and their justification show that there is quite some scope for carbon sequestration solutions, in addition to individual efforts by Member States' governments to reach their Nationally Determined Commitments.

With this contribution to the IORA Silver Jubilee Brochure, the author would like to argue that such kind of projects in Member States are indeed an excellent opportunity to be taken up and championed by a regional body like IORA. This is for the following reasons:

1. The looming climate crisis is the most imminent danger, not only for humanity on Planet Earth in general, but even more so in the Indian Ocean Region which is particularly vulnerable.
2. While, according to the current international climate negotiation, every country is responsible for reducing its own emissions, the emissions attributable to the transport of goods and people between different countries are treated like a common good, i.e. largely neglected.
3. Some regional entities, like e.g. the European Union, have started to integrate these

Footnote:

12. *https://www.conserve-energy-future.com/airlines-that-offer-carbon-offset-programs.php*

13. *See https://www.atmosfair.de/en/climate-protection-projects/*

trans-boundary emissions within Europe into their emission trading schemes, at least to some extent,[14] but most regional organizations have not taken any steps in this direction yet. While it may be over-ambitious to create an overarching legal framework for compulsory emission charges for international or intra-regional traffic in the Indian Ocean Region, IORA could start and initiate a regional discussion towards soliciting funding for measures abating the negative impacts triggered by its connectivity requirements.

4. In order for such funds to be used as straightforward as possible, it is recommended to start with projects that are easily measurable with respect to their emission impacts. This is the more so, as IORA does not have the experience or track record of managing funds for project implementation on the ground. And given the common space and common realm of the different IORA Member States, a second criterion for project selection could be a focus on coastal areas and maritime solutions which could be identified in each Member State.

The focus on such a topic would offer an opportunity for IORA to gain a distinct profile and strategic orientation, and to occupy its own space among regional organizations as well as in the international discussion – and in climate negotiations.

Suitable Project Ideas

Although carbon sequestration, or emission reductions, as at least partial global climate solutions could take place just anywhere in the world, it is preferable to deploy these projects in the region. In addition to their carbon emission off-setting effects, they also have additional benefits in terms of employment and income generation, by stimulating the respective industries in the region. Therefore, suitable projects should be identified in each Member State.

Some particularly promising types of projects which respond to the above outlined criteria may include the following:

- Mangrove reforestation and afforestation: mangroves are not only particularly effective in carbon sequestration, but also do not suffer from water stress while growing, and also offer additional benefits such as coastal protection, and safe spawning grounds for fish;
- Biochar through pyrolysis of plant waste material such as agro-waste, water hyacinths, invasive species: this process allows to capture up to 50% of the carbon contained in the plant material which can be permanently stored, while the biochar can also be used as soil enhancer for use in agriculture and forestry;
- Promotion of maritime renewable energy solutions such as wave energy, off-shore wind, or sea water air conditioning;
- Hybridization of existing hydropower dams through adding of floating solar photovoltaic systems, thereby allowing to save water during day time operations, while serving as a storage solution for the solar power. This allows for maximization of the base-load generation capacity of existing hydropower dams during periods of increasing drought conditions. This is similar to pumped storage, but without the necessity to pump water from a lower to a higher reservoir during the day.
- Desalination through renewable energies such as solar, wind, or wave energy: the intermittent nature of renewable sources in this case is negligible, as the desalinated water can be stored or even pumped to higher ground while the renewable source is available. The clean water acts like a storage option for renewables, as it can be distributed as needed through gravity.
- Electrification of public urban transport, in particular in combination with the additional generation of renewable energy at opportunity charging points such as bus terminals;
- Introduction and promotion of low-carbon (coastal) maritime transport for goods and

Footnote:

14. *Fageda, X., Teixidó, J.J, 2021: Pricing carbon in the aviation sector: Evidence from the European emissions trading system, in: Journal of Environmental Economics and Management, Volume 111, 2022; accessed through: https://www.sciencedirect.com/-science/article/pii/S0095069621001352*

passenger ferries, through electrification or by hybridization with modern sailing technologies;

- Use of shore power (from renewable energy sources) for container ships and cruise tourism ships in ports: shore power is substantially cleaner than the heavy fuel generators currently used by the ships, and could even be enhanced through additional solar capacities established in the ports.
- Production of zero-carbon bunker fuels such as ammonia and hydrogen which can be used as clean shipping fuels;[15]
- Cultivation and use of seaweed and algae, as food as well as basis for the production of sustainable biofuels, e.g. for aviation.

Possible Funding Options

The challenge for IORA is to create an appropriate funding mechanism where climate action funding can be collected at the regional level, and awarded to meaningful local level interventions for carbon sequestration, as compensation for emissions attributable to regional connectivity. The funds mobilized would then be awarded to projects selected upon rigorous criteria, and paid upon a proven record of avoided or sequestered carbon emissions. A certain element of climate justice may be introduced by favoring project funding for Least Developed Countries or Small Island Developing States. While additional international funding may only be used for countries listed in the countries listed as eligible for development assistance by the Organization for Economic Co-operation and Development, the funds raised through voluntary contributions and through IORA itself could go to any project in any country which can provide the respective proof of emission impacts.

As much as possible, the funding raised should be proportionate to the respective Member State´s share in regional and international connectivity emissions. To start with, voluntary contributions may be the way to go, not only from Member States and Dialogue Partners, but also from individual travelers. For duty trips to and from IORA functions and events, such carbon contributions should be standard and should be directly introduced, in line with the attributable emissions and prevailing carbon prices. Beyond the mobilization of funding from Member States and Dialogue Partners, voluntary contributions from the bulk of individual private travelers can be enhanced through public awareness campaigns in the respective in-flight magazines and by presenting show-case projects in the various countries which can be visited and explored, by foreign tourists as well as by the local population.

Conclusions

Such practical climate action on the ground would, first of all, help to create a substantially enhanced visibility of the Association in the region and beyond. As a future step, discussions at IORA level may even go in the direction of introducing and harmonizing mandatory carbon contribution payments at the respective entry points in the country of arrival, at airports or ports. In this way, IORA could also set an example for actively advancing the international debate on accepting responsibility for carbon emissions from aviation and maritime transport.

These ideas and thoughts are meant to stimulate the respective discussion within IORA: What is the future of this Association, and its role in, and for, the Region? Would climate action - linked to the challenges of regional connectivity, and with a focus on the maritime and coastal space - not be particularly suitable as a meaningful and widely appreciated contribution of a regional organization against a common and global threat?

Footnote:

15. *See: Englert, D.; Losos, A.; Raucci, C.; Smith, T. 2021: The Potential of Zero-Carbon Bunker Fuels in Developing Countries. World Bank, Washington, DC. Accessed through: https://openknowledge.worldbank.org/handle/10986/35435 License: CC BY 3.0 IGO*

SCIENCE AND TECHNOLOGY AS KEY FACTORS FOR IORA COUNTRIES ROLE AT WORLDWIDE LEVEL

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ABSTRACT

This article presents a methodological approach for policy decision makers in science and technology looking at their interactions and it offers a model for their implementation. This methodology is useful both ex-ante for planning and ex-post for evaluating investments in science and technology, in such a way to optimize the impact of R&D and Innovation activities onto the economy of a given country. A case study of the application of this method is highlighted in the results section by presenting an Italian R&D and Innovation project named TecBIA (Technologies with low environmental impact for the production of energy on ships), specifically dealing with the maritime and marine domain. The main outcome of the TecBIA project is ZEUS (Zero Emission Ultimate Ship), a 25 meter ship that integrates cutting edge technologies for sustainability, by using green hydrogen as propeller for a fuel cell technology engine. The ZEUS ship is multi-purpose, and it can therefore constitutes a model to beused by individual countries according to their priority needs in term of target uses.

Keywords: science and technology model and policy, R&D and Innovation, key enabling technologies, interoperability, standardization, Indian ocean, IORA.

1. INTRODUCTION

While increasing the human knowledge, research and development (R&D) efforts play a vital role in sectors such as financial growth and job creation, business competitiveness, national security, energy, agriculture, transportation, public health, environmental protection. Global spending on R&D has reached a record high of almost US $ 1.7 trillion (UNESCO, How much does your country invest in R&D, s.d.). The top fifteen countries for R&D spending by billions (US dollar) or by percentage of their Gross Domestic Product (GDP) include only three IORA current members: France, Australia and Singapore (UNESCO, How much does your country invest in R$D UNESCO UIS., s.d.). Several IORA dialogue partners are part of the top fifteen. Recently, innovation has been added to the classic R&D efforts, creating research and development and innovation (R&D&I) efforts where the final products and/or services are not only the results of strong research background and cutting-edge industrial know-how but also have a disruptive nature. Nowadays, the R&D&I efforts are highly dependent from the interaction between science and technology.

In this paper, the role of science and technology for IORA countries will be discussed as a key issue

to promote their continuous development stemmed out from the IORA mission and vision as represented in the IORA original documents of 25 years ago. The analysis of such a role will put into evidence how science and technology, thanks to their quite fast and disruptive evolution in the two last decades, at affordable cost, offers an unexpected occasion not only for carrying out the original IORA vision and mission limited to the interest of their participant countries, but also for allowing a reinforced place for IORA worldwide. Such an analysis will be conducted by looking at the interplay between science and technology, offering a model to their future structuring and conducting. This model can be eventually shared among IORA countries, starting from their main demands as arising at social, economic and industrial level, looking at their geographical condition of facing the Indian ocean as a sort of liquid glue to yield a proactive union of the large number of the various IORA cultural heritages, reach of values to be made available not only to IORA dialoguing partners, but worldwide.

2. METHODS

From a methodological point of view, the model to be considered as useful for science and technology in order to provide a measurable driving force with impact on IORA countries is the one currently shared at international level (Cristina, Laura, Mioara, & Ciprian Ionel, 2018), i.e. the OECD circular model versus the linear one. As matter of fact, it is quite evident to anyone the limitations which are inherent to the old original linear model for science and technology. Such linear model envisages a series of linear steps starting from the inventor idea, through the various phases of prototyping at laboratory level, then the testing phase at preliminary verification trials level, followed by a quite long and costly structured phase defined as validation over many different centers with many cases in each center, to lead at the difficult technology transfer phase to industries, ending with the even more risky issue of finding interested investors. It is quite clear how these steps require a long time from the original idea and how the rate of failure is unacceptably high.

Since at least the end of the ’80, in the OECD context, it became quite clear the advantages as offered by the circular model for science and technology, aimed at shortening time, costs and maximizing impact of results. Such a model starts from the premise of involving since the very beginning in the scientific adventure on a given matter the entrepreneur, intended in its double face role of demand carrier and active idea promoter in a jointly manner with scientific actors. Therefore, the first advantage is the jointly presence at the same table of demand and offer, which allows the scientific actors to match their offer considering the culture of the industrial partner, in order to optimize the impact of the results over the short and the long term (Satish, 2017).

More specifically, given by granted the principle of starting the scientific roadmap from demand in order to design, developing and verifying the correspondent offer in technological terms of products and processes and not viceversa, two kinds of research activities have to be carried out in parallel, i.e. the first one, commonly named industrial research devoted to lead impact for the industrial entrepreneur in the short-mid term (time being determined basically from the quality and the disruptive level of the originally conceived idea), and the second one, which can be named strategic mission oriented basic research on the very same issue, aiming at pursuing and maintaining in the long range the impact as achieved in the short term by the line of industrial research. Of course, industrial research acts as relevant feedback onto the strategic mission oriented basic research, modulating/re-adjusting the original idea according to the measured impact versus time: here is where the role of the loop is coming in (from which the naming of circular model). Circular cooperation of industrial research and of strategic mission oriented basic research will hopefully ensure impact persistence and, in the end, a competitive advantage for the entrepreneur with respect to his market of reference.

A more general view of the aforementioned circular model can be represented by three words:

RESEARCH, KNOWLEDGE and VALUE**.**

This means that an effective scientific research policy has to consider that RESEARCH is devoted - but not limited to - KNOWLEDGE production, since this last one needs to have a VALUE, i.e. of being not only curiosity KNOWLEDGE but, possibly, performative KNOWLEDGE. Such a sentence may be better understood if stated backwards: if a need which as a certain VALUE in a given area of a society arises, i.e., healthcare, transport, etc., that means that something is still unknown and therefore it calls for KNOWLEDGE production and the professional activity for such a purpose is to conduct scientific RESEARCH, not a generic one, but as merged and inspired by the culture as expressed by that target use calling for that societal or economic needs of that VALUE. Again, it is quite clear the circularity nature of such an approach, eventually leading to effective and efficient impacts.

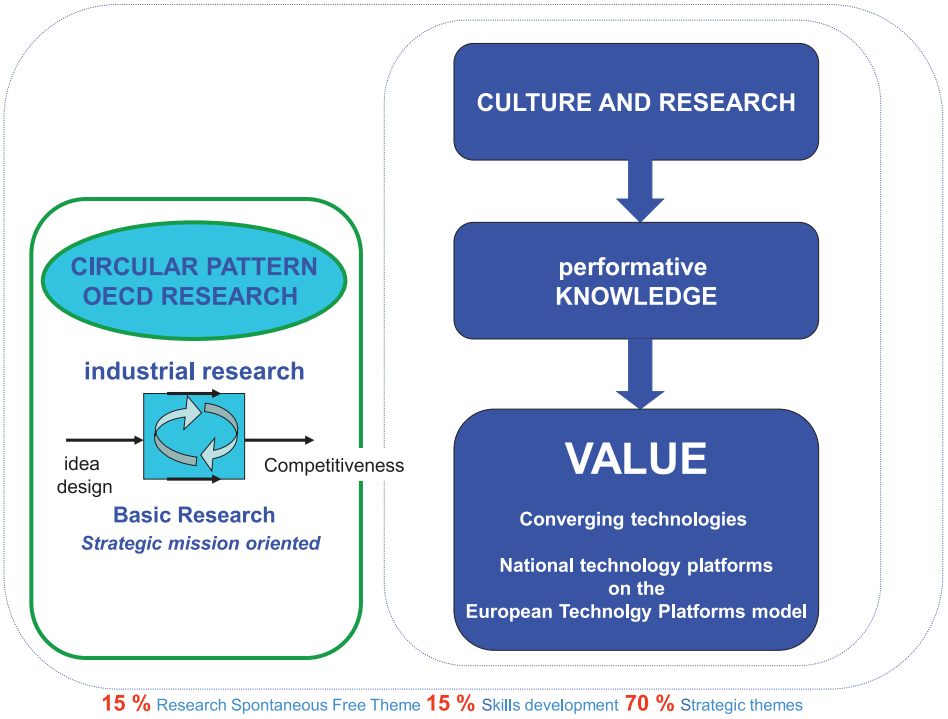

Figure 1 - R&D circular model.

Furthermore, what above stated should not be read as a suggestion to disregard the power of research driven by free curiosity as normally conducted in academic and research institutions, with specific reference to the IORA basin. On the contrary, RESEARCH, KNOWLEDGE and VALUE need to be properly nurtured and protected, because most of the time they act as necessary inspiration input for the previously described approach.

The important factor for science and technology policy decision makers, in the IORA context, would be to propose, define and share an appropriate model for research resources distribution weighted according to the different described kinds of research activities. The European Union, in recent decades, has allocated the funding as follows: 15% for curiosity driven research projects (i.e. ERC), 15% for human and material infrastructures and 70% for industrial research. IORA will have to consider its own peculiarities to choose the appropriate focuses and percentage allocations.

Another important issue to be taken into account is the difference between R&D activities, as above represented to be conducted (see Figure 1), from innovation activity, particularly the difference between innovative research and innovation. Innovation per se is a completely separated sphere of action, much larger that the sphere of R&D. It needs to be associated with specific attributes such as technological innovation, economic innovation, social innovation and so on. The sphere of innovation is located between the sphere of R&D and the

sphere of industrial policies. It is quite evident its role, for example, in transferring from one to another target use R&D results which may be quite assessed in one area (i.e, automotive sector) into another one (i.e. maritime sector). Moreover, under the pervasive diffused adoption of Internet and ICT in general intended as key enabling technology (KET), the definition and way of action of innovation itself have been changing in time, particularly since the first decade of year 2000, at international level, as clearly indicated by OECD, specifically from the DSTI (Department of Science Technology and Innovation), as depicted in the following Figure 2:

Figure 2 - OECD Innovation Strategy.

Such a new definition carries quite important consequences onto the interaction between the innovation sphere and the industrial policies sphere, therefore giving even much more importance and impact to science and technology achievements obtained through R&D activities. The most important of them being the possibility to offer an integrated and systemic vision from outside to the productive system of a given country, empowering its attractively for potential investors.

For evaluating the social and economic impact of both R&D and Innovation results as deliverables of resources investment decisions in a given country, it is important to have available an integrated visualization, for example in the form of a 3D graph as depicted in Figure 3, of at least the main three concurrent instances: Innovative Technology Platforms (axis y), Infrastructures (axis x) and, overall, Target Uses (axis z). Innovative Technology Platforms is mainly related to the novelty and disruptive degree of the R&D activities dimension, Infrastructures is linked to the availability of feasible support for them as a necessary condition deriving from the Innovation dimension existing or easily deployable at a given time in a given country, while Target Uses represents the measurements of the features of the potential end users of the R&D products and processes and its properly conducted estimation as volume and variety: perhaps it is the crucial element to decide the identification of R&D and Innovation investment priorities. An example may be of help in better understanding the relevance of such a 3D representation and corresponding qualitative and quantitative evaluation to optimize the return of the R&D and Innovation investments, or the benefit to cost ratio.

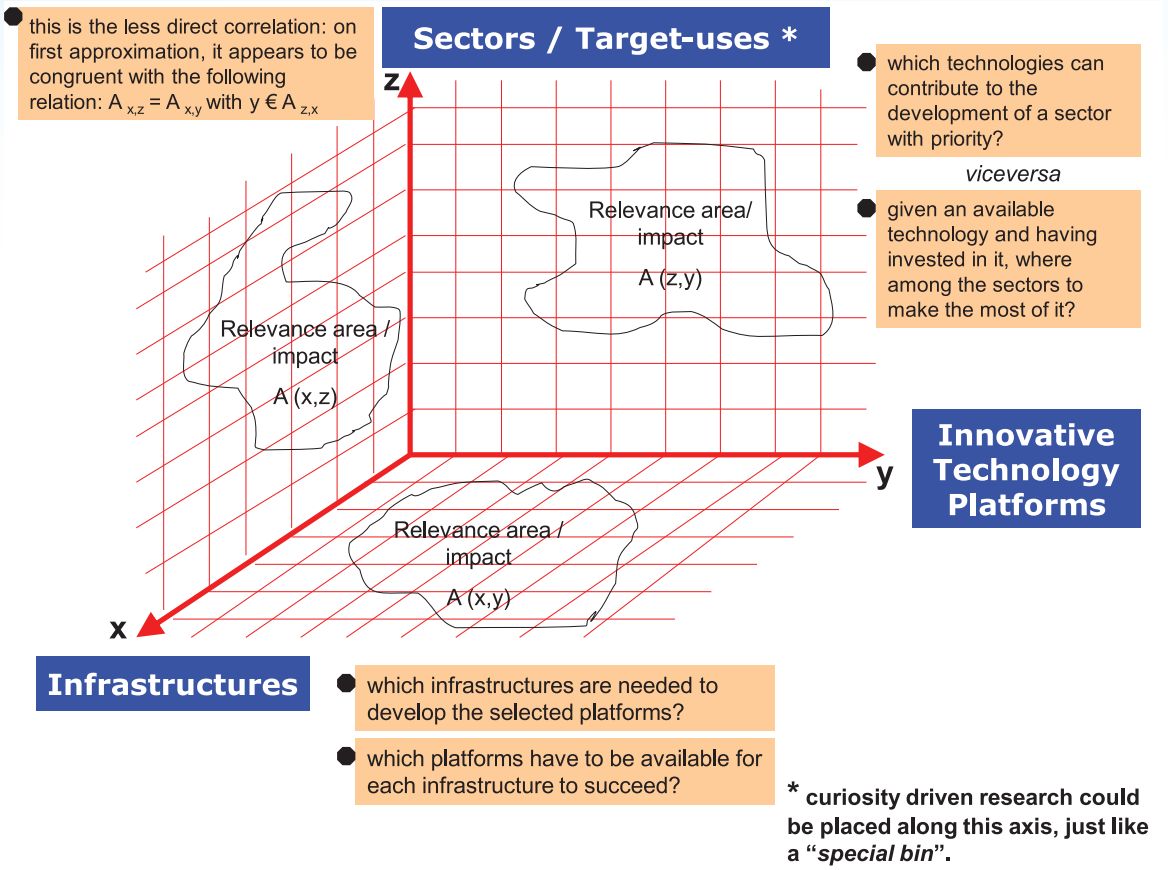

Figure 1 - 3D graphic representation of the relationships among innovative technological platforms, infrastructures and target uses to evaluate R&D and Innovation policies relevance

Let's suppose the Innovative Technological Platform be the ship of the future, in view of a zero emission system. In this case, the necessary Infrastructure for the use of such a ship will be the availability of properly equipped ports, for example with adequate electrical power lines and also able to carry onto the ship the green fuel (i.e. hydrogen). Target uses will first be marine and maritime research people, progressively evolving to the passenger category (i.e. cruise ships), for example oriented to green tourism and other scenarios.

From a methodological point of view, jointly with the graph of Figure 3, is the question of interoperability (for example, among different IORA countries), which leads to the issue of providing shared guidelines and standardization in view of further certification which in turns acts as positive factor for market competitivity worldwide. The result section will present a real example of the aforementioned methodology.

3. RESULTS

Information and Communication Technologies (ICT) are a central pillar for the world, as the world is now labeled as "digital" and "global village". The usefulness of ICT transcends all sectors including the marine and maritime sector (A.B., 2018). Innovative and sustainable ICT technological solutions are fundamental for the production of clean energy, for an increasingly less polluted environment and for an increasingly safer sea (Zacharoula, 2012). Paying particular attention to the maritime research activity and analyzing what is above the sea and what is below the sea, we have an integrated circular vision, in which what is present on land can also be included.

The experience of the research project TecBIA (Technologies with low environmental impact for the production of energy on ships), co-financed by the Italian Ministry of Economic Development,

led by FINCANTIERI, intends to verify the sustainable technology of fuel cells propelled with green hydrogen for naval applications by creating of a vessel prototype, named ZEUS (Zero Emission Ultimate Ship) with hybrid propulsion. The project started on 31 October 2018, and is expected to end on 30 October 2022, with a contribution of 5.077.000 euros. (Fincantieri, 2014/2020). The hull is 26 meters long and weights approximately 170 tons. ZEUS is also equipped with a hybrid apparatus to be used as a conventional propulsion system (2 Diesel generators and 2 electric motors). To this apparatus are added a fuel system (130 kW), powered by about 50 kg of hydrogen contained in 8 metal hydride cylinders, and a lithium battery system. The ship will thus have an autonomy of approximately 8 hours of zero emission navigation at a speed of approximately 7.5 knots.

The common reference scenario of the research concerns the improvement of the level of environmental sustainability of merchant and cruise ships, through the reduction of emissions of greenhouse gases, nitrogen oxides, sulfur oxides and particulate matter.

The naval prototype ZEUS was designed and developed following a well-defined approach that combined innovative technological solutions with appropriate and available know-how and industrial infrastructures. Since the beginning of the TecBIA project, this approach kept under consideration the needs of the target uses of ZEUS. Only an integrated approach, like the one used for ZEUS, can help IORA countries identifying which research efforts should be prioritized and eventually funded. Figure 3 shows a three-dimensional representation of the recommended approach The innovative technological solutions and the infrastructure are the foundations to identify an innovative product or service that, with an appropriate funded research effort, can been built or offered in a well-defined short time frame (less than 5 years). It is important to highlight that only by identifying and engaging with the target uses, the results have the possibility to positively impact the life of the target uses.

The main activity of ENR (The National Institution of Italy for Standardization Research and Promotion), in the TecBIA project, has focused on the proposal of a set of regulations for the use of hydrogen as a fuel on board ships. In accordance with internationally established procedures, on the basis of the experience gained and the assessments made in the project, guidelines have been drawn up for the use of hydrogen as a fuel on board ships. The drafting of appropriate safety regulations, with the requirements that these types of ships must possess to ensure safe navigation for the environment and for the crew, will represent a fundamental element in promoting the spread of hydrogen as a fuel. ENR, will present the TecBIA project and the ZEUS naval prototype, technically launched on 31 January 2022 in the Castellammare di Stabia FINCANTIERI shipyard, at the EXPO 2020 in Dubai. The ZEUS prototype ship produced by Italian industrial and research excellence has as its main objective to propose the vision of a possible environment for future generations around the world. This theme recalls the need to respect marine ecosystems using internationally shared standardization processes that do not yet exist or that are in an initial state of conceptualization

Figure 4 - ZEUS technical launch in Castellammare di Stabia on January 31, 2022 (Stabianews, 2022).

The concept of the prototype follows the chemical / physical and acoustic balance of the environment and it is oriented towards marine-maritime sustainability, according to the principles of the circular blue economy. Green hydrogen and fuel cells generate 100% clean energy (DNV-GL, 2019) and the ZEUS ship is multipurpose for fishing, recovery and energy reuse of plastic marine litter, research in marine protected areas, silent transport of goods and people, underwater robotics missions such as sustainable deep sea mining.

The ZEUS ship is an opportunity for dialogue between countries belonging to geographic basins of ancient and rich different cultures that share, for their activities, communicating seas. In particular, the above described circular model can be applied within the large IORA basin where very different cultures are facing but all sharing a common purpose. The cultural difference of the various IORA countries must be intended as a value to focus on and not as a barrier. For each country, for example, a matrix of priority needs that could be met by other countries could be created, representing real needs that must be highlighted. This approach can be shared in a scientific and technological context, through the Suez Canal for the Mediterranean basin and the IORA basin. The Mediterranean basin, in turn, has an opening onto the Atlantic ocean through the Strait of Gibraltar and onto the Pacific ocean through the Panama canal.

The goal is to combine the issue of environmental sustainability and the issue of technological innovation (Janusz, et al., 2018). The latter has as a fundamental requirement the increase of the safety of those

who work a sea, of those who live at sea and of the entire supply chain connected to this sector. In particular green hydrogen is the potential proactive technological witness of this dialogue, due to its nature as a sustainable fuel produced from electrolysis powered by electricity from renewable sources available in large quantities, as in the case of photovoltaic, in countries overlooking the southern shores of the Mediterranean and the Indian ocean, benefiting from better solar radiation (SNAM, 2019).

4. DISCUSSION

An interesting aspect to consider is the role of technology in facilitating international co-governance of a complex matter as the exploitation and preservation of a shared resource, the sea, is.

Observation and mapping of coastal and marine biodiversity are key tools to manage and share the “ocean commons” in a fair and responsible way under the present global challenges and rapid environmental changes. They also help ensure that the benefits derived from the exploitation of ocean resources can be sustainably managed and equitably shared. The distribution of these “ocean commons” is changing. The melting polar ice caps, stagnation in wild seafood provisioning opportunities, emergence of harmful pathogens and parasites, and previously inaccessible ocean spaces (i.e. the deep sea) now increasingly within human reach, are challenges that need to be addressed by responsible ocean governance to reduce the potential for conflicts at all levels and ensure human well-being. Current knowledge on how to relate and govern marine natural resources and associated societal changes is fragmented, and observations of resource distribution, use, state and dynamics are scant and insufficiently accessible. We need to advance observations to support modelling of the complex links between marine ecosystems and societal developments to forecast, manage and mitigate these changes.

Examples of modern technologies and their possible applications for monitoring biodiversity in view of better governance are (PJStephenson, 2020):

- use of satellite and drone images (earth observation) to assess pressures on freshwater, coastal and marine ecosystems (fragmentation, hydromorphological changes, etc.); - innovative bioinformatic protocols complementing established biological indicators to monitor ecological status i.e. of sea waters; - ICT platforms for storage and integration of a variety of sensors in situ, autonomous unmanned vehicles, acoustic monitoring, satellite applications, holistic approaches (i.e.., systems

biology, meta-omics, and ecosystem approaches) in an integrated framework to inform decision making, particularly in inherently dynamic coastal ecosystems.

The related amount of data is enormous and growing constantly: without doubt the "big data" paradigm applies to marine biodiversity (Isabelle, et al., 2021). This means that, even more than in the past, it is necessary to create links with existing relevant information and data storage systems such as, for example, the ones of the Group on Earth Observations (GEO) and the Global Earth Observation System of Systems (GEOSS) and, in an EU perspective, the ones of the EC-ESA Joint Earth system science initiative.

Creating links and enabling immediate, safe and controlled upload, download and use of data and information distributed on a variety of different data spaces and platforms: this is all what interoperability of ICT system is about. Without entering into technical details, it requires the use common data exchange protocols and agreed semantics, in other words, a good deal of collaboration which, at the end of the day, is one of the scopes of IORA: establish a permanent collaboration among its members to enable a shared and sustainable exploitation of the Indian ocean.

Apparently, there is nothing new: technology (in this case ICT) changes the way to operate it but not the final aim and result. However, in this case, there is something new and really important: preservation of marine biodiversity and sustainable exploitation of oceans is a global issue and it also should be dealt with at global level by establishing synergies and focused inter-ocean cooperation i.e. Indian ocean and Mediterranean. Interoperability between ICT systems would enable it, already today.

In the definition of interoperability there is an implicit concept that needs to be made explicit: standardization (Sergio, 2020). In fact, by making the various ICT systems interoperable (i.e. ships, ports, electrification of ports, transport, goods) they can be standardized and consequently are able to offer the best margins of competitiveness for product manufacturers, processes and services themselves.

5. CONCLUSION

The role of science and technology at international level has been discussed in this paper. In order to encourage development in these sectors, a methodology has been introduced and it can be used to promote investments, in order to optimize impacts according to the priorities of various countries, obviously of potential interest in the wide international context of IORA member states. From a methodological point of view, the model to be used for science and technology is the circular stemming from OECD, that sees the active involvement of the entrepreneur during scientific activity. In particular, carrying out two research activities in parallel: industrial research and strategic mission oriented basic research.

The application of this method made it possible to create a quite intelligent real object, i.e, the ZEUS (Zero Emission Ultimate Ship).ship. The common reference scenario of the research concerns the improvement of the level of environmental sustainability of merchant and cruise ships, through the reduction of emissions of greenhouse gases, nitrogen oxides, sulfur oxides and particulate matter. Within the research project TecBIA, the sustainable technology of fuel cells for naval applications was verified through the development of the ZEUS naval prototype.

The ZEUS naval prototype was designed and built according to the chemical / physical and acoustic balance of the environment and is oriented towards marine-maritime sustainability, following the principles of the circular blue economy. The ZEUS ship is multipurpose and can be used by individual countries according to the priority needs of the target uses (i.e. for fishing, recovery and energy reuse of plastic marine litter, research in marine protected areas, silent transport of goods and people, underwater robotics missions such as the sustainable deep sea mining).

An R&D&I project such as ZEUS is not considered concluded at the end of the product realization, but as the product is innovative, it is itself subject to a new cycle of R&D&I projects. Innovative ships such as ZEUS will in turn require, for example, ports with innovative infrastructures,

which do not yet exist and are capable of supporting them.

The goal is to combine the theme of environmental sustainability with the theme of technological innovation and the ZEUS ship is a quite important real opportunity to foster dialogue between the countries belonging to the large IORA basin

LIST OF ACRONYMS

ERC European Research Council

GEO Group on Earth Observations

GEOSS Global Earth Observation System of Systems

ICT Information and Communication Technologies

OECD Organization for Economic Co-operation and Development

ZEUS Zero Emission Ultimate Ship.

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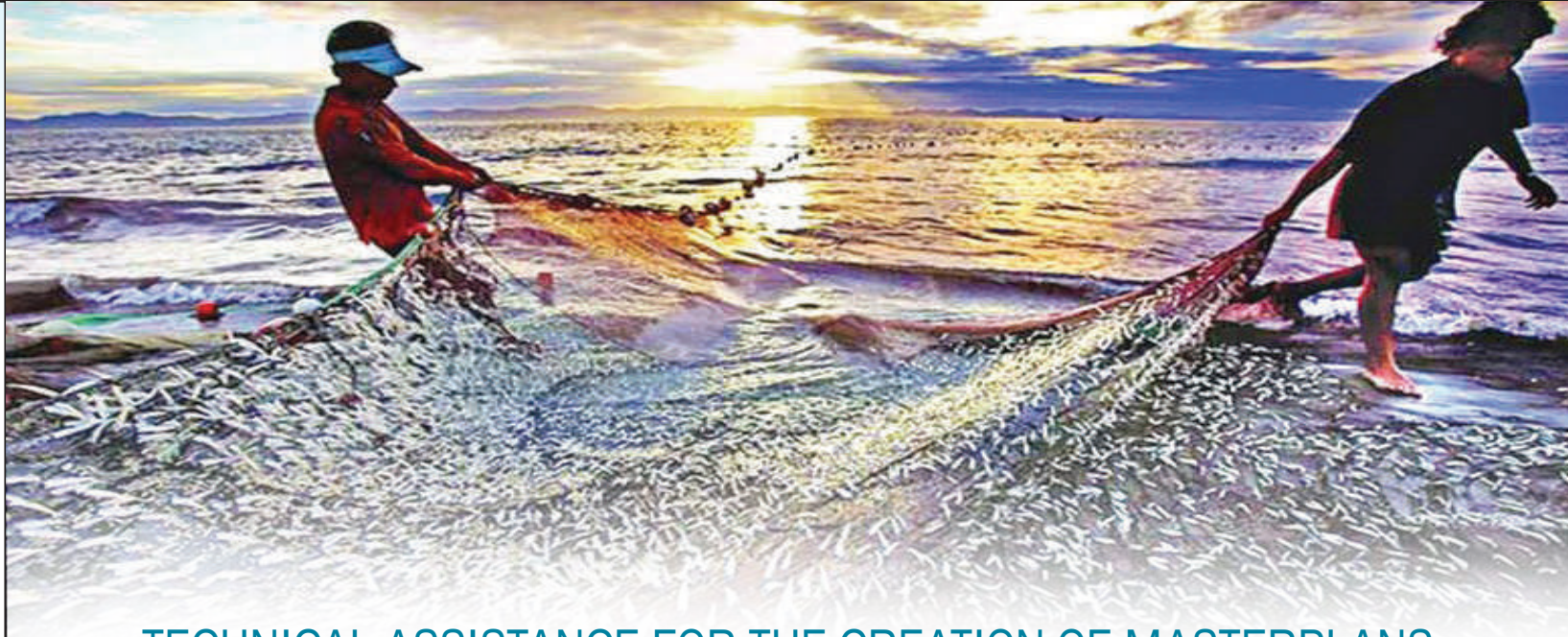

TECHNICAL ASSISTANCE FOR THE CREATION OF MASTERPLANS FOR SUSTAINABLE FISHING IN IORA COUNTRIES

Stefania Valentini, Francesca Biondo, Federico Gallas

ABSTRACT
Based on their long-term experience, Federpesca and H.OPES Foundation can provide technical assistance for strengthening the fisheries sector in the IORA countries. The need to realise or update the Fisheries Master Plans could represent an action-oriented approach to strategic planning. Each Master Plan is based on the current situation in the subject area. The document includes an overview of the current state of play, knowledge and opportunities in the fish stocks and potential impacts of climate change on stocks/migration and other central topics related to fishing and aquaculture.

Keywords: fisheries, Indian Ocean, IORA Countries, Master Plan, Strategic planning, standardisation

1. INTRODUCTION

IORA Countries decision-makers are increasingly recognising that fisheries have the potential to contribute to the development of their countries in terms of revenue generation, employment creation, food and nutrition sectary and emergency preparedness. However, to date, many of the interventions have been delivered in isolation, with States and internal partners responding to situations rather than planning interventions in a coordinated and complementary manner.

Although the IORA Countries have made significant progress in recent years in the development of fisheries, this progress, however, has not affected the entire development of the fisheries supply chain with gaps remaining in many areas, such as the collection and use of data, fisheries application, stock assessment and fishery hygiene certification.

2. TECHNICAL ASSISTANCE TO STRENGHTEN THE FISHERIES SECTOR

Federpesca and H.OPES Foundation can provide technical assistance for strengthening the fisheries sector and particularly to the strategic level planning for interventions in the industry. In several countries, the lack of an overarching strategic framework for the industry to which all stakeholders can subscribe seriously holds back to the sector development. The need to realise or update the Fisheries and Aquaculture Master Plans in the IORA countries could represent an action-oriented approach to strategic planning.

Using information and inputs from the several ministries of fisheries of the IORA Countries and othersources, Federpesca and H.OPES Foundation can give technical assistance focusing on:

1. Legal and Policy Framework
2. Stock assessment and management
3. Industrial fishing sector
4. Artisanal fishing sector

5. Landing sites, harbours and other shore-based infrastructure

Each theme will follow the following roadmap

- Current situation in the subject area
- Analysis - Gap analysis or SWOT or similar in the subject area
- Action/Future plans/Recommendations
- The Experts of Federpesca will carry out all relevant analyses to allow technically sound and defensible recommendations and build a way forward in their areas of responsibility.
- In addition to these specific deliverables and outputs, the Experts' team will be involved in the technical editing process and exchanging views with the other experts working on the master plan.

3. One possible structure of the Master plan for sustainable fishing

Each Master Plan is based on the needs of the country it focuses on, but based on the experience of Federpesca and H.OPES Foundation, the structure can be resumed in the following chapters/sections, each of one focusing on a different topic, but tightly linked each one to the others.

- Introduction. Objectives of the document. Process of consultation with the private sector and other key stakeholders in the preparation.
- The fisheries sector. General overview. The resource. Landings trends. Fleet structure. Markets and fish consumption. Existing infrastructure and value chains. Management systems. Law, regulation and international obligations. Likely impacts of climate change.
- Private sector leadership. Export-led growth to be the driving force. Measures to addressclimate change – mainstreamed across all themes Fisheries co-management Respect for international agreements. Transparency and accountability.
- Legal and policy framework. The current state of play. Regulatory needs. International obligations. Compliance with IOTC Management Measures. Internal issues, e.g. National Maritime Administration. Hygiene Regulation and Authority. Import/export regimes, taxation, space for fisheries co-management.
- Stock assessment and management. The current state of play, knowledge and opportunities. What we know/don't know about the fish stocks available; how many tonnes can be caught; where they are, seasons etc.; historical information, what funding is needed to assess better and understand the different stocks. What ongoing data collection, potential impacts of climate change on stocks/migration.
- Industrial fishing sector. The current state of play, knowledge and opportunities. Fleets. Licenses. Further infrastructure needs. Upskilling and Reskilling needs.
- Artisanal Fishing Sector. The current state of play, knowledge and opportunities. How does this need to be developed, and where? What additional inputs/training/co-management is needed to support this? Driven by the private sector.
- Landing sites, harbours and other shore-based infrastructure. The current state of play, knowledge and opportunities. Mapping of the location of current facilities. Location, Type of landing facilities- linked to market needs and availability of fish stocks, management, investment. Map the infrastructures and potential investors/donors + feasibility study.
- Fisheries law enforcement - Current state of play, knowledge and opportunities. What size? How many? What political agreements are needed? What is the cost? What is the timetable? What is extra support needed ashore? We can support the Italian/European Navy and Coast Guard. Specifically divide to patrol capability (i.e. the ships on water) and MCS capacity looking at a host of other areas of work – not just patrol vessel.
- Hygiene standards and certification. The current state of play, knowledge and opportunities

4. Additional potential services

Apart from the above-mentioned sectors, each Master Plan can be integrated to better match to the needs of the target country. Some of the additional sectors could focus on:

1. Monitoring and enforcement capacity
2. Artisanal sector development
3. Infrastructure improvements
4. Industrial Processing

KOREA'S ASPIRATION TO BE A RESPONSIBLE STAKEHOLDER IN IOR: POTENTIAL FOR FUTURE ROK-IORA PARTNERSHIP

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The views expressed in this article are those of the author and do not necessarily reflect the Ministry of Foreign Affairs and the Korea National Diplomatic Academy of the Republic of Korea.

This article is a revised and updated version of the author's earlier commentary, "South Korea's IORA Dialogue Partnership and its Implications for the New Southern Policy" IFANS Focus 2018-35E (November 12, 2018).

Abstract South Korea obtained a dialogue partnership in the IORA in 2018. The partnership makes Korea enjoy consultative relationships in the areas of shared interest with the IORA. The Indian Ocean in the 21st century is emerging as the center of the world economy as well as a theater of geopolitical competition. But, the Indian Ocean rim countries prioritize sustainable development, the combating of the Covid-19, and the regional response to non-traditional security issues. Thus, the Indian Ocean region needs responsible international players with no strategic ambition. The role of responsible middle powers such as South Korea has become more necessary than ever.

The Indian Ocean has great potential for economic prosperity and has vital sea lanes used for the transport of energy resources and goods. The region is critical concerning Korea's economic security because about 99.7% of energy resources and cargoes are brought into Korea from overseas by ships. The IORA serves as the only formal regional multilateral platform from a Korean perspective to discuss various issues and challenges the Indian Ocean region is facing.

Korea is seeking to become a new responsible stakeholder in the Indian Ocean, contributing to the region's peace, stability, and prosperity. Korea broadens its diplomatic horizons by joining the IORA and can contribute to enhancing global and regional governance in the Indian Ocean region. Since acquiring IORA's dialogue partner status, South Korea has been gradually strengthening its cooperation with the IORA. There is an increasing possibility that IORA will develop into an indispensable multilateral institution in the Indian Ocean through joint cooperation between its member states and dialogue partners in a situation where its institutionalization has not yet been fully established. Therefore, South Korea as a responsible middle power can take the lead in cooperation with IORA member states on specific issues to respond to the challenges the Indian Ocean region is facing and strive for sustainable economic development and stable regional order. Korea's constructive engagement in the Indian Ocean

region provides an opportunity for Korea to pay back the help of international society and share development experiences with countries in the region.

Introduction Alfred Thayer Mahan, a famous naval historian in the late 19th and early 20th centuries, once remarked: 'whoever controls the Indian Ocean will dominate Asia. (This ocean will be the key of the seven seas.) In the 21st century, the destiny of the world will be decided on its waters.'[1] Over the past few years, the Indo-Pacific, a geographic and strategic concept, has attracted significant attention from government officials, experts and commentators across the world. In the Indo-Pacific narrative, the Indian Ocean has emerged as a crucial geostrategic space. In fact, the Indian Ocean was the pivot in world commerce and trade until the 18th century. The ocean played a crucial role of maritime routes linking diverse civilizations. The recent rapid economic growth of the Indian Ocean rim countries could turn the region into an economic force to consider, given that the Indian Ocean has grown into an important region of the world economy, which the Atlantic Ocean has dominated for a thousand years.[2]

The current geopolitical and strategic landscapes are undergoing a profound change. The Covid-19 pandemic has brought unprecedented challenges to countries in the Indo-Pacific. The Covid-19 pandemic has accelerated geopolitical changes that could narrow strategic options for small and middle powers, which face China's growing influence, the relative decline of US power, and the intensification of US-China strategic rivalry. So, the world is becoming more complicated and polarized, with transnational challenges ranging from terrorism to climate change, food security, mass migration, political radicalism and extremism. The Indian Ocean region is no exception either.

The Indian Ocean in the 21st century is once again emerging as the center of the world economy as well as a theater of geopolitical competition. With China's increasing presence through the pursuit of the Belt and Road Initiative (BRI) in the Indian Ocean region, the United States, India, and Japan have invigorated their engagement in the region, raising the possibility of the region turning into a space for great power competition. In contrast, the Indian Ocean rim countries prioritize sustainable development, the combating of the Covid-19, and the regional response to non-traditional security issues. Thus, the Indian Ocean region needs responsible international players with no strategic ambition. The role of responsible middle powers such as South Korea has become more necessary than ever.

This article provides an overview of the importance of the Indian Ocean and ROK's new engagement in the IOR through joining as a dialogue partner. It also identifies policy recommendations for deepening ROK-IORA partnership.

Growing Importance of IORA in the Indo-Pacific Age Major countries have recently increased their engagement in the Indo-Pacific. The United States, Australia, Japan, and India have been actively stepping up the Indo-Pacific cooperation, institutionalizing the Quad Summit and increasing their security networks in bilateral and minilateral settings. China is also increasing its presence in the region through the BRI. The Indian Ocean region becomes the theatre of changing global power dynamics.

First, the Indian Ocean has great potential for economic prosperity and has vital shipping lanes used for the transport of energy resources and goods. The Indian Ocean is the 3rd largest body of water in the world, containing key sea lines of communication (SLOC) connecting the Middle East, Africa, and East Asia with Europe and the Americas. The region has about 2.7 billion people or 30 percent of the world's population. Furthermore, it could become a promising market because the proportion of the younger population is much larger than in other regions. The sea lanes of the Indian Ocean are considered to be one of the most

Footnote:

1. *P. K. Ghosh, "Indian Ocean dynamics: An Indian perspective," East Asia Forum, April 5, 2011, https://www.eastasiaforum.org/2011/04/05/indian-ocean-dynamics-an-indian-perspective/.*

2. *Anton Hermansyah and Tama Salim, "Indian Ocean can become new economic power: Jokowi," The Jakarta Post, March 7, 2017, https://www.thejakartapost.com/news/2017/03/07/indian-ocean-can-become-new-economic-power-jokowi.html.*

strategically important in the world in the sense that nearly two-thirds of the world's oil tankers and half of container ships pass through choke points in the Indian Ocean. For Korea, about 99.7% of energy resources and cargoes are brought into Korea from overseas by ships. Therefore, the Indian Ocean region is very critical concerning Korea's economic security, and The IORA serves as the only formal regional multilateral platform from a Korean perspective to discuss various issues and challenges the Indian Ocean region is facing.

Second, the Indian Ocean region becomes increasingly important, especially with regard to broadening Korea's diplomatic and economic horizon further. The IORA is a valuable mechanism from a Korean perspective because of its geographical and multilateral distinction. It is the inter-regional multilateral platform launched to strengthen cooperation among coastal countries bordering the Indian Ocean from three continents – Asia, the Middle East and Africa. So the dialogue partnership with the IORA increases Korea's external portfolios. South Korea has cooperative partnerships with many IORA member countries (See Table 1.). For instance, India led the establishment of the IORA and Indonesia enthusiastically hosted the 1st IORA Leaders' Summit. The two countries are major partners of Korea's New Southern Policy (NSP) to strengthen its cooperation with ASEAN and India. Thailand, Malaysia and Singapore are also Korea's NSP partners. In addition, many countries in the IORA are Korea's ODA partners. They are Tanzania, Sri Lanka, Bangladesh, India, Indonesia (major partners), Kenya, Mozambique, Madagascar, Yemen, and Thailand (partners). Korea has also established strategic, special strategic, or comprehensive strategic partnerships with many IORA member states.

Table 1. Korea's major partnerships with IORA countries

Strategic Partnership	India, Thailand, Indonesia, Malaysia, Singapore, Australia, UAE, South Africa
ODA Partnership	Sri Lanka, Bangladesh, India, Indonesia, Thailand, Tanzania, Kenya, Mozambique, Madagascar, Yemen
NSP Partnership	India, Thailand, Indonesia, Malaysia, Singapore

Source: the author created

A New Responsible Stakeholder in IOR: Korea's Stepping-Up Middle-Power Engagement South Korea gained a dialogue partnership in the IORA in 2018, which makes itself enjoy consultative relationships in the areas of common interest.[3] The website of IORA notes that dialogue partners 'refer to individual sovereign states and not members of IORA, but with a special interest and/or capacity to contribute to IORA, particularly in the areas of common interest.' And it also mentions that dialogue partners' provide valuable assistance in the field of technology transfer, environmental issues, the promotion of trade and investment, technical cooperation and assistance to the Special Fund.'[4] As aforementioned, the importance of the Indian Ocean Region is growing more than ever. South Korea's joining of this regional grouping as a dialogue partner has some policy implications.

First, Korea's joining the IORA has broadened its diplomatic horizon in two aspects. On the one hand, by joining the regional grouping that brings together the countries adjacent to the Indian Ocean, South Korea has expanded the geographical horizon of its foreign policy, in particular the New Southern Policy (Plus). On the other hand, the IORA's specific focus on maritime security, the blue economy and combating non-traditional security challenges[5] is in line with Korea's national interests. As mentioned before, the Indian Ocean is a crucial route for trade and oil transport,

Footnote:

3. *"Dialogue Partners," Indian Ocean Rim Association. https://www.iora.int/en/about/dialogue-partners.*

4. *Ibid.*

5. *They include human and drug trafficking, piracy and maritime terrorism, and climate change.*

and keeping the region peaceful and stable is critically important to Korea, a free-trading and energy-importing country.[6]

Second, the IORA provides South Korea with a crucial multilateral venue to contribute to enhancing global and regional governance. Korea played a leading role as a responsible stakeholder in launching and implementing ASEAN+3 and the East Asia Summit which strengthen the regional cooperation to effectively tackle the regional economic crisis and discuss diverse issues including political, security and economic challenges in East Asia, respectively. In a similar vein, ROK-IORA partnership will encourage Korea to contribute to the sustainable development and stability of the Indian Ocean region. Since acquiring IORA's dialogue partner status, South Korea has been gradually strengthening its cooperation with the IORA, for instance, by attending the Council of Ministers (COM), the Committee of Senior Officials (CSO), Working Groups, and the Indian Ocean Dialogue (IOD). In addition, Korea inaugurated the 1st ROK-IORA Partnership Seminar in 2020 and held the 2nd Partnership Seminar on blue economy in 2021.[7]

Moreover, South Korea has sought to constructively engage in the Indian Ocean region, participating in intergovernmental organizations and helping countries overcome challenges in the region. For example, Ms. Jung-re Riley Kim was elected the chairperson of the Indian Ocean Tuna Commission (IOTC) in 2021, with which the IORA is working. It was reported that the container vessel MV X-Press Pearl was anchored at the Port of Colombo, Sri Lanka and caught fire, making it the worst marine environmental disaster. In order to help out Sri Lanka, an IORA member country, Korea 'provided essential equipment and supplies including PPE, Oil Absorbent Pads and Oil Absorbent Rolls to support marine recovery in Sri Lanka to the Marine Environment Protection Authority.'[8]

Policy Recommendations for ROK-IORA Partnership As briefly mentioned in the introduction, China's rapid rise over the past decade and its growing influence in the Indian Ocean region have led to the strengthening of the Quad, a US-led Indo-Pacific coalition, to counter China. This brings about a new geopolitical and geoeconomic competition in the region. Thus, there are growing concerns among many IOR countries that intensifying great power competition might harm regional stability and economic development. In this circumstance, a multilateral body like the IORA can provide an appropriate alternative to navigate great power competition regardless that it is yet to be a fully-established institution.[9]

Korea took the first step towards engaging with the IORA as a dialogue partner. Although the role of dialogue partner is yet limited, Korea needs to expand its role as a responsible middle power in the Indian Ocean region beyond East Asia. Korea also needs to recognize IORA's importance in the mid to long term and actively seek specific cooperative measures to strengthen Korea-IORA partnership. The five opportunities for Korea-IORA future cooperation are as follows:

First, South Korea can develop its partnerships with like-minded countries in order to contribute to stability and prosperity in the Indian Ocean by cooperating on various emerging challenges. Prominent challenges facing IORA include terrorism, piracy, illegal unreported and unregulated (IUU) fishing, and illicit weapon trading.[10] For instance, Korea can collaborate with IORA countries regarding the IUU issues. Amid the growing IUU problem in the Indo-Pacific region, there are

Footnote:

6. *Byung-jae Cho, Speech by Chancellor of the Korea National Diplomatic Academy, delivered at the 3rd Indian Ocean Conference, August 28, 2018, Hanoi, Vietnam. https://www.mofa.go.kr/www/brd/m_20142/view.do?seq=302578&page=1.*

7. *"1st ROK-IORA Partnership Seminar to Take Place," Ministry of Foreign Affairs, Republic of Korea, October 23, 2020. "2nd ROK-IORA Partnership Seminar on Blue Economy Takes Place," Ministry of Foreign Affairs, Republic of Korea, July 13, 2021.*

8. *"KOICA-AKOFE support marine recovery in Sri Lanka," Daily News (Sri Lanka), June 28, 2021. https://www.dailynews.lk/2021/06/28/local/252580/koica-akofe-support-marine-recovery-sri-lanka.*

9. *MD Mufassir Rashid. "Potential role of IORA in a changing international context." Asia Times. January 18, 2022. https://asiatimes.com/2022/01/potential-role-of-iora-in-a-changing-international-context/.*

10. *Premesha Saha, "Evolution of IORA and its relevance in 21st century," The Jakarta Post, March 6, 2017.*

many opportunities for technological cooperation in the Indian Ocean through cooperation between South Korea and the IORA based on cases in which South Korea has improved monitoring of illegal fishing boats on the Pacific coast through the application of satellite technology. Each country in the Indian Ocean region is currently monitoring illegal fishing activities and overfishing of fishing boats with the technology of the Automatic Identification System (AIS) and the Vessel Management System (VMS). They have a short scope of surveillance, while each fishing boat can arbitrarily turn off the device. As a result, Korea can conduct remote monitoring of illegal fishing boats in consultation with satellite holders such as Australia, which is expected to greatly increase Korea's role and status in regulating IUU activities in the Indian Ocean, which is the main agenda of the IORA.

Second, South Korea can seek ways to contribute to groups in the region as dialogue partners, primarily by strengthening cooperation with IORA member states, which consist of South Korea's key partners in the New Southern Policy, strategic partners, several ODA major partners, and so on. In particular, it is essential for Korea to explore how to make efforts to ensure maritime safety and security and the blue economy, the main promotion areas of IORA. At the same time, South Korea has strategic partnerships with some IORA countries, including the UAE, India, Indonesia, and Australia. South Korea can establish a number of cooperative networks to reflect the IORA's key agenda. In particular, Korea can form minilateral platforms with several IORA members with a variety of dialogue channels on the common agenda, such as the blue economy, non-traditional security, maritime security and strengthening digital capabilities. South Korea can also discuss areas of cooperation between the two sides on the IORA's agendas in bilateral talks with various Indian Ocean countries, including France, Australia, India, Indonesia and the UAE.

Third, it is necessary to explore the possibility of linking a sustainable blue economy in the Indian Ocean and the people-oriented Green New Deal pushed by the South Korean government. As part of the Green New Deal, Korea is seeking sustainable development and green growth in the post-Covid-19 era, and it is also worth considering joint cooperation measures to link it with the IORA's sustainable blue economic initiative in terms of sharing and solidarity with the international community.

Fourth, Korea can contribute to economic development in the Indian Ocean region by helping strengthen the technological capacity of IOR countries and reduce the digital gap in the region. In addition, Korea as a dialogue partner may seek ways to strengthen cooperation with the IORA in areas such as investment and exchange, infrastructure, and technology transfer, including providing education and training to strengthen business and digital capacity in the region.

Last but not least, Korea can find ways to demonstrate its ability as a middle power by spearheading the efforts to host Track 1.5 and Track 2 dialogue platforms such as workshops, seminars and international conferences in the fields of maritime security and non-traditional security, given that the 'Jakarta Concord' stipulates academic cooperation among IORA member states. Most notably, the IORA faces some challenges such as intense regional diversity, weak economies of most IORA members, and IORA's low level of institutionalization in order to establish a robust and inclusive multilateralism in the region.[11] So the intellectual discussions between IORA member states and dialogue partners like South Korea through Track 1.5 and/or 2 platforms can help explore ways to break through these challenges.

In conclusion, Korea is seeking to become a new responsible stakeholder in the Indian Ocean, contributing to the peace, stability, and prosperity in the region. IORA has begun to receive much attention from the international community in the Indo-Pacific age. And there is an increasing possibility that IORA will develop into an indispensable

Footnote:

11. *Barana Waidyatilake, "The Indian Ocean Rim Association: Scaling Up?" LKI Policy Brief, July 2017 (Lakshman Kadirgamar Institute of International Relations and Strategic Studies, LKI).*

multilateral institution in the Indian Ocean through joint cooperation between its member states and dialogue partners in a situation where its institutionalization has not yet been fully established. Therefore, South Korea as a responsible middle power can take the lead in cooperation with IORA member states on specific issues to respond to the challenges the Indian Ocean region is facing and strive for sustainable economic development and stable regional order. Korea's constructive engagement in the Indian Ocean region provides an opportunity for Korea to pay back the help of international society and share development experiences with countries in the region. It will be a starting point for the prosperity of both South Korea and the Indian Ocean region.

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IORA Youth Writing Competition: First Place

Mustun Zuhayr, Mauritius

Plastic marine debris: The Silent Killer. Implications for Indian Ocean Rim Association (IORA) countries and the way forward.

Abstract

With global population set to reach a whopping 10.9 billion by the end of this century (Roser, 2019), the natural environments surrounding mankind are expected to be continuously plundered of their ephemeral resources, which signals accumulated pressures on the already heavily threatened ecosystems, unless rapid and adequate measures are set in place by stakeholders across the board to curb the devastating effects of human activities on earth. One such anthropogenic challenge, which has raised itself to the notorious status of a global problem throughout the decades, is unarguably marine debris. Essentially, marine litter consists of items that have been deliberately discarded, unintentionally lost, or transported by winds and rivers, into the sea and on beaches (EU, 2010). While marine debris have been recognized as a highly complex and multi-dimensional phenomenon with far-reaching adverse impacts, marine biota bears the biggest brunt of this ecological nuisance. Bearing testimony to this, is the bulk of videos present on social media platforms and notably on YouTube, where random beach-goers, divers, rescue teams and environmental activists are seen helping entangled seals in ropes or turtles having their limbs stuck in plastic buckets and even whales swimming with fish nets wrapped tightly around their waist. Such a miserable plight for many marine faunae, are the visual consequences of marine debris, which show how harmful haphazard and irresponsible littering can be. Given the nomadic nature of plastic marine debris, they move across vast oceanic regions, from shores to shores and possibly from continent to continent, thereby reaching Areas Beyond National Jurisdiction (ABNJ), and hence it is impossible to trace back their sources and infer accountability. Nonetheless, this very capacity of aimless navigation and movement make marine debris a global responsibility since they can make any marine ecosystem, coastline, beach or harbour port their permanent residence. Extending over 30% of the global ocean area, and rimmed by 36 littoral and 11 hinterland countries, the Indian Ocean is a cradle of biodiversity which is home to 30% of the global coral reef cover, 40,000 km2 of mangroves, some of the world's largest estuaries, and 9 large marine ecosystems (Wafar et al., 2011). The Indian Ocean Rim Association (hereafter IORA) hosts a membership of 23 nations bordering the Indian Ocean, whose geographical location engenders a natural exposure to marine debris. The literature has achieved consensus that coastal nations, in this

case IORA member states, are doubly concerned by the plastic debris conundrum, since one hand they are increasingly vulnerable to marine debris drifting from off-shore sources, and on the other hand, with their extended coastlines, they are heavily responsible for the leakage of plastic from terrestrial sources to the open seas.

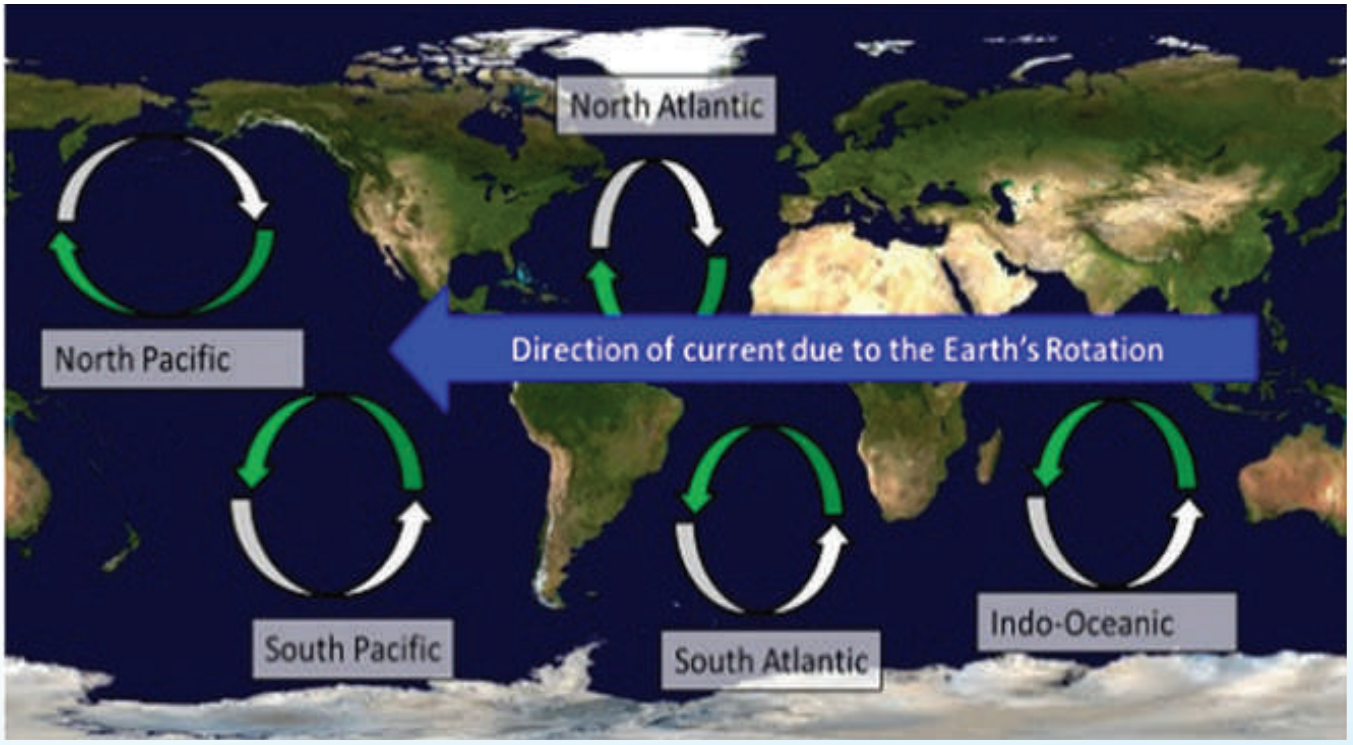
1. Introduction.

1.1 Plastic marine debris: A global mess.

According to Tangora Blue Foundation, an NGO in Australia which is at the fore against marine debris prevention, over 7 million tons of plastic find their way into the oceans annually, representing 8 million pieces per day, and amount to 3 times as much as rubbish as the weight of fish caught in a year. With such an impressive volume of plastic pieces and garbage entering the open seas, it is clear that plastic consists the largest share of marine debris. Marine litter get disposed off either from inland sources or from activities occurring on seas, and these get whirlpooled in the gigantic oceanic gyres, as shown in Figure 1 below, which act as carriers for the debris through water currents, and finally bundle up in a large "garbage patch" or "plastic soup". It is extremely likely that such patches exist in every ocean, but by far the largest and most documented one is the "Great North Pacific Garbage Patch".

The mammoth floating debris island is located between Hawaii and California and is the biggest oceanic junkyard for marine plastic litter of all sorts, and it is estimated to contain 1.8 trillion of plastic, weighing around 80,000 tons (The Ocean Cleanup, 2021). With its impressive size which is 3 times that of France (Lebreton et al., 2018), the "Great North Pacific Garbage Patch" is unquestionably one of the foremost examples of how human induced activities have the dramatic potential of creating a vicious entity, which has the ability to sting back, given the plentitude of negative effects marine debris can have on marine ecosystems and even on human beings.

Figure 1. Oceanic gyres.



Source: (https://askabiologist.asu.edu/anatomy-open-ocean).

2. Plastic marine debris and IORA member states: How worried should we be and what does it entail for IORAs' Blue Economy?

The IORA recognizes the potency of plastic marine debris as an ecological and environmental stressor within the Indian Ocean region. With the conjoint burdens of responsibility and vulnerability, IORA member states have been subject to research in order to uncover the sources of and the potential outcomes of plastic marine debris in that part of the world. The table below, synthesizes some of the main reported findings or highlights (extracts) from recent publications based on studies on each IORA member state.

Table 1. Main findings and highlights from some publications across IORA member states.

Author(s)/year	Paper title	Country	Main findings and highlights
Verlis et al., (2013)	*Ingestion of marine debris plastic by the wedge-tailed shearwater Ardenna pacifica in the Great Barrier Reef, Australia.*	Australia	• Plastics were found within sampled chicks which indicate that adults of this species are taking up plastics and feeding it to their young either directly or indirectly.
Hossein et al., (2019)	*Microplastics in fishes from the Northern Bay of Bengal*.	Bangladesh	• A total of 443 micro plastic items were found in the intestines of Bombay-duck, White Bombay-duck and gold-stripe sardines, averaging in the range of 3.20–8.72 items per species. Such findings provide evidence for possible human contamination through the food web.
Lachmann et al., (2017)	*Marine plastic litter on small island developing states: Impact and measures.*	Includes Comoros	• SIDS are exposed to concentrations of plastic litter that are disproportionate to their own consumption and populations. • SIDS are believed to be exposed to long-range transported marine plastic litter more than many other coasts.
Cartraud et al., (2019)	*Plastic ingestion in seabirds of the western Indian Ocean.*	France/ Reunion	• 50% of the birds analyzed had plastic in their gizzard or proventriculus, with strong variation in relation to species and age. • Results show a higher number and a higher mass of plastic particles in juvenile Barau's petrels, compared to adults and a higher mass of plastic particles in juvenile tropical shearwaters compared to adults. These differences are most probably due to food regurgitation from the adults to feed the chicks.
Kumar et al., (2016)	*Preliminary study on marine debris pollution along Marina beach, Chennai, India.*	India	• The major contributing factor for the debris abundance in Marina beach is the local recreational activity. • Most of the debris accumulated is of local origin and indicates its inflow due to human activities and through storm rather than the ocean deposition.

Suteja et al., (2021)	Stranded marine debris on the touristic beaches in the south of Bali Island, Indonesia: The spatiotemporal abundance and characteristic.	Indonesia	• Plastic category was the most common marine debris in all sampling periods, both by abundance and weight. • It seems that recreational and tourism activities were making a significant contribution to marine debris.
Mehdinia et al., (2020)	Identification of microplastics in the sediments of southern coasts of the Caspian Sea, north of Iran.	Iran	• Sampling sites with higher micro plastic concentration were located in the regions with higher level of recreational and tourism activities. • The Caspian Sea's hydrodynamics facilitate the distribution of micro plastic as floating particles on water and get entrapped in the sediments toward Iranian coasts in south of Caspian Sea.
Okuku et al., (2020)	Marine macro-litter composition and distribution along the Kenyan Coast: The first-ever documented study.	Kenya	• A significant amount of litter encountered in the beaches was of local origin (88%). • Low occurrence of foreign products was reported on beach areas despite fairly high tourism activities. This could be an indication that beach hotels are running a relatively efficient waste management system.
Gjerdseth, (2017).	Quantitative Analysis of Debris and Plastic Pollution on Beaches in Northern Madagascar.	Madagascar	• The general trend for the debris recorded at the backshore seemed to originate from the nearby inhabited areas due to poor or lacking rubbish disposal sites and infrastructure, unconscious or conscious dumping, and dispersal by wind.
Fauziah et al., (2015)	Plastic debris in the coastal environment: The invincible threat? Abundance of buried plastic debris on Malaysian beaches.	Malaysia	• Findings indicated that beach activities are contributing to plastic debris deposition. • The presence of pellets on the beaches highlights the fact that the coast is susceptible to the influence of shipping activities from which pellets would most likely be sourced.
Stelfox et al., (2020)	*Minimum drift times infer trajectories of ghost nets found in the Maldives.*	Maldives	• Ghost nets drifting less than 30 days remained inside the exclusive economic zone of the Maldivian archipelago highlighting potential illegal, unreported and unregulated fishing activities. • For drift times longer than 10 days the simulations suggest that purse seine fisheries (Korea, Mauritius, Philippines, Spain, France and Seychelles) and gill nets from Sri Lanka are 'are high risk fisheries (with regard to possible source of lost nets).

Seeruttun et al., (2021)	*First assessment of anthropogenic marine debris in mangrove forests of Mauritius, a small oceanic island.*	Mauritius	• The uninhabited mangrove site (Ferney) has almost no human activities nearby yet pollution from anthropogenic debris prevailed. • Most debris originated from shoreline and recreational activities.
Pereira, (2006)	*National overview and assessment on marine litter related activities: Mozambique*	Mozambique	• Marine littering in Mozambique has been rather neglected both in terms of research and management. • Plastics, aluminium cans and glass are the main items found, while in areas under oceanic influence tar pellets and high-density foams are also found, from high-seas shipping activities.
van Hoytema et al., (2020)	*Fishing gear dominates marine litter in the Wetlands Reserve in Al Wusta Governorate, Oman.*	Oman	• 58.1% (by weight) of the litter sampled consisted of discarded or lost fishing nets. • The discarded or lost fishing nets observed were of both "woven" construction and monofilament nets which are illegal in Oman.
Dunlop et al., (2020)	*Plastic pollution in paradise: Daily accumulation rates of marine litter on Cousine Island, Seychelles.*	Seychelles	• Over the 10-year study period there was a significant increase in the amount of litter deposited on Cousine Island's beach. • The vast majority of the bottles were from Asia, presumably mostly dumped by ships, many of the bottles were also from brands that were bottled and distributed within the Seychelles.
Nor et al., (2014)	*Microplastics in Singapore's coastal mangrove ecosystems.*	Singapore	• Micro plastics were found at all the seven mangrove sites sampled in Singapore. • Plastic bags, food wrappers, drink cartons and plastic bottles found between the aerial roots of the mangrove plants. This highlights the intensity of recreational and leisure activities in nearby parks which become pathways for litter to reach the mangrove areas.
van der Mheen et al., (2020)	*Beaching patterns of plastic debris along the Indian Ocean rim.*	Includes Somalia	• Simulations show that Somalia and the Maldives are consistently affected by beaching particles, even though they have no or few river sources of plastics of their own. • Somalia is among the top 15 countries affected by beaching particles in all simulations.

Chitaka, & von Blottnitz, (2019).	*Accumulation and characteristics of plastic debris along five beaches in Cape Town.*	South Africa	• Food and beverage related items were the most frequent type of plastic litter across all beaches, ranging from 40%–63% of all plastic debris by count. • Nine of the top ten identifiable items were associated with foods commonly consumed on-the-go, including polystyrene packaging, snack packets and straws.
Dharmadasa et al., (2021)	*Microplastics pollution in Marine Protected Areas of Southern Sri Lanka.*	Sri Lanka	• At Bundala National Park, micro plastics were recorded in all turtle nesting areas with high abundance, also in the dune area where turtles tend to nest. • Most of the micro plastics in Bundalal National Park are probably arriving on ocean currents, while in Hikkaduwa National Park local input of micro plastics appear to be dominant.
Maione, (2021)	*Quantifying plastics waste accumulations on coastal tourism sites in Zanzibar, Tanzania.*	Tanzania	• The results show that plastic litter surveyed at one of the sampling site was primarily linked to tourism consumption. • Plastic was a persistent pollutant on all sites during the high tourism season.
Pradit et al., (2020)	*Marine debris accumulation on the beach in Libong, a small island in Andaman sea, Thailand.*	Thailand	• The debris from shoreline and recreational activities was found the most prevalent of followed by fishing and sailing activities.
Yaghmour et al., (2018)	*Marine debris ingestion of green sea turtles, Chelonia mydas, (Linnaeus, 1758) from the eastern coast of the United Arab Emirates.*	UAE	• The results show that debris was found in the esophagus of 50% of sampled turtles. • The plastics encountered by the turtles examined are mostly composed of threadlike user plastics (rope monofilaments, weaved plastic bag monofilaments, fishing line and fishing nets) and sheet-like user plastics (plastic bags and food wrapping)
Al-Shwafi, & Ahmed, (2011).	*Litter on the beaches of the Red Sea of Yemen.*	Yemen	• Most of the litter is plastic, including food bags, oil and water bottles, bait, bags, and vehicles tires. • Most of the litter on the beach come from the sea, which indicates sea born pollution from the ships, due to the heavy traffic and from the nearby fishing vessels.

Source: (Author's compilation).

The above brief literature review gives an insightful eye into the realm of plastic debris in aquatic environments and the extent of its consequences within the IORA community, and the findings are in accordance to what has been equally revealed in other studies in different regional contexts. In fact, as can be observed, beachgoer or tourism recreational activities are one of the most prevalent ways through which beach littering potentially metamorphoses into marine debris [refer to table above for: India, Iran, Indonesia, Kenya, Malaysia, Mauritius, Singapore, South Africa, Tanzania and Thailand] especially in countries where the coastal line is vast and represent a substantial component of economic activities (Pawar et al., 2016; Portman et al., 2020). Moreover, an increasing stream of studies have echoed the possibilities for illegal rubbish dumping by passing ships in the open seas [refer to table above for: Malaysia, Maldives, Mozambique, Oman, Seychelles, Thailand and Yemen]. To ascertain this, Ryan et al., (2016) investigated the bottles drifting on the coast of Inaccessible Island, an inhabited island situated in Central South Atlantic Ocean. It was inferred from their samplings that most plastic bottles were newly manufactured and were not much fouled by goose barnacles, which means that the littered items have not been loitering for a long time in seawater; reinforcing the hypothesis that they come from nearby commercial vessels or cruise ships.

Furthermore, when speaking of derelict fishing equipment, its release is deemed to be more pronounced in cases of Illegal, Unreported and Unregulated (IUU) fishing due to rampant opportunistic and unethical practices. Eventually, such plastic debris are hazardous to marine organisms through what is popularly known as "ghost fishing", whereby aquatic faunae continue to get caught in discarded fishing cages, nets, ropes and other lost fishing tools. Similar confirmations can be gathered within a panel of IORA member states, such as Malaysia, Maldives, Oman, Seychelles, Thailand and Yemen. The recent work of Baneli et al., (2020) provides conclusive results on the lethality of "ghost fishing" on marine environments, and present evidence of increased coral mortality due to entangled fishing lines, which consequently impacted feeding frequency attempts in certain herbivore fish species.

While research endeavours studying the emergence and possibilities for the sources of marine debris are critical, assessing the bearing of littering on marine biodiversity in fact complements the understanding on the life cycle of plastic from "bin to biota". The ramifications of marine debris, notably plastic, especially in the context of aquatic life, are extensively catalogued in a broad body of scientific reporting. Ingestion and entanglement due to plastic marine debris pose considerable threats to aquatic wildlife with dire consequences jeopardizing their survival, including reduced mobility leading to failure in catching prey and increasing possibility of being ambushed, starvation, intoxication, suffocation through digestive or respiratory track blockage, infection and eventually compounded effects trigger un–natural deaths. Overall, long term serious implications arise when the aggregate repercussions are considered from the lenses of reproduction and fertility, which foretell a dwindling of species population especially within already frail environments and among most at risk categories. These deleterious effects on surrounding fauna have been documented in the studies of Verlis et al., (2013), Hossein et al., (2019), Cartraud et al., (2019) Dharmadasa et al., (2021) and Yaghmour et al., (2018) [refer to table above] for IORA member states such as Australia, Bangladesh, France/Reunion, Sri Lanka and the UAE. Simultaneously, scholarly interests have sparked further investigations, in view to probe the routes by which humans might face the toll of marine debris, especially in the form of micro or nano-sized plastic particles. Digged deeper, matters related to marine debris as a potential hazard to human health suggest that chemicals and pollutants present in plastic debris can biomagnify and potentially grow in potency at various trophic stages of the marine food web, where subsequently the toxic effects may reach humans through consumption of those contaminated or chemically bloated marine species. The results of Hossein et al., (2019) bring validity to this, when micro plastics were found in the intestines of highly

Bombay-ducks and gold-stripe sardines. Consequently, anthropogenic and environmental pressures related to plastic debris formation, accumulation and impact are countless among IORA member states, especially for SIDS like, Comoros, Reunion, Maldives, Mauritius and Seychelles, who in reality contribute the least in terms of littering.

The pernicious nature of plastic marine debris is no longer speculative, and its consequences are multi-directional within a larger conceptual sphere known as the Blue Economy, which is one of the cornerstone of IORAs' Focus Areas. Blue Economy means the use of sea and its resources for sustainable economic development (Bari, 2017), and is continuing to garner momentum amidst political, scientific and entrepreneurial communities. In order to effectively harness the cornucopia of resources and promises offered by the Ocean Economy, the IORA has prioritized six pillars, as shown in Table 2. However, the issue of plastic marine debris is strongly associated with all the subsets within the Blue Economy, either directly or indirectly, as elaborated in Table 3.

Table 2. IORA Priority Pillars in the Blue Economy

1. Fisheries and Aquaculture
2. Renewable Ocean Energy
3. Seaports and Shipping
4. Offshore Hydrocarbons and Seabed minerals
5. Marine Biotechnology, Research and Development
6. Tourism

Source: (IORA's website).

Table 3. Association of Blue Economy pillars with plastic marine debris.

IORA Blue Economy priority pillars	Association with plastic debris	Evidence
1. Fisheries and Aquaculture	1. Fisheries and aquaculture have been shown to be significant drivers of plastic marine debris.	1. Sea-based activities (mussel farming and salmon aquaculture) are responsible for most FMD (Floating Marine Debris) in the fjords, gulfs and channels of southern Chile for the period 2002 to 2005 (Hinojosa et al., 2009).
2. Renewable Ocean Energy	2. Intensive activities on oceans can potentially leak plastic into aquatic ecosystems.	2. All types of boats, ships and offshore industrial platforms are potential sources of marine debris (Pawar et al., 2016).
3. Seaports and Shipping	3. Widespread maritime trade and traffic can promote illegal waste dumping in seas.	3. Most foreign PET (Polyethylene Terephthalate) drink bottles found on South African beaches have been discarded by ships, since many of these items were crushed to expel air to be resealed again, a practice common in ships to reduce volume of trash onboard (Ryan et al., 2021).
4. Offshore Hydrocarbons and Seabed minerals	4. Extensive seabed exploration and offshore activities can cause plastic items to consciously or unconsciously reach oceanic areas.	4. Undersea exploration and resource extraction also contribute to marine debris (US EPA, 2002; Sheavly, 2005)
5. Marine Biotechnology, Research and Development	5. Plastic marine debris is a burgeoning area of research with tremendous opportunities for research and development, both for scientific advancement and policy formulation.	5. The current understanding of plastic fluxes, pathways and fate is incomplete (Van Sebille et al., 2020). Research and understanding are presently narrow in plastic debris as vectors for pathogen and parasites ("Plastisphere" centered-research).
6. Tourism	6. Tourism and recreational activities are heavily blamed for coastal littering and marine environment pollution.	6. Sediments in public tourist hotspots areas are characterized by higher magnitudes of micro plastics (Rahman et al., 2020).

Source: (Author's compilation).

Hence, it is evident that plastic marine debris have significant implications for IORAs' core objectives as outlined in the IORA charter and the sub pillars within the Blue Economy agenda. For instance, the promotion of maritime transport, fisheries trade and aquaculture (objective 2) can be detrimental to the regions' marine environments, especially when increased connectivity becomes a pathway for marine debris to flow from one-member state's oceanic economic activities, to another. This has been evidenced by way of spatial simulations by Stelfox et al., (2020) in the Maldivian scenario which suggest that ghost nests originate from purse seine fisheries and gill nets outside Maldives' territories [refer to table 1]."At the same time, trade liberalization and enhanced flow of goods across oceanic routes (objective 3 and objective 4), might be vectors for illegal dumping by passing vessels in the open seas, [refer to Table 1 and Table 3].

Thus, it is sine-quanon that the right balance between plastic marine debris formation and the pursuit of ambitious Blue Economy objectives is maintained effectively and efficiently, whereby oceanic sustainable development do not occur at the cost of marine environments, and trade-offs are maintained at the minimum level possible. In other words, plastic marine debris should not be a resultant of the adventurous endeavours in the oceanic kingdom, for marine pollution on one side and environmental sustainability on the other side would mean an incoherent discourse. In fact, strategy and policy paths for marine debris and Blue Economy should be unified and comprehensive. Congruently, the IORA commenced the first workshop in December 2021 to initiate a declaration and an action plan to address the concerns related to plastic marine debris, under the overarching thematic of the Blue Economy.

3. Recommendations and conclusion.

The literature review has unveiled the protagonist role played by off-shore sea activities such as fisheries, estuaries, trans-oceanic shipping and trade, in dispersing marine litter either consciously or unconsciously, and the resulting consequences do not only endanger nearby biota, but also faraway lands and ecosystems [refer to Table 1 for Maldives and Somalia]. Efforts to meet IORAs' Blue Economy objectives relating to Fisheries and Aquaculture, and Seaports and Shipping should be accompanied by measures to curb the possible negative externalities, more so in the context of IUU fishing. The different concerned functional bodies of the IORA, namely: the Working Group Maritime on Safety and Security, the Working Group on the Blue Economy and the Core Group on Fisheries Management are expected to synergize to address the marine litter problem. For instance, different indices can be created to measure the level of IUU fishing, the regions with highest risk of marine debris formation and those most under marine litter threats. This will serve as baseline to sectorialise specific zones across the Indian Ocean rim, where eventually appropriate measures can be adapted for each area of focus. For example, maritime zones with the highest index of IUU fishing will entail policies such as rigorous control, inspection, certification and marking of vessels to deter the prevalence of marine debris. While those areas estimated to be under threats of exogenous marine debris, the response would be conservation and preservation of aquatic ecosystems through protected marine parks or artificial reefs. Furthermore, tourism and recreational activities are despicably a catalyst to beach litter [refer to Table 1] and for that reason, comprehension of beachgoer behaviours, level of understanding, social drivers and perceptions of littering need to be assessed by IORA's Core Group on Tourism. Social experiments and observations can unveil underlying aspects of marine littering on coastal areas, such as frequency, degree of impact and the barriers to impactful marine litter sensitization and education campaigns.

Moreover, the recent UNEP 2021 report titled: "From Pollution to Solution: A global assessment of marine litter and plastic pollution", recommends the mapping of the full life cycle for key plastic products from source to the sea with environmental, health, social, economic and food safety impacts. With this in mind, the IORA can foster a grouping of scientific resource persons to systematically document the sources, impacts and

associated risks of marine litter within the Indian Ocean region. This will aid in the building of an extensive master database for the entire region, especially useful for the identification of research gaps. The rationale is that research on plastic marine debris is scarce for the Indian Ocean region (Gall and Thompson, 2015). Also, the search for the Indian Ocean "garbage patch" can be a vital data source for the understanding of litter origins, toxicity, persistence and threats. With scientific research and development as one the pivotal axes of IORA's Blue Economy concept, the Indian Ocean Academic Group and the Working Group on Science Technology and Innovation are significantly concerned by evolving areas of interests for research.

For instance, understanding is presently narrow in plastic debris as vectors for microbes and parasites, where human pathogens such as bacteria can raft on plastic pieces and form a colony, known as the "plastisphere" which serve as a thriving ground for the transmission of infections and diseases to marine and land organisms, to be then passed on to humans [Barboza et al., (2018); Vethaak & Leslie, (2016)]. Other potential areas which beckon investigations include: marine debris formation in the seabed and impact at the benthic level, demographic alterations of species and movement of plastic pollution across the trophic stages amongst others. The Indian Ocean region offers a remarkable territory for the answering of those scientific queries.

Conclusively, marine littering is definitely one of the most pressing issues of present times and in many sense is a threat-multiplier across marine environments. Hence, there is an urgent call for action which engages the wider society in considering a more environmentally-friendly lifestyle. At the same time, regional coordination and sharing of scientific resources to address key research gaps are critical in promoting cleaner, more sustainable and pristine aquatic biosystems. Noteworthy, the tricky nexus between IORA's Blue Economy and plastic marine debris would require offsetting measures, to balance off any probable adverse results from oceanic development.

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IORA Youth Writing Competition: Second Place

Sharad Mitra, Bangladesh

PREVENTIVE MEASURES FOR CLIMATE SHOCKS AFFECTING THE INDIAN OCEAN: ROLE OF IORA

In today's growing world, climate change has become a serious issue. From natural disasters, to agricultural detriment, it has been posing threats to humanity's basic sources. More than anything else, Climate Change has been affecting oceans. As human activities induce greenhouse gas into the environment, the ocean has helped moderate the effects, by absorbing more than 90% of excess heat and approximately 30% of excess carbon emissions. In this essay, the particular focus will be on the Indian Ocean. The Indian Ocean is the third-largest of the world's five oceanic divisions, covering 70,560,000 km² or approximately 20% of the water on Earth's surface. The ocean stretches 6,200 miles between the southern tips of Africa and Australia. The Indian Ocean also contributes to world trade. Oil deposit accounts for 40% of world production. According to some reports, the Indian Ocean is warming at a higher rate than other oceans. This means the relative sea level can also increase over the regions. The first part will consist of the problem definition, while the second part will explain the proposed solution, as well as IORA's involvement with its mission.

The primary problem due to Greenhouse gas is the problem of Ocean Acidification. Ocean Acidification occurs due to excess amounts of Carbon Dioxide in the air. As the ocean absorbs more carbon dioxide, the pH of the water decreases, making it more acidic. This is a problem, especially in the Indian Ocean, since it's a big threat to the survival of marine organisms. It also hinders coastal settlements, since lots of small islands rely on the Indian Ocean for their basic needs. Next, extreme CO2 emissions lead to reduced oxygen levels. Warmer ocean surfaces lead to ocean stratification, which prevents the ocean from mixing freely, thereby limiting oxygen delivery to the surface. This not only reduces oxygen for humans, but also marine creatures living close to the surface. Some affected species include those that we eat or depend upon for livelihood. Oxygen is vital for the survival of animals. Scientists estimate that around 50% to upto 80% of the oxygens come from under the ocean. Third, Marine Heatwaves are another threat. An increased marine temperature disrupts the ecosystem, hampering marine life. Some creatures need to stay at a certain temperature to stay alive. Hot climate is often unsuitable for many organisms, killing them in the process. Changing ocean temperatures and ocean chemistry threaten global food security, particularly devastating to developing countries that heavily depend on seafood as a vital source of protein. Fourth, Marine

Debris. Marine Debris is marine littering or human created waste that goes to the ocean, whether it be deliberately or accidentally. Marine debris injures and kills marine life, interferes with navigation safety, and poses a threat to human health. Our oceans and waterways are polluted with a wide variety of marine debris ranging from soda cans and plastic bags to derelict fishing gear and abandoned vessels. Lastly, rising sea levels are an issue. Seal level rising causes erosion of beaches as well as flooding in coastal areas. Countries such as Bangladesh are heavily influenced due to the flooding.

There can be many proposed solutions towards helping to save the environment. In the next few paragraphs, a wide variety of solutions will be explored, while in the following ones a comprehensive way of how IORA can fight will be proposed.

Number one on the list is adaptation. The healthier an ocean is the better chance it has of surviving and rebounding from climate change impacts. Adaptation planning includes trying out alternative livelihood, food sources, and better preparing locals for impacts. Adaption is really important, since the environment is constantly changing and the atmosphere is shifting. My second point is Mitigation. Mitigation can be performed in various ways, including the enhancement of Marine ecosystems, development of “Blue Carbon” complex markets, as well as ocean renewables, depending on the location. Marine ecosystems can store a significant amount of carbon, which could help offset carbon emissions while industries transition to zero-emission practices. Third is protection. Ocean protection enables marine ecosystems to better endure ocean changes, such as ocean acidification, reduced oxygen and increased

heat, so these systems can continue to provide the resources we depend on to live. Protecting marine and coastal ecosystems are therefore crucial. Fourth, there’s an option of Strengthening Resilience. As the private sector evaluates supply chain vulnerabilities, climate risk exposure and the value of long-term resilience, the benefits of healthy coastal ecosystems will shine. Developing more coastal ecosystems, from mangroves to coral reefs, helps to strengthen our own resilience to climate change impacts, giving us more access to natural defenses. Lastly, the promotion and support of sustainable fisheries. Sustainable fisheries is managing a complex level of control so that it guarantees ocean population and freshwater wildlife for the future. Sustainable fishing avoids overfishing, as well as loss of marine biodiversity. Loss of marine biodiversity is a serious threat, since more than 3 billion people in the world live off of seas and coasts. Sustainable fishing also helps protect marine fauna, avoids waste, contributes to food security, as well as reduces pollution. As evident through this paragraph, there are many ways to use the Indian Ocean to our advantage in helping fight Climate Change and preserve the quality of the ocean.

One of IORA(Indian Ocean Rim Association)’s primary priority and focus areas is Disaster Risk Management. The Indian Ocean Region is sometimes called “World’s Hazard Belt", since it is prone to natural and manmade disasters. According to the website of IORA, “Natural disasters under the group of Climatological (cyclones and droughts), Geological and Tectonic (earthquakes and tsunamis) and Hydrological (floods and tidal surges) origins are very common and recurring phenomena in the region.” As reiterated multiple times in this essay, a lot of life, both animals and humans, depend on the well being of the Indian Ocean. Therefore Disaster management is a very important goal. Disaster Risk Management also means preventing the problem from occurring in the first place.

Another of IORA’s focus areas is the “Blue Economy”. Oceans cover two thirds of the global surface, in turn providing a substantial part of the global population with food and livelihood. According to their website, “The objective of the Blue Economy is to promote smart, sustainable and inclusive growth and employment opportunities within the Indian Ocean region’s maritime economic activities.”

Now for the comprehensive and proposed solution. Based on everything that has been mentioned

above, it is evident that the need for the Indian Ocean is high. Lives and economies heavily rely and depend upon it. Therefore it is really important to look after the wellbeing of the ocean. This is where IORA comes in. My proposed solution is developing a networking system that will increase the Blue Economy, as well as cultivate ocean technology. Although the development of the Blue Economy and ocean technology are big projects, IORA can certainly help in advancing. For example, IORA can help put limits on certain activities to help preserve the ocean. Restrictions can be put in place in certain areas of fishing. If there is overfishing, there can be a restriction to prevent fishing there for a while. Moreover, there can be an increase in innovative technology such as Bioprospecting, Seabed mining, Marine Life protection, or Coastal Renewable Energy.

Climate Change is a big global problem. However, it is not possible for IORA to control climate change. However, what it can do is control the effects caused by global warming and climate change, in turn limiting the harm caused to the Indian Ocean. As mentioned above, modern innovative solutions are one aspect that might help. Coastal Renewable Energy sources, for example, are great ones. Moreover, developing the Blue Economy includes protecting ocean wildlife such as sharks and coral reefs. Coral reefs occur in a lot of countries and territories and whilst they cover only 0.2% of the seafloor, they support at least 25% of marine species and underpin the safety, coastal protection, well being, food and economic security of hundreds of millions of people. Scientists estimate that some 50-80% of the oxygen production on Earth comes from the ocean. The majority of this production is from oceanic plankton; drifting plants, algae, and some bacteria that can photosynthesize.

The Blue Economy also provides a lot of opportunities. Shipping and Port facilities, for example. 80% of global trade by volume, and over 70% by value, is carried by sea and handled by ports worldwide. Fisheries. Fishes account for 15.7% of the annual protein consumed. Through following the model of Blue Economy, fishing optimally can benefit both in profit, as well as sustainability.

Then, there is Aquaculture. Aquaculture is breeding, rearing, and harvesting fish and other sea organisms in various water environments. Next, we have tourism. Tourism is of key importance to many developing countries. For some countries and small islands, tourism can be their main source of income. Through the model of Blue Economy, there is increased international tourism. Moving on, there is energy. In 2009 offshore fields accounted for 32% of worldwide crude oil production and this is projected to rise to 34% in 2025. Furthermore, Biotechnology also comes with the Blue Economy. Biotechnology includes a vastly different amount of areas; from Bioprospecting to Ocean Engineering to Marine Technology. Bioprospecting refers to the finding and creation of medicinal drugs from plants and animals. Submarine Mining is another aspect, since the world is "gearing up for the exploration exploitation of mineral deposits on and beneath the sea floor." Last but not least, the Blue Economy presents us with the opportunity of governance. Each sovereign country is responsible for its own resources and sustainable development. A key aspect that guarantees the success of these kinds of international collaborations for the Blue Economy is research. Since the Blue Economy is a relatively new concept, plenty of scientific research and technical advancement are being funded. This opens a new door, since a lot has yet to be explored.

Furthermore, another way IORA can help to save the environment is raising awareness. With its 23 member states, some of which are heavily populated, IORA can help promote action. Updating the member states with current news, as well as the statistics of the Indian Ocean is useful, in the sense that can raise people's concern.

Another way of promotion is by using social media and technology. In today's world social media can be a powerful thing, considering the vast amount of users. According to a report, over 3.6 billion people in the world are connected in some form or other social network. Promoting campaigns and raising awareness through platforms such as Facebook, Instagram, Twitter, and Youtube, can also help meet the goal.

In conclusion, the Indian Ocean is one of the "organs" of our mother earth. Without the wellbeing of the Indian Ocean, millions, if not billions of people will suffer. Ocean protection is not only important, but vital to our survival. Throughout the essay, a lot of problems, such as ocean acidification, reduced Oxygen levels, excessive heat, and marine debris. To top it all off, there is the problem of Climate Change, which is one of the, if not the biggest threat to the environment in today's world. Next, a few possible solutions were discussed. Adaptation is a big one, followed by Mitigation, Protection, Strength Resilience, and Sustainable Fisheries. Then, a comprehensive plan of how IORA(Indian Ocean Rim Association) can help tackle these problems was discussed. The highlight was developing a more Blue Economy, as it comes with a lot of benefits, and opens up new opportunities. With twenty three, mostly high populated, member states, IORA can campaign and raise awareness to a ton of people. Social Media can also help in raising awareness, due to the large number of users. Raising awareness is an important task, since a lot of people are still under-educated about the Indian Ocean. This point is crucial, especially those sharing borders with the ocean. I would like to conclude by saying that we are faced with an early warning. It's not too late for action, however, if we don't act now, we suffer later. The choice… is ours to make!

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IORA Youth Writing Competition: Third Place
Eliya Peter, Tanzania

THE IMPACTS AND MITIGATIONS OF MARINE PLASTICS IN THE INDIAN OCEAN REGION

Abstract
The dramatic increase in human population and the unsustainable use of plastic products as well as lack of proper waste management have contributed to the accumulation of plastics in the marine environment. In 2014, The Indian Ocean was ranked second following the North Pacific Ocean with an estimated total count of 130.0 X 1010 pieces and weight of 591.3 X 102 tons. The accumulation of marine debris in the Indian Ocean has become an urgent environmental issue as it poses a threat to the marine ecosystem and to people living across the Indian Ocean region. Some of the harmful impacts associated with marine plastics include; loss of biodiversity, alteration of water quality, socio-economic losses and public health concerns. In this paper, the proposed mitigations to overcome the on-going trend of plastic pollution in the Indian Ocean have been put forward addressing how Indian Ocean Rim Association (IORA) should work in collaboration with other respective bodies and agencies in ensuring the protection of the marine environment as well as reducing the impacts posed by plastic pollution. The following have been proposed, (1) raising the public awareness and education on the potential dangers of marine plastic pollution and the necessary actions to be taken; (2) creating policies that ensure systemic changes; (3) adopting waste bank management approach; (4) Ocean clean-up strategies; (5) reducing plastic wastes through recycling of wastes and lastly (6) converting unrecyclable wastes to produce energy.

Keywords: Marine debris, Indian Ocean, Plastic pollution, Harmful effects, Mitigations

Introduction

Marine debris refers to any synthetic material or object thrown, abandoned or disposed in the marine environment. It can be deliberately in a manner as dumping of waste materials in the ocean or fortuitous release of objects through the action of wind, water ways or natural disasters (Sheavly, 2007). Floating plastics are considered to be the most polluting items in the ocean that pose a threat to the marine life and ecosystem (Thevenon et al., 2014).

Plastics are synthetic or semi-synthetic organic polymers (made from fossil-fuel based chemicals and natural gas or petroleum) which are long and high molecular weight molecules constructed from units called monomers. The widespread use of plastics is as a result of the plasticity nature that makes plastics capable of being extruded, molded

or pressed into different types of solid objects of different shapes with regard to various purposes (Thevenon, et al., 2014). Plastics have widely been used in construction, packaging, electronics and automotive sectors.

According to Worldometers, (2022), as of January 2022, the human population was 7.9 Billion. The tremendous and dramatic increase in human population has brought about the high demand for plastic production, of which has brought a widespread environmental problem due to their bulk presence as a result of durability and very slow degradable property which makes them persist in the environment for centuries as waste (Barnes, et al., 2009).

Plastic pollution has become an urgent environmental issue affecting the world. In their study, Eriksen et al., (2014) postulated that the Indian Ocean ranks second following North Pacific Ocean in plastic loading with an estimated total count of 130.0 X 1010 pieces and weight of 591.3 X 102 tons. Wang et al., (2018) categorized plastics on basis of their size in which >1m is mega-plastic, <1m is macro-plastic, <2.5cm is meso-plastic, <5mm is micro-plastic. The harmful effects of the plastic debris have well been reported by many researchers and their consequences to both human beings and the marine ecosystem pose a great threat.

Photo by Depois (2018) showing the accumulation of plastics in the marine environment <https://phys.org/news/2018-12-oceans-garbage-prompt-war-plastics.html>

Impacts of plastics in the marine environment

Loss of biodiversity which is attributed by the presence of plastic debris have proven fatal to the life of marine organisms as they can accidentally be ingested or trap marine species. Plastic pieces may mistakenly be taken as food and once ingested, can cause obstruction of the gastrointestinal tract leading to failure of digestion and consequently causing starvation which poses lethal impacts such as death to species (Murray, F and Cowie, P.R., 2011). Furthermore, different fishing gears such as nets, hooks and traps that are abandoned or left in the ocean may entangle and cause death to various marine species such as fish and turtles due to inability to breath, move or feed (Sheavly, 2007; Baulch S. and Perry C, 2014).

A photograph by Pitts, M (2017) showing marine species killed by abandoned fishing nets <https://www.breathemagazine.com/2017/11/21/20-things-need-know-plastic-oceans/ >

The chemical, physical and biological characteristics of water can be altered as a result of organic pollutants sorbed in plastic resin from surrounding water or coastal areas leading to habitat destruction (Rochman et al., 2012). Water quality alteration has facilitated loss of nursery and spawning sites for many marine species. In addition, plastics can cause habitat degradation through physical damage to sensitive marine ecosystem such as sea grass beds and coral reefs of which affects the marine species number (Sheavly, 2007; Diaz et al., 2019; Rogers and Aburto, 2020).

Beaumont et al., (2019), estimated an annual loss of about 500 – 2500 Billion U.S Dollars occurs on a global scale as a result of decline in benefits derived from marine ecosystem services. Plastic pollution in the marine environment has caused significant economic damages in various sectors and communities. Marine debris that accumulates along the beautiful beaches, waterways and shorelines reduces the aesthetic value and diminishes the use of such areas for recreational purposes of which discourages tourists to visit the places and therefore impairing the tourism sector. Further more, economic costs can be encountered as a result of discarded or abandoned plastics, fishing ropes and nets that stuck and wrap around marine equipments such as propellers, engines and operating machines causing disturbance and damage to the boats and ships (Charitha et al., 2021). Watkins and Brink, (2017) explained how loss of potential fish catches has affected the fishery sector as a result of accumulation of marine debris. Presence of plastic debris causes decline in the quality of captured fish and seafood by destructing the marine ecosystem, habitat and killing species.

Health of human beings becomes exposed to risk following consumption of contaminated marine products such as fish and seafood. Polymers are rich in additives such as biocides, flame retardants and plasticizers of which when accumulates in the marine environment undergoes sorption to concentrate persistent organic pollutants such as dichlorodiphenyltrichloroethane (DDT) and Polyclinic Aromatic Hydrocarbons (Rios et al., 2007) and microbial pathogens (Kirstein et al., 2016). Teuten et al., (2009) reported that, once marine debris are accidentally ingested by the marine

species, the organic pollutants tend to accumulate in the tissues and result into contamination of marine products which increases its concentration in the tissues of higher predators including human beings. Some of the plastic pollutants and toxins have developmental problems and hormonal abnormalities to human beings.

Solutions for the control of marine debris (plastics) in the Indian Ocean region Public awareness and education: The goal is to increase the awareness and understanding of the public on the potential dangers posed by plastic pollution and the necessary actions or solutions to be undertaken. In today's world, technology has managed to hasten the rate at which information and ideas are shared among individuals. Social media has taken over, for example; as of September 2021, according to Johnson, (2021), he reported that approximately 951.11 million people use internet in Southern Asia, 495.95 million in Southeast Asia, 146.3 million in Eastern Africa, 29.42 million in Australia and Oceania, 182.58 million in Southern Europe. It is easy for one to convey a message and reach majority since social media provides a platform where both literate and illiterate people share narratives, stories and pictures. IORA should collaborate and work with public figures such as famous politicians, musicians, athletes and other people with massive influence in the social media and internet by providing endorsements to them so that they help in promoting public awareness through short educational video clips, inspiring photographs on environmental issues and music to help changing the perception of people on the dangers of plastic pollution as well as the available solutions.

Policies formulation: The Indian Ocean Rim Association (IORA) should collaborate with respective national governments of countries in the Indian Ocean region, non-governmental agencies as well as different stakeholders in creating policies that ensure systemic changes such as phasing out the single-use plastics that pollute the most by shutting off the plastic machines operating in the respective regions. This is because, we are putting the world in danger by agreeing to use materials engineered to last forever to produce items geared to be used once and thrown away. Plastic production has far outrun the world's ability to keep up and manage waste. The way out to plastic pollution is to stop plastic use. For example, Tanzania started an initiative by passing a regulation that prohibits all plastic carrier bags regardless of their thickness from being imported, exported, manufactured, sold and used (The Environmental Management Regulations, 2019). An audit carried out from 1st June 2019 to March 2021 following the prohibition in Tanzania revealed a decline in the use of plastic carrier bags in which, about a total of 253.7 tones were surrendered to collection point (National Audit Office, 2021). IORA and respective stakeholders should lead the way by promoting policies that encourage plastic-free services such that, the use of sustainable and biodegradable materials to supersede plastics in different areas such as restaurants, hotels, shops, beaches and workplaces.

Waste banks: IORA should adopt waste bank management approach in the respective regions as means to reduce plastic pollution. In this system, the waste deposited by community members in the collection points, will be weighed and valued with a sum of money that is offered to the person depositing the plastic waste. IORA can work to improve the waste collection systems in the respective countries and then sell the collected waste to recycling agents or factories. This method is suitable in giving positive results because it is true that people are always highly motivated to work when it is beneficial, such that when a reward like money is put forward. Wulandari et al., (2017) pointed out that the waste management model by using waste banks proved a good effort in managing waste problems in the areas of Indonesia. Waste banks not only help in managing plastic pollution but also serve to empower members of the societies economically with regard to their efforts in collecting and depositing plastics (Pariatamby and Tanaka, 2014).

A picture showing a waste collection point where people exchange plastic wastes for money (waste bank) in Morogoro region, Tanzania

Ocean clean-up strategy: The already accumulated plastic waste in the Indian Ocean can be get rid off by trapping and collecting them by using floating barriers. The U-shaped floating barriers are installed on the surface of water in areas with massive accumulation of plastic to trap them into a retention zone at its far end and prevent escaping underneath (Slat and Peytavin, 2022). Rivers should also be intercepted so as to prevent plastics from entering the ocean. Natural forces such as wind sweep and push the plastics which become trapped in the barriers. The collected waste is then taken to recycling or down cycling agents and factories for energy conversion. IORA should offer technical arrangement support and work with stakeholders in respective regions of the Indian Ocean to ensure effective implementation of the strategy and create special teams for close monitoring of the systems for the aim of reducing plastic pollution in the Indian Ocean.

Recycling of plastic waste: Plastic debris found floating or in the surface of the Indian Ocean as well as the landfills can be reduced through the action of recycling. Even though recycling process is expensive but its benefits surpasses many waste management approaches as it reduces pollutant emissions, saves energy and resources, reduces the need for landfills and open air burning. IORA should work with respective countries in the Indian Ocean providing sufficient recycling bins and encouraging the recycling rate to help reduce plastic waste in the environment.

Converting plastic wastes to energy: The unrecyclable plastic wastes can be transformed to produce fuel, char, combustible gases and monomers. Various environmental friendly techniques can be used to convert waste to energy. For example pyrolysis is widely used in which plastic wastes are heated at a very high temperature to produce fuel, carbon gas, hydrogen chloride gas, char and monomers (Pahl, 2020). Another commonly used method is gasonification, in which under the absence of oxygen gas, plastic wastes are melted at very high temperatures (525 to 625 degree of Celsius) resulting into production of synthetic gases used to fire turbines (Sharma et al.,

2021). The methods work in an eco-friendly way as they capture and store carbon by using developed technologies to balance greenhouse gases emission.

Conclusion

The ongoing tremendous increase in human population coupled with mismanagement of non degradable plastic has facilitated the accumulation of marine debris which has posed threat to the ecosystem, human beings and marine life. With the ongoing trend, the world is expected to have a drastic increase in plastic waste coming from the land to the Ocean if countries continue to produce plastics without keeping up with the proper strategies and methods to manage and combat waste materials. Taking into consideration the ramping up and the impacts as well as the fate of plastic pollution in the Indian Ocean, further action needs to be taken. There is a need for the governments in the respective countries of the Indian Ocean region, policy makers, stakeholders and other environmental agencies such as Non-governmental organizations and community based organizations to work in collaboration to provide appropriate interventions as well as ensuring appropriate and necessary actions are implemented to effectively address the threats posed by ineffective waste management so as to ensure success in terms of reduced plastic pollution and offer sustainable life to people living across the Indian Ocean region. Much focus should be on switching to alternatives (plastic-free services) because targeting the source before its production is far more effective than clean-up projects and dealing with the consequences of plastic pollution. Furthermore, more sponsorship to researchers should be offered in the area of finding solutions to plastic-free-alternatives so as the world could overcome the use and dependency to plastic services.

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Photo Gallery

The vision for IORA originated during a visit by late President Nelson Mandela of South Africa to India in 1995.

Indian Ocean Rim Initiative 1st Meeting of Working Group Mauritius, 15-17 August 1995

Indian Ocean Rim Initiative International Meeting of Expert Mauritius, March 1995

Photo Gallery

Indian Ocean Rim Association For Regional Cooperation (IORA-ARC) 1st Ministerial Meeting Mauritius, 5-7 March 1997

Indian Ocean Rim Association For Regional Cooperation (IORA-ARC) 1st Ministerial Meeting Mauritius, 5-7 March 1997

5th Meeting of the Council of Ministers (COM) Colombo, Sri Lanka, 26-27 August 2004

10th Meeting of the Council of Ministers (COM) Sana'a, Yemen, 05 August 2010

Photo Gallery

11th Meeting of the Council of Ministers (COM)
Bengaluru, India, 15 November 2011

12th Meeting of the Council of Ministers (COM)
Gurgaon, India, 02 November 2012

13th Meeting of the Council of Ministers (COM)
Perth, Australia, 01 November 2013

14th Meeting of the Council of Ministers (COM)
Perth, Australia, 09 October 2014

Photo Gallery

15th Meeting of the Council of Ministers (COM)
Padang, Indonesia, 23 October 2015

1st IORA Ministerial Blue Economy Conference
Pointe aux Piments, Mauritius, 2-3 September 2015

16th Meeting of the Council of Ministers (COM)
Bali, Indonesia, 27 October 2016

IORA Leaders' Summit held in Jakarta, Indonesia to commemorate the 20th Anniversary of IORA – March 2017

Photo Gallery

IORA Leaders' Summit held in Jakarta, Indonesia to commemorate the 20th Anniversary of IORA – March 2017

IORA Workshop on Women's Entrepreneurship and Skill Development in collaboration with the Federation of Indian Chambers of Commerce & Industry (FICCI) in New Delhi, India held on 27 September 2017.

17th IORA Council of Ministers held in Durban, South Africa, 18 October 2017.

Photo Gallery

2nd IORA Renewable Energy Experts Meeting, October 2018 - Delhi NCR, India

IORA High Panel on Enhancing Maritime Cooperation for Inclusive Growth in Indian Ocean, Bali, Indonesia, 7 – 8 December 2018.

2nd IORA Renewable Energy Ministerial and Experts Meetings, 1st International Solar Alliance General Assembly and 2nd Global Renewable Energy Investment Meeting and Expo (REINVEST2018), 2 – 4 October 2018 in Delhi NCR, India.

Photo Gallery

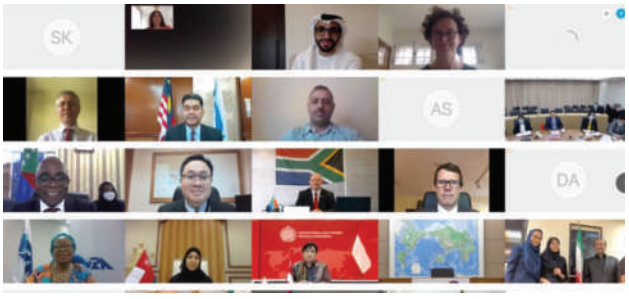
18th IORA Council of Ministers Meeting concluded in the city of Durban, South Africa, 2 November 2018

1st IORA Strategic Planning Workshop, Mauritius, 9 – 10 April 2019

3rd IORA Blue Economy Ministerial Conference, Dhaka, Bangladesh, 4 – 5 September 2019

Photo Gallery

19th IORA Council of Ministers Meeting (COM), Abu Dhabi, UAE, 7 November 2019



Virtual Meeting of the Committee of Senior Officials (CSO) and Dialogue Partner Engagement on COVID-19: Responses, Cooperation, and Partnerships, 25 May 2020

20th IORA Council of Ministers Meeting, Virtually, 17 December 2020.

Photo Gallery

IORA Day 2021 – Virtual Celebrations, 5 March 2021

23rd IORA Committee of Senior Officials Meeting, Dhaka, Bangladesh, 15-16 November 2021

21st IORA Council of Ministers Meeting (COM), Dhaka, Bangladesh, 17 November 2021

Photo Gallery

Welcoming H.E. Ambassador Masud Bin Momen, Foreign Secretary of Bangladesh to the IORA Secretariat!

Signing of the IORA Secretariat Annual Operation Plan by Rear Admiral Md. Khurshed Alam, Secretary & IORA CSO Chair and IORA Secretary General H.E. Salman Al Farisi at the Secretariat, 15 February 2022.

IORA Secretary General, H.E. Mr Salman Al Farisi, and Dr. Thomas Krimmel, Project Director, German Agency for International Cooperation (GIZ) , signed a second Financial Contribution Agreement aimed at further improving the service delivery capacity of the Indian Ocean Rim Association (IORA) Secretariat in Mauritius, 15 February 2022.

Rear Admiral (retd.) Md. KhurshedAlam, Secretary (MAU), Ministry of Foreign Affairs Bangladesh and Chair of the IORA Committee of Senior Officials (CSO) and IORA Secretariat Staff, 15 February 2022

ANNEXURES

CHARTER OF THE INDIAN OCEAN RIM ASSOCIATION (IORA)

PREAMBLE

We, the Governments of the Member States of the Indian Ocean Rim Association (IORA)

CONSCIOUS of historical bonds created through millennia among the peoples of the Indian Ocean Rim and with a sense of recovery of history;

COGNIZANT of economic transformation and speed of change the world over which is propelled significantly by increased intensity in regional economic co-operation;

REALISING that the countries washed by the Indian Ocean in their diversity, offer vast opportunities to enhance economic interaction and co-operation over a wide spectrum to mutual benefit and in a spirit of equality;

CONVINCED that the Indian Ocean Rim, by virtue of past shared experience and geo-economic linkages among Member States, is poised for the creation of an effective Association and practical modalities of economic co-operation; and

CONSCIOUS of their responsibility to promote the welfare of their peoples by improving their standards of living and quality of life.

CONSIDERING that the 13th Council of Ministers in Perth, Australia, agreed to a new name of the Association as the "Indian Ocean Rim Association" (IORA);

CONSIDERING that, at the 17th Council of Ministers in Durban, South Africa, it was agreed to amend the IORA Charter further to replace the Charter of the Association as adopted in 1997 and amended in 2010 and 2014;

Have adopted the following:

1. DEFINITIONS

For the purpose of this Charter, the terms used in the Charter are defined as follows, unless the context otherwise indicates:

(a) "Association" means Indian Ocean Rim Association, "IORA" and which was formerly known as the Indian Ocean Rim Association for Regional Cooperation or IOR-ARC;

(b) "Member States" means the Member States of the IORA;

(c) "Observer" means the States/Organisations which are granted Observer Status by the IORA;

(d) "Dialogue Partners" means States/Organizations with which IORA enjoys consultative relationships in agreed areas of common interest;

(e) "IORA Region" means the territories of the Member States;

(f) "Council of Ministers" '(COM)' means the Council of Ministers of the IORA;

(g) "Committee of Senior Officials" '(CSO)' means the Committee of Senior Officials of the IORA;

(h) "Institutional Mechanisms" means the institutional mechanisms and/or bodies of IORA established by a decision of the Member States, as adopted by the Council of Ministers (COM);

(i) "Specialised Agencies" means the specialised agencies of IORA established by a decision of the Member States, as adopted by the Council of Ministers (COM);

(j) "Secretariat" means the Secretariat of the IORA in Mauritius;

(k) "Secretary–General" means the Secretary-General of the IORA; and

(l) "Host Country/Government" means the Country/Government of the Republic of Mauritius.

2. FUNDAMENTAL PRINCIPLES

The Association will facilitate and promote economic co-operation, bringing together inter-alia representatives of Member States' governments, businesses and academia. In a spirit of multilateralism, the Association seeks to build and expand understanding and mutually beneficial co-operation through a consensus-based, evolutionary and non-intrusive approach. The Association will apply the following fundamental principles without qualification or exception to all Member States:-

(g) Co-operation within the framework of the Association will be based on respect for the principles of sovereign equality, territorial integrity, political independence, non-interference in internal affairs, peaceful co-existence and mutual benefit;

(h) The membership of the Association will be open to all sovereign States of the Indian Ocean Rim which subscribe to the principles and objectives of the Charter and are willing to undertake commitments under the Charter;

(i) Decisions on all matters and issues and at all levels will be taken on the basis of consensus;

(j) Bilateral and other issues likely to generate controversy and be an impediment to regional co-operation efforts will be excluded from deliberations;

(k) Co-operation within the Association is without prejudice to rights and obligations entered into by Member States within the framework of other economic and trade co-operation arrangements whichwill not automatically apply to Member States of the Association. It will not be a substitute for, but seeks to reinforce, be complementary to and consistent with their bilateral, plurilateral and multilateral obligations;

(l) A member-driven approach will be followed by Member States to achieve the goals and objectives of the Association.

(m) Promotion of principles of good governance by Member States will enable smooth implementation of programs.

3. OBJECTIVES

(a) To promote the sustained growth and balanced development of the region and of the Member States, and to create common ground for regional economic co-operation;

(b) To focus on those areas of economic co-operation that provide maximum opportunities to develop shared interests and reap mutual benefits. Towards this end, to formulate and implement projects for economic co-operation relating to trade facilitation and liberalization, promotion of foreign investment, scientific and technological exchanges, tourism, movement of natural persons and service providers on a non-discriminatory basis; and the development of infrastructure and human resources inter-aliapoverty alleviation,promotion of maritime transport and related matters, cooperation in the fields of fisheries trade, research and management, aquaculture, education and training, energy, IT, health, protection of the environment, agriculture, disaster management.

(c) To explore all possibilities and avenues for

trade liberalisation, to remove impediments to, and lower barriers towards, freer and enhanced flow of goods, services, investment, and technology within the region;

(d) To encourage close interaction of trade and industry, academic institutions, scholars and the peoples of the Member States without any discrimination among Member States and without prejudice to obligations under other regional economic and trade co-operation arrangements;

(e) To strengthen co-operation and dialogue among Member States in international fora on global economic issues, and where desirable to develop shared strategies and take common positions in the international fora on issues of mutual interest;

(f) To promote co-operation in development of human resources, particularly through closer linkages among training institutions, universities, and other specialised institutions of the Member States; and

(g) To seek to reinvigorate the Association by progressing the prioritised agenda decided upon at the Council of Ministers' meeting in Bengaluru in November 2011. That meeting gave a focused direction towards formulation of a dynamic road map of cooperation, in line with the growing global emphasis on the unique geo-strategic primacy of the Indian Ocean Rim. A list of priority areas of cooperation and cross-cutting issues are listed in Annex I.

4. MEMBERSHIP

(a) Member States

(i) All sovereign States of the Indian Ocean Rim are eligible for membership of the Association. To become members, States must adhere to the principles and objectives enshrined in the Charter of the Association. Expansion of membership of the Association will be decided by Member States;

(b) Dialogue Partners and Observers

(i) Council of Ministers may grant the status of Dialogue Partners or Observers to other States or Organisations, having the capacity and interest to contribute to IORA.

(c) Member States, Dialogue Partners, and Observers are listed in Annex II.

5. INSTITUTIONAL MECHANISMS

5.1 Primary Bodies

(a) Council of Ministers (COM)

(i) There will be a Council of Ministers of the Association. The Council will meet annually, or more often as mutually decided, for the formulation of policies, review of progress of co-operation, decisions on new areas of co-operation, establishment of Functional Bodies and Specialised Agencies as deemed necessary, and decisions on other matters of general interest.

(ii) The Council of Ministers will elect a Chair and Vice-Chair of the Association for a period of two years respectively.

(iii) A ministerial retreat may be held during each IORA Council of Ministers' Meeting to explore and reflect on Indian Ocean issues and to exchange ideas. The IORA Chair, in consultation with other Member States, will propose elements and themes to guide discussion by Ministers at this closed meeting.

(iv) The Council of Ministers can endorse the convening of other IORA Line Function Meetings to explore and reflect on Indian Ocean issues and exchange ideas on enhancing cooperation amongst Member States.

(b) Committee of Senior Officials (CSO)

(xxi) There will be a Committee of Senior Officials of the Association composed of senior-government officials of Member States. It will meet bi-annually, or as often as mutually decided. The CSO will consider reports and recommendations of the Institutional Mechanisms established by the COM, and review implementation of the decisions taken by the COM.

(xxii) The Committee of Senior Officials will establish the priorities for economic co-operation, develop, monitor and co-ordinate the Work Programs, and mobilise resources for the financing of the Work Programs.The Committee will submit periodic reports to the Council of Ministers, and refer as and when necessary, policy matters for the Council's decision.

(c) TROIKA

(i) A "TROIKA" consisting of the Chair, the Vice-Chair and the previous Chair will apply to the Council of Ministers (COM) and the Committee of Senior Officials (CSO). It will meet in the period between the meetings of the COM and CSO as often as mutually decided.

(ii) It will report to the Member States, on any important matters relating to the Association, including a review of progress, establishment of additional mechanisms, policy direction to IORA institutions, and the appointment and term of office, mandate, duties and the termination of the services of the Secretary-General.

(d) Secretariat

(i) There will be a Secretariat of the Association to manage, co-ordinate, service and monitor the implementation of policy decisions and Work Programs, as well as prioritisation of projects as adopted by the Council of Ministers.

(ii) The Secretariat will be responsible for servicing of all IORA meetings, the representation and promotion of the Association, the collation and dissemination of information, the maintenance of an archive, depository and registry for IORA documentation and research material, and mobilisation of resources.

(iii) The Secretariat will function in accordance with the provisions of the Agreement between the Government of the Republic of Mauritius and IORA relating to the rights, privileges and immunities of IORA Secretariat approved by the Council of Ministers in 2002 signed between the Government of the host country and the Secretary-General and amended through an addendum in 2017 following the change of the name of Association in 2014.

(iv) The Secretariat will be headed by a Secretary-General who will be assisted by Directors/Experts, on voluntary secondment from Member States. In the absence of the Secretary-General, the most senior Director will act on behalf of the Secretary-General.

(v) The Secretary-General will be appointed by the Council of Ministers for a term of three years renewable for one additional term, from among candidates nominated by the Member States on the basis of qualification, experience and suitability as laid down in the staff regulations of the IORA Secretariat. He/she will be responsible to the Council of Ministers for all activities of the Association. He/she will participate in all meetings of the Council and will perform such other functions as are entrusted to him/her by these bodies. He/she will provide an annual report to the Council of Ministers on the work of the Association.

(vi) The staff of the Secretariat will be appointed and governed in accordance with the terms, conditions and procedures laid down in the Staff Regulation approved by the Council of Ministers.

5.2 Functional Bodies

(i) To strengthen and promote activities in the Association, the COM may establish or remove Functional Bodies such as Working Groups, Sub-Working Groups, Sectoral/-Cluster Core Groups, and Dialogue Forums. The COM could also consider as necessary the revitalisation of existing functional bodies and specialized agencies.

(ii) The Functional Bodies will be constituted through Modalities and Terms of Reference (TOR) as recommended by the CSO and approved by the COM.

(xxiii) Functional Bodies are listed in Annex III.

5.3 Specialised Agencies

(i) The Association includes Specialised Agen-

cies which may be established by a decision of the Member States, as adopted by the COM, to promote activities in cooperation with IORA Secretariat, as the need arises. Establishment of new Specialised Agencies under IORA and removal of existing Agencies, as required from time to time may be authorised by a decision of the Member States duly adopted by the COM, to promote activities in cooperation with the IORA Secretariat, A standardised Memorandum of Understanding (MOU) has been created for the establishment of IORA Specialised Agencies, where the need may arise.

(ii) Specialised Agencies are listed in Annex IV.

5.4 Subsidiary Instruments

Secretariat will maintain Rules of Procedure, Staff Regulations, and Financial Regulations of IORA and any such subsidiary instruments as approved by the Council of Ministers.

6. SPECIAL MECHANISMS

(a) Ad Hoc Working Groups

(i) Ad Hoc Working Groups may be established to address specific topics when required, upon recommendation by the CSO and approved by the COM. Ad Hoc Working Groups will be dissolved according to the Working Group's Terms of Reference as agreed

7. NATIONAL FOCAL POINTS

(a) Each Member State of the Association will set up appropriate National Focal Points for IORAto co-ordinate and advance the implementation of its activities and achievement of its objectives.

(b) Dialogue Partners and Observers will nominate and update Focal Points for liaison with the Association.

8. FINANCIAL ARRANGEMENTS

(a) The contribution by Member States will be determined on the basis of criteria which will be adopted by the decision of Council of Ministers.

(b) Adequate arrangements will be made by Member States financing the implementation ofthe Work Programs. This will not exclude external sources of financing where appropriate.

(c) A Special Fund will be established as a financial mechanism for supporting and complementing the funding of projects and programs adopted by the Association.

(d) The Secretariat will prepare the Budget for each year and will submit it to Committee of Senior Officials for its consideration and recommendation for adoption by the Council of Ministers.

(e) The Council of Ministers will consider measures to address the non-payment of annual membership contributions by any Member State.

9. ADOPTION AND AMENDMENT OF THE CHARTER

(a) This Charter will take effect from the date of its adoption by the Council of Ministers, which will be preceded by signature of the Charter by all Member States.

(b) This Charter may be amended at any time by mutual consent of Member States. Any amendments will be in writing and will take effect upon the approval of the Council of Ministers.

(c) This Charter will replace and supersede the Charter signed by Heads of Delegation at Perth, Australia on Thursday 9 October 2014.

Adopted by the 18th Council of Ministers in its meeting held in Durban, eThekwini, Republic of South Africa on 2 November 2018, in a single original in the English language.

Annex amended on 2 November 2018

Annex I

LIST OF PRIORITY AREAS OF COOPERATION AND CROSS-CUTTING ISSUES

A set of prioritised agenda was decided upon at the 11th Council of Ministers' meeting in Bengaluru, India, in November 2011. Subsequently, the 13th Council of Ministers' meeting in Perth, Australia, decided on cross-cutting issues.

The Priority Areas of the Indian Ocean Rim Association:

1. Maritime Safety and Security;
2. Trade and Investment Facilitation;
3. Fisheries Management;
4. Disaster Risk Management;
5. Academic, Science and Technology Cooperation; and
6. Tourism and Cultural Exchanges.

The Cross-cutting Issues of the Indian Ocean Rim Association:

1. Blue Economy; and
2. Women's Economic Empowerment

Annex amended on 17November 2021
Annex II

LIST OF MEMBER STATES, DIALOGUE PARTNERS, AND OBSERVERS OF

THE INDIAN OCEAN RIM ASSOCIATION

Member States:

Commonwealth of Australia (1997)
People's Republic of Bangladesh (1999)
Union of the Comoros (2012)
French Republic (on account of Reunion - 2020)
Republic of India (1997)
Republic of Indonesia (1997)
Islamic Republic of Iran (1997)
Republic of Kenya (1997)
Republic of Madagascar (1997)
Malaysia (1997)
Republic of Maldives(2018)
Republic of Mauritius (1997)
Republic of Mozambique (1997)
Sultanate of Oman (1997)
Republic of Seychelles (1999 and 2011)
Republic of Singapore (1997)
Federal Republic of Somalia (2014)
Republic of South Africa (1997)
Democratic Socialist Republic of Sri Lanka (1997)
United Republic of Tanzania (1997)
Kingdom of Thailand (1999)
United Arab Emirates (1999)
Republic of Yemen (1997)

Dialogue Partners:

People's Republic of China (2000)
Arab Republic of Egypt (1999)
Federal Republic of Germany (2015)
Republic of Italy (2019)
Japan (1999)
Republic of Korea (2018)
Russian Federation (2021)
Republic of Turkey (2018)
United Kingdom of Great Britain and Northern Ireland (2000)
United States of America (2012)

Observers:

Indian Ocean Research Group (IORG) (2010)

Western Indian Ocean Marine Science Association (WIOMSA) (2019)

Annex amended on 17 November 2021
Annex III

FUNCTIONAL BODIES

1. Indian Ocean Rim Academic Group (IORAG)
2. Indian Ocean Rim Business Forum (IORBF)
3. Working Group on Trade and Investment (WGTI)
4. Working Group on Women's Economic Empowerment (WGWEE)
5. Working Group on Maritime Safety and Security (WGMSS)
6. Working Group on the Blue Economy (WGBE)
7. Working Group on Science, Technology, and Innovation (WGSTI)
8. Working Group on Disaster Risk Management (WGDRM)
9. Core Group on Tourism (CGT)
10. Core Group on Fisheries Management (CGFM)

Annex amended on 2 November 2018
Annex IV
SPECIALISED AGENCIES

1. Regional Centre for Science and Technology Transfer (RCSTT)
2. Fisheries Support Unit (FSU)

INDIAN OCEAN RIM ASSOCIATION

JAKARTA CONCORD

THE INDIAN OCEAN RIM ASSOCIATION

Promoting Regional Cooperation For A Peaceful, Stable And Prosperous Indian Ocean

1. We the Heads of State/Government, and other representatives, of the Member States of the Indian Ocean Rim Association (IORA): the Commonwealth of Australia, the People's Republic of Bangladesh, the Union of Comoros, the Republic of India, the Republic of Indonesia, the Islamic Republic of Iran, the Republic of Kenya, the Republic of Madagascar, Malaysia, the Republic of Mauritius, the Republic of Mozambique, the Sultanate of Oman, the Republic of Seychelles, the Republic of Singapore, the Federal Republic of Somalia, the Republic of South Africa, the Democratic Socialist Republic of Sri Lanka, the United Republic of Tanzania, the Kingdom of Thailand, the United Arab Emirates and the Republic of Yemen on the occasion of the Leaders' Summit held in commemoration of the 20th anniversary of the IORA held in Jakarta, Indonesia;

2. Recalling the fundamental principles and objectives of the IORA Charter;

3. Adhering to the rights and obligations under international law including those under the Charter of the United Nations and the 1982 UN Convention on the Law of the Sea (UNCLOS);

4. Recalling also the United Nations General Assembly Resolution 2832 (XXVI) on the "Declaration of the Indian Ocean as a Zone of Peace" to maintain peace and stability in the region and to establish the Zone of Peace;

5. Emphasising our commitment to the UN 2030 Agenda for Sustainable Development on strengthening our cooperation that no one will be left behind in the achievement of sustained growth and sustainable development in this strategically vital region;

6. Noting the historical and cultural bonds among our peoples and the diversity of the peoples in the region, which offer vast opportunities to enhance various areas of economic cooperation;

7. Respecting the principles of sovereign equality, territorial integrity, political indepen-

dence, non-interference in internal affairs of other states, peaceful co-existence and mutual benefit guiding relations and interactions among IORA Member States;

8. Recognizing the achievements of the past 20 years of IORA and the opportunities we have to build on these and to address common challenges facing the Indian Ocean, for the welfare of our future generations;

9. Affirming our commitment to build a more peaceful, stable and prosperous Indian Ocean region through enhanced cooperation, including but not limited to the six priority areas: maritime safety and security; trade and investment facilitation; fisheries management; disaster risk management; academic, science and technology cooperation; tourism and cultural exchanges; and the cross-cutting issue of women's empowerment;

10. Recognising the importance of moderation as an approach to counter all forms of extremism and promote dialogue, mutual respect, understanding, and social harmony, thereby contributing towards the achievement of sustainable and inclusive development, equitable growth, stability and prosperity in the Indian Ocean Region;

11. Convinced of the significance of the Blue Economy as a driver of inclusive and sustainable economic growth and development in the Indian Ocean region;

12. Acknowledging that the coastal areas and maritime waters of the Indian Ocean bind the region together and link it to other regions of the world, and that it is therefore essential to maintain maritime safety and security for peace, stability and sustainable economic growth and development in the region;

13. Reaffirming that gender equality and the empowerment of women and girls are central to realising inclusive and sustainable economic growth;

14. Recognising the importance of Dialogue Partners to advance the objectives of the Association; and

15. Underscoring the importance of regional synergies and cooperation to promote peace, stability and prosperity.

OBJECTIVES

16. We commit ourselves to:

a. Promoting Maritime Safety and Security in the region by:

- enhancing cooperation in preventing and managing accidents and incidents at sea and promoting effective coordination between IORA member states' aeronautical and maritime search and rescue services;
- encouraging the sharing of expertise and resources to reduce substandard shipping and manage risks to the safety of vessels and the marine environments of the Indian Ocean region;
- strengthening regional cooperation to address transboundary challenges, including piracy, armed robberies at sea, terrorism, trafficking in persons, people smuggling, irregular movement of persons, illicit drugs trafficking, illicit trafficking in wildlife, crimes in the fisheries sector, and environmental crimes; and
- ensuring that countries in the region can exercise freedom of navigation and overflight in accordance with international law, including UNCLOS, as constitution for the Oceans.

b. Enhancing Trade and Investment cooperation in the region by:

- encouraging greater intra-IORA flow of goods, services, investment, and technology as a stimulus to further develop and grow our economies sustainably;
- exploring ways to improve the production capacity, competitiveness, and value addition of products from the region;

- promoting public-private partnership in infrastructure development;
- strengthening the involvement of the private sector, in particular SMEs, through regular dialogues and interactions between Governments and businesses, including women owned businesses;
- continuing regulatory reforms to encourage competitiveness and innovation and promote ease of doing business;
- improving connectivity (institutional, physical, and people-to-people) in the Indian Ocean region, including facilitating the movement of businesspersons;
- recognising the importance to regional economic growth and skills development of producing value added goods and increasing participation in global value chains;
- promoting shipping, ports, transport and logistic alliances within the region and with other regions in the world; and
- encouraging the development of standards suitable to IORA Member States, taking into account international and national standards.

c. Promoting sustainable and responsible fisheries management and development by:

- enhancing science-based management and conservation of marine living resources, including through supporting and strengthening the work of Regional Fisheries Management Organisations (RFMOs), and enhancing regional and international mechanism to combat IUU fishing;
- promoting environmentally sustainable practices in aquaculture, marine capture fisheries, and post-harvest technology.
- increasing technical assistance and capacity building in fostering and strengthening protection and preservation of the coastal and marine environment; and
- supporting measures to increase the capacity of small-scale fishers in line with sustainable fisheries practices so as to promote and facilitate trade in fish and fisheries products as well as the access of this products in global markets in order to improve their livelihoods.

d. Enhancing disaster risk management in the region by:

- acknowledging the vulnerability of coastal and Small Island Developing States due to climate change and ocean acidification and working together to implement the provisions of the Paris Agreement on climate change;
- strengthening regional disaster preparedness, community resilience, and disaster risk management in accordance with the Sendai Framework for Disaster Risk Reduction;
- improving geodetic data-sharing, methods and infrastructure and further developing integrated early warning systems in the region for forecasting and communicating disaster-related risks and hazards; and
- Enhancing cooperation with stakeholders in addressing issues related to disaster and climate change through capacity building including sharing of information, experiences and best practices to improve community resilience to minimize disruption of economic activities.

e. Strengthening academic, science and technology cooperation by:

- increase scientific knowledge, develop research capacity and transfer marine technology, among research and development institutions and academics;
- increasing opportunities for accessible and affordable scholarships and capacity-building to further human development, with a particular focus on the challenges of Least Developed Countries (LDCs) and Small Island Developing States (SIDS);

- promoting sharing and collaboration in technology and innovation and in the implementation of e-Government and other Information, Communication, and Technology (ICT) solutions in the region; and
- strengthening the IORA-Regional Centre for Science & Technology Transfer (IORA-RCSTT) and the Fisheries Support Unit (FSU) to better perform their mandates.

f. Fostering tourism and cultural exchanges by:

- increasing people-to-people interaction to promote regional economic growth;
- encouraging the sustainable development of community-based tourism and eco-tourism;
- promoting cultural heritage and harnessing the economic potential of this heritage, including World Heritage properties and sites; and
- cooperating and sharing experiences for the sustainable development of tourism
- Augmenting regional connectivity by encouraging direct flights and shipping services including cruises by encouraging investment in requisite infrastructure.

g. Harnessing and developing cross cutting issues and priority objectives by:

- developing the opportunity of the oceans by promoting the Blue Economy as a key source of inclusive economic growth, job creation and education, based on the evidence-based sustainable management of marine resources;
- promoting gender equality and the empowerment of women and girls, ensure women's rights, access, and opportunities for participation and leadership in the economy and to eliminate violence and discrimination against women and girls in all its forms as the prosperity of the region will only be realised fully by investing in the empowerment of women and girls.
- enhancing cooperation in promoting the culture of democracy, good governance, combating corruption, promotion and protection of human rights and fundamental freedoms.

h. Broadening IORA's external engagement by:

- enhancing and deepening cooperation with Dialogue Partners, including sharing of technical expertise and other resources for mutual benefit;
- expanding collaboration with countries outside the region and relevant regional and international organizations based on mutual interest to increase the profile of IORA at international fora; and
- expanding and deepening engagement with non-government stakeholders, including civil society, chambers of commerce, media and youth of the region in order to enhance people-to- people interaction for mutual understanding, trust and community-building in the region.

i. Strengthening IORA's institutions by:

- providing adequate resources to the IORA Secretariat; and
- enhancing and strengthening the role of IORA specialized agencies.

We do hereby acknowledge:

Z The contribution of the Secretariat to managing, coordinating and implementing the policy decisions and work programmes of IORA.

18. The IORA Action Plan that was welcomed by the Council of Ministers Meeting in Jakarta, Indonesia in March 2017 which is in the spirit of the IORA Concord.

19. The Government of the Republic of Indonesia, as the current Chair of IORA, for the leadership and initiative to hold the First IORA Leaders' Summit and the excellent hospitality and arrangements for the 20th Anniversary Celebrations.

SECOND IORA ACTION PLAN 2022-2027

PRIORITY AREA	Overarching Strategic Goals	Short-term (02 years)	Medium-term (24 years)	Long-term (46 years)
MARITIME SAFETY AND SECURITY (MSS)	Coordinator: Sri Lanka Cluster Group: Australia, Bangladesh, India, Indonesia, Iran, Kenya, Madagascar, Mauritius, South Africa, Tanzania and UAE			
	Promoting Maritime Safety and Security (MSS) in the Indian Ocean Region (IOR) through effective coordination between Member States and relevant international organisations for sharing of expertise and resources, strengthening regional cooperation to address Trans Boundary challenges, and ensure freedom of navigation in accordance with International Law, including UNCLOS, while ensuring collaboration across IORA Working Groups on common areas of interest.	• Capacity building programmes, sharing of information and best practices. • Developing the MSS capabilities of Member States. • Enhancing cooperation ~~on~~ through MoUs with other relevant international organisations (IOM, IONS, DCoC, ASEAN, UNODC, ReCAAP, BIMSTEC, etc) and ocean governance	• Strengthening MSS research and identifying potential threats and challenges. • Establishing a cooperation in SAR activities between IORA and IMO through technical and maritime cooperating centres of the Member State.	• Developing mechanisms to enhance cooperation, to build capacity and a common understanding. • Developing guidelines on an integrated IORA Maritime policy, covering all aspects of maritime safety and security. • Information sharing on Early Warning Systems (EWS) through the transfer of technologies. • Establishing a cooperation on Airborne

		instruments (SAR, PSC, etc). • Studying potential threats with regard to movement of high risk containerized cargo shipments in IOR. • Encouraging remaining member states to sign PSC and SAR MoUs.		platform for surveillance in the IOR on MSS. • Pursuing International cooperation for post-disaster recovery. • Improving the capability of IORA member states to deal with disasters, disaster relief and supporting actions in maritime crisis. • Establishing/Developing Maritime Information Fusion Centres. • Enhance Chemical, Biological, Radiological I &I Nuclear Explosive materials (CBRN-E) preparedness of IORA Member States.

PRIORITY AREA	Overarching Strategic Goals	Short-term (02 years)	Medium-term (24 years)	Long-term (46 years)
TRADE AND INVESTMENT FACILITATION (TIF)	Coordinator:Australia Cluster Group: India, Iran, Kenya, Malaysia, Mauritius, South Africa and Tanzania			
	Improving the production capacity, competitiveness,	• Establish a directory of business operators in	• Policy formulation to reduce trade barrier.	• Implement the policy and increase the volume of
	and value addition of products through inclusive public-private partnership which will contribute in enhancing intra-IORA flow of goods, services, investment to further develop and grow the region's economies sustainably. Facilitating the movement of businesspersons, increasing connectivity (institutional, physical, and people-to-people and endeavour to achieve enhanced ease of doing business ranking of IORA members, which will result in enhanced business facilitation. Strengthening regional cooperation for promotion of SMEs.	the IORA region with a view to facilitate networking amongst those willing to engage in regional value chains. • Organize business familiarisation visit/seminar programmes in different countries to share knowledge and skills amongst Members of the region. • Conduct awareness campaigns on digital and e-commerce for SMEs in IORA to boost online trade. • Signed by all Member States the IORA MOU on SMEs.	• Develop a strategy for the facilitation of movement of persons and businesspersons. • Organise B2B meetings/shows to promote SMEs entrepreneurship in the IORA region. • Implementation of areas under the IORA SME MOU.	the intra-IORA trade flow. • Increase the movement of people and businessperson within the IORA Member States • Implementation of activities under the remaining areas in the IORA SME MOU.

PRIORITY AREA	Overarching Strategic Goals	Short-term (02 years)	Medium-term (24 years)	Long-term (46 years)
FISHERIES MANAGEMENT (FM)	Coordinator:Indonesia Cluster Group: Australia, Bangladesh, India, Iran, Kenya, Madagascar, Mauritius, Oman, Seychelles, Sri Lanka, Tanzania, Thailand, and FSU			
	Enhancing protection,	• Implementing	Improving fisheries and	Facilitating fish trade and

	conservation and sustainable management of fisheries resources in the Indian Ocean region.	integrated and ecosystem-based approaches and environmentally sustainable practices in the management of fisheries resources. • Enhancing science-based management and conservation of marine living resources, and enhancing regional and international mechanism to combat IUU fishing.	aquaculture productivity in fisheries sector through technical assistance and capacity building across the value chain.	market-oriented intensification along the fisheries value chain.

PRIORITY AREA	Overarching Strategic Goals	Short-term (0-2 years)	Medium-term (2-4 years)	Long-term (4-6 years)
DISASTER RISK MANAGEMENT (DRM)	Coordinator: India Cluster Group: Indonesia, Iran, Madagascar, Mauritius, Mozambique, South Africa and Sri Lanka			
	Strengthening regional disaster preparedness, community resilience, and disaster risk management in accordance with the Sendai Framework for Disaster Risk Reduction.	• Promote cooperation among DRM stakeholders, including to share data, technology, and information to reduce disaster impacts and inform anticipatory action.	Explore organising regional experts' exchange programmes and exposure visits, including in relation to the International Conference on Disaster Resilient Infrastructure.	• Improve early warning and evaluation systems for disaster mitigation. • Prepare guidelines on HADR for IORA Member States.
		• Share DRM lessons identified through the Sendai Framework mid-term review processes. • Undertake capacity building activities including addressing gender equality and social inclusion in disaster risk reduction actions.		

PRIORITY AREA	Overarching Strategic Goals	Short-term (02 years)	Medium-term (24 years)	Long-term (46 years)
ACADEMIC, SCIENCE AND TECHNOLOGY COOPERATION (ASTC)	Coordinator:India Cluster Group: Indonesia, Madagascar, Iran, Mauritius, South Africa, UAE, RCSTT			
	1. Increase scientific knowledge, develop research capacity, and transfer technologies, among research and development institutions and academics.	• Identification of priority areas of collaboration. • Align the work programme of the IORA-Regional Centre for Science & Technology (RCSTT) with the work plan of the Working Group on Science Technology and Innovation and vice versa (WGSTI). • Develop mechanisms for capacity building and sharing of knowledge and expertise among Member States. • Establish a common understanding among IORA on academic and scientific matters through practical consultation and coordination among member states on Science, Technology, and Innovation (STI).	• Increasing opportunities for accessible scholarships and capacity-building to further human development, with a particular focus on the challenges of Least Developed Countries (LDCs) and Small Island Developing States (SIDS). • Exchange of experiences and expertise among Member States with the aim of promoting the creation of centres of excellence.	• Promoting sharing and collaboration in technology and innovation and in the implementation of e-Government and other Information, Communication, and Technology (ICT) solutions in the region. • Foster developmental research in STI and enrich capacities of IORA Member States on STI. • Creation of centres of excellence and scientific networks.
	2. Advancing collaboration among universities and higher education and scientific institutions of Member States in the field of academics, science, and education.	• Identification of priority areas of collaboration. • Establish mechanisms for collaboration.	• Joint programmes: Establishing collaborative programmes, joint academic research projects, exchange of information and publications. • Academic Scholarship Programmes: Establishing scholarship programmes for postgraduate and research studies, subject to Member States' individual capacities. • Collaborative research: Identifying mutual priority areas of co-operation in the fields of academic and scientific research; and Setting up Joint Call for Proposals on identified priority areas for collaborative STI projects between Member States.	• Develop joint research programs and sharing research facilities. • Exchange programmes: Organising exchange programmes for students, researchers, and technical experts. • Conferences and seminars: Organizing regional scientific seminars to be attended by representatives from the field of academic and scientific research. • Establish an IORA University Network.

			• Exchange programmes: Organising exchange programmes for students, researchers, and technical experts. • Development of an early-career Professionals (E-CP) network within IORA. • Conferences and seminars: Organizing regional scientific seminars to be attended by representatives from the field of academic and scientific research.	

PRIORITY AREA	Overarching Strategic Goals	Short-term (02 years)	Medium-term (24 years)	Long-term (46 years)
TOURISM AND CULTURAL EXCHANGES (TCE)	Coordinator: Mauritius Cluster Group: Iran, Maldives, Mauritius, Mozambique, Oman, Seychelles, South Africa, Sri Lanka and Tanzania			
	Increasing people-to-people interaction to promote regional economic growth through Tourism.	• Conduct feasibility study/ies to explore the potential of cruise tourism. • Cooperate and share experiences for the sustainable development of tourism. • Encourage the sustainable development of community-based tourism and eco-tourism.	• Augment regional connectivity by encouraging direct flights and shipping services including cruises by encouraging investment in requisite infrastructure. • Creation of IORA platforms (digital or otherwise) for sharing of data and best practices in Tourism.	• Explore MOUs on Tourism with Member States. • Establish an IORA Tourism Resource Centre and Website. • Explore potential MOUs on regional connectivity and cruise tourism with Member States of IORA.
	Post-COVID-19 recovery - Rethink tourism for the future and to rebuild tourism post-COVID-19.	• Support governments and industry preparedness and response capacity, especially with regard to sanitary standards and measures. • Promote use of international standards for vaccination certification to facilitate travel.	• Cooperate to leverage digitalisation in tourism in order to improve efficiency and customer experience.	• Cooperate on delivering on transformative and regenerative travel through education and training for the industry.
	Promoting cultural heritage and harnessing the economic potential of this heritage, including World Heritage properties and sites.	• Review the status of the Core Group for Culture and assess its revivability.	• Explore MOUs on cultural heritage with Member States of IORA.	• Identify and assess the value of natural and cultural heritage conservation to cruise tourism.

PRIORITY AREA	Overarching Strategic Goals	Short-term (02 years)	Medium-term (24 years)	Long-term (46 years)
BLUE ECONOMY (BE)	Coordinator: South Africa Cluster Group: Australia, Bangladesh, Comoros, France/Reunion, India, Indonesia, Iran, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, Sri Lanka, Tanzania, Thailand, UAE			
	Developing a sustainable	• Developing and	Appropriate policy	Creating an enabling

	Blue Economy as a key source of inclusive economic growth, job creation and education.	harnessing opportunities of the oceans for socio-economic development, whilst safeguarding the ocean's health and ensuring sustainable development and management of its resources. • Promote capacity building and research in resource mapping and sustainable utilisation/management of marine resources.	frameworks, effective leadership, and innovative technologies to generate blue growth and to manage risks to the marine ecosystem and associated biodiversity.	environment for private investments and sustainable financing for Blue Economy initiatives to secure sustainable, economic, and inclusive growth.

PRIORITY AREA	Overarching Strategic Goals	Short-term (02 years)	Medium-term (24 years)	Long-term (46 years)
WOMEN'S ECONOMIC EMPOWERMENT (WEE)	Coordinator: Islamic Republic of Iran Cluster Group: India, Indonesia, Iran, Kenya, Mauritius, Seychelles, South Africa, Thailand, UAE			
	Promoting gender equality and the empowerment of women and girls, ensure women's rights, access, and opportunities for participation and leadership in the economy and to eliminate violence and discrimination against women and girls in all its forms as the prosperity of	• Adopt a "IORA Gender Equality Pledge" that sets targets for female/male participation in IORA and is reported on at least annually. • Establish a network of women	• Arrange regular regional events for private and public sector participants to address barriers to women's economic empowerment, drawing on the UN Women's 2020 and 2021 reports and featuring success	• IORA's WGWEE delivers at least one to two initiatives, projects or activity annually targeting a network of women in the region aimed at addressing the barriers to women's economic advancement as set out in the Jakarta Concord and Balaclava
	the region will only be realised fully by investing in the empowerment of women and girls.	entrepreneurs in the region, supported by an online platform and a events and training programs focussed on overcoming WEE barriers, strengthening income generating activities, improving women's digital and financial literacy and offering avenues of support, including women affected by violence. • Review and amend the WEE work plan to align with the short, medium and long term objectives outlined herewith; overarching objectives of IORA's other priority areas; and addressing the challenges posed by COVID-19.	stories across the region. • Develop a matrix of stakeholders that could assist with advancing WEE in the region.	Declaration on Women's Economic Empowerment and Gender Equality as a Pre-Requisite for Sustainable Development. These barriers include discriminatory laws and practices (particular on sexual assault), job segregation, gender-based violence, unequal access to and control over resources inadequate representation in decision-making and inadequate social safety nets. • Improvements in women's digital and financial literacy, referencing UN Women's Economic Empowerment in the Indian Ocean Rim: Progress and Challenges report as a baseline. • Increase in the number

				of private sector entities to sign, support and implement the Women's Empowerment Principles (WEPs).

PRIORITY AREA	Overarching Strategic Goals	Short-term (02 years)	Medium-term (24 years)	Long-term (46 years)
INSTITUTIONAL ARRANGEMENTS AND BROADENING ENGAGEMENT (IABE)	Coordinator: Sri Lanka Cluster Group: Troika+, Australia, India, Mauritius, South Africa			
	1. Strengthening the IORA Secretariat, its institutions and specialised agencies by providing adequate resources to build capacity to support Member States, to deepen cooperation with the Dialogue Partners, non-government stakeholders and to enhance people-to-people interaction especially among the youth for mutual understanding, trust and development in the Indian Ocean region. Expanding collaboration	• Institutionalise the annual Meeting of the IORA Working/ Core Groups Chairs/ Priority/Cross-cutting Areas Coordinating Countries as an annual mechanism for engagement. • Explore the establishment of the IABE as a Functional Body. • Annual engagement with Dialogue Partners on the margins of the CSO and COM.	• Annual Coordination Meetings between the IORA Working/ Core Group Chairs, Coordinating Countries for the respective Cluster Groups. • Engagement between the Member States (TROIKA and Cluster Group) regarding the needs and requirements of the Secretariat. • Establishment of the IABE as a Functional Body.	• To strengthen its relations and engagement with other International Organizations in the Indo-Pacific region, such as: ASEAN, APEC, African Union (AU), Pacific Islands Forum (PIF), Indian Ocean Commission (IOC), the European Union (EU) and the Commonwealth and explore mutual Observership arrangements especially with the UN and its relevant agencies.
	with countries outside the region and relevant regional and international organizations based on mutual interest to increase the profile of IORA at international fora. 2. Determine the Role of Primary Bodies (CSO, COM)	• Preparation ToRs for the Committee of Senior Officials (CSO) and Council of Ministers (COM). • Preparation of ToR of the IORA Champion Awards. • Implementation of the Streamlining Decision-making processes. • Finalisation of the Special Fund Arrangements. • Celebration of IORA Day. • Finalisation of the Membership criteria.	• Implement and continue the IORA Champion Awards and continue the media familiarisation visits to Member States. • Celebration of IORA Day	• Explore the establishment of the IORA Development Fund and to execute projects that would endeavour to narrow the gap between the advanced economies and least developed countries (LDCs) of IORA, ensuring that development across the Indian Ocean Rim is inclusive and sustainable. • Celebration of IORA Day.