The Indian Ocean Rim Association

Topic A: Managing Fisheries and Aquaculture
Topic B: Utilizing Ocean Energy and Resources
HISTORY OF THE COMMITTEE

In 1995, then president of South Africa Nelson Mandela visited India and remarked that, “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...”.\(^1\) In March of that year, Mandela’s vision was realized with the creation of the Indian Ocean Rim Initiative. Two years later in March 1997, this body became the Indian Ocean Rim Association for Regional Co-operation (IOR-ARC).\(^2\) In 1999, member states finalized the legal documents and reaffirmed their commitment to cooperation through the IOR-ARC Charter.\(^3\)

Over the next several years, the body grew in size as it added many new member states and official dialogue partners. The IOR-ARC also revised its charter in order to keep up with the most recent developments in the Indian Ocean Rim and the world.\(^4\) In 2013, the body changed its name to the Indian Ocean Rim Association (IORA) which it still uses today.\(^5\)

The IORA acts as a body similar to the UN with focuses on cooperation and a non-intrusive approach between member states to solve the unique problems of the Indian Ocean Rim. The body also serves as a means of increasing regional solidarity across countries of many different cultures. The IORA holds frequent meetings of member state officials and leading experts in relevant fields to further discussion in the body. These meetings are a vital part of the IORA’s goal for increased dialogue and consensus approach for the body. With the body’s 20\(^{th}\) anniversary in 2017, the IORA looks to continue pursuing its goals for the region.

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2. Ibid.
4. Ibid.
5. Ibid.
LETTER FROM THE COMMITTEE EXECUTIVE OF THE INDIAN OCEAN RIM ASSOCIATION

4 November 2018

Dear Delegates,

Welcome to MUNUC 31 and to the Indian Ocean Rim Association! All of us here at the University of Chicago have been working throughout the year to prepare an exciting conference for you. We look forward to a weekend full of debate, policy formation, problem resolution, and education.

My name is Rohan Gandhi and I will serve as your chair for this committee. This is my second year as a committee executive, having chaired the Organization of American States at MUNUC 30. I am originally from Philadelphia, Pennsylvania (or Philly as we say). I am a third year student here at UChicago and am double majoring in Economics and Political Science. In addition to MUNUC, I am also an executive for ChoMUN, our college conference. Outside of MUN, I am a Resident Assistant for my house here on campus. Some of my favorite non-school activities are watching sports, binging obscure YouTube channels, and exploring Chicago.

I am excited for all of you to come and discuss the topics for this committee. The Indian Ocean Rim Association is a unique international organization with its focus on a shared non land resource among several different countries. The topics of Fishing and Aquaculture and Ocean Energy and Resources have a special role in the Indian Ocean that is unique to the region.

I hope you enjoy reading this background guide and that it assists you in your own research. Please do not hesitate to reach out if you have any questions. See you at conference!

Sincerely,

Rohan Gandhi

Committee Executive, Indian Ocean Rim Association
TOPIC A: MANAGING FISHERIES AND AQUACULTURE

Statement of the Problem

The Indian Ocean is unique among the world’s seas in its number of unique fish species and is responsible for a notable percentage of the world’s fish capture, at around 10% of the total global harvest. These fish play a key role across the region in providing food, economic resources, and political power for the people and states across the region. The Indian Ocean Rim Association has the challenge of determining how to best use and protect this precious resource for the future.

With the global increase in population, all sorts of resources around the world are becoming relatively scarce. For the Indian Ocean fisheries, this effect is most apparent when it comes to fish as a potential source of food for the people living in the Indian Ocean Rim countries, as well as a vital part of many countries’ economies and socio-economic development. A fishery can mean either the practice of commercial fishing, or as it is used here, the geographic region where fish are caught. The United Nations predicts that the world population will reach 9.8 billion by the year 2050 and 11.2 billion by the year 2100. Much of this population growth will come from IORA member nations, including India, Tanzania, and Indonesia, three of the countries expected to have the highest concentration of the world population growth. As a result, it is more important than ever that the IORA creates long term strategies to ensure that the growing populations of their countries can be sustainably fed, counteracting current trends towards scarcity. These strategies will be most effective when they directly focus on Indian Ocean fisheries and aquaculture.

As global resources become scarcer, states become more susceptible to conflict. Countries often do not have agreements with each other on sustainable fishing practices. As a result, 41 of the 47 fish species in the Indian Ocean fisheries have been termed as either “moderate-full exploited” or “full-overexploited”. The main problem with overfishing in terms of sovereignty, is the problem of a natural resource that countries share. When countries overfish in one area, fish populations across the ocean are impacted, and the same species may travel to different territorial waters. Thus, overfishing by one country can deplete the resources of other countries.

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8 Ibid.
The question of sovereignty over fisheries has also become a contentious issue. As countries compete over fisheries, disputes can arise over the territoriality of certain waters with the potential escalation as nations militarize their waters in order to scare competitors away. These disputes have already arisen in the South China Sea, and have the potential to spread to the Indian Ocean as well.\textsuperscript{10} It will be crucial for the IORA to ensure ongoing peace and cooperation between its members.

Beyond conflict between countries, the IORA states also face the threat of losing particular fish species altogether. When unregulated, fishing practices can easily lead to species extinction. Species extinction has occurred in the past and can easily continue without preventative action. When species go extinct, the biodiversity of the ocean decreases which destabilizes the environment. Other species can become threatened or endangered due to disruptions in the food web, and the fisheries themselves become more depleted.

In 2010, the government of the United Kingdom designated its territory in the Indian Ocean as a **Marine Protected Area (MPA)**.\textsuperscript{11} Because of its protected status and subsequent open space, the MPA served as an excellent area to research marine biodiversity and how it is affected by species population decline. Researchers found that species extinction and overall population decline naturally led to severely decreased marine biodiversity.\textsuperscript{12} It is also found that while the Indian Ocean fisheries were relatively diverse, little is known about the full extent of the fisheries' diversity due to a lack of research and cooperation between Indian Ocean states.\textsuperscript{13} Furthermore, researchers indicated that concerted effort to increase marine reserves and plan for resource use can mitigate the loss of marine biodiversity in the region.\textsuperscript{14}

Modern fishing practices do not plan for sustainability and the preservation of important biodiversity. The most common contribution to unsustainable fishing practices is illegal and

\textsuperscript{10} Ibid.
\textsuperscript{12} Ibid.
\textsuperscript{13} Ibid.
\textsuperscript{14} Ibid.
unreported (IU) fishing. IU fishing occurs throughout the Indian Ocean at alarming rates. A British study estimated that anywhere from 16 to 34% of the fishing catch in the Indian Ocean is from IU fishing.\textsuperscript{15} Estimates put the number of foreign, unlicensed vessels in Somalian waters at around 700.\textsuperscript{16} These illegal fishing practices compound the fact that Indian Ocean fisheries suffer from overexploitation. Large scale commercial fishing occurs without check, as few regulations exist between IORA states, and the regulations that do exist are subverted.

It is, therefore, of utmost importance that the IORA develop comprehensive strategies to mitigate species depopulation. Cooperation will be of utmost importance in order to create fishing regulations that can actively be enforced by the nations that institute them. The most glaring problems in terms of fishing practices today are lack of regulation, and lack of enforcement. The IORA member states must work collectively in order to resolve these issues.

The IORA also faces the task of determining how to best move forward with aquaculture. Aquaculture is defined as “the farming of aquatic organisms in both coastal and inland areas involving interventions in the rearing process to enhance production” by the United Nations Food and Agriculture Organization (FAO).\textsuperscript{17} While the practice of aquaculture can be thought of as a potential solution to the problem of fishing, it is worth discussing here, as it accounts for half of the world’s fish population for human consumption.\textsuperscript{18} Aquaculture is not merely a solution to overexploitation of the ocean, but an integral part of understanding fishing.

Aquaculture as a practice is key in the socioeconomic development of many IORA member states. Aquaculture can occur on both small and large scales, making it an interesting option for all of the countries in the IORA. Due to the different levels of socioeconomic development among IORA states, no single solution will be apt for the body. It is therefore important to understand the benefits and drawbacks of aquaculture.

The greatest benefit of aquaculture is the long-term sustainability it can help nations achieve. When implemented properly, aquaculture can be a reliable food option, in contrast to fragile and overfished species in the wild. Aquaculture can take many different forms. Farming methods can be adapted to which species are most prevalent in a given area. Even within a species, different practices exist depending on the financial resources available to create infrastructure. An example of the spectrum of farming methods of a species in relation to accessible infrastructure can be found in bottom culture. Bottom culture is the harvesting of mussels, clams, oysters, scallops,


\textsuperscript{16} Ibid.


\textsuperscript{18} Ibid.
and other similar species. Bottom culture can be developed with either extensive rows of metal beds, or simply rope lines connected between buoys. This way, small communities can practice aquaculture with relatively low effort and financial cost.

Large scale aquaculture can provide greater amounts of food for a country, but can also have larger environmental impacts. In order for large scale aquaculture to be a better option than fishing, strong regulations must exist to ensure that aquaculture practices are not detrimental to marine habitats. Large scale aquaculture requires the building and development of more sophisticated technology which can include above ground tanks, artificial ponds, and submerged metal nets. This infrastructure has the potential to damage habitats, furthering the problems of overexploitation of wild fish populations.

Fishing and aquaculture are key topics for the IORA to discuss. Many countries in the IORA have large populations that require government planning in order to ensure they are being fed. Many countries can also benefit economically from trade in their excess of fish. Countries with smaller populations also require strategies to empower citizens to be self-sustaining. This is different from environmental sustainability in that self-sustainability entails being able to provide for oneself without dependence on others. The Indian Ocean binds the IORA countries, and all member states will have to cooperate in order to provide for a positive future of fishing and aquaculture.

20 Ibid.
22 "Aquaculture."
23 Ibid.
History of the Problem

Overfishing

Commercial fishing began to develop in the 17th Century, as whalers in North America began using several larger ships in fleets.\textsuperscript{24} This was distinct from small scale fishing of eras past as the fleets were comprised of several ships, and sought to turn a profit beyond basic needs. The abundance of these fleets led to excessive whaling and a dramatic drop in whale populations worldwide. This dramatic drop in populations set off effects across the ecosystem and resulted in the decline of other animal populations. Despite the decline of commercial whaling, and the introduction of protections for many whale species, many if not most whale population levels remain drastically depleted. This stands as one of the primary examples of overfishing and depletion of a natural resource from which the IORA can learn, in order to prevent such irreversible results in their own waters.

Specifically, in the Indian Ocean, fishing has the potential to be overdone considering the lack of regulation in the region. Many commercial fishing fleets operate with little to no supervision from home governments.\textsuperscript{25} These practices have led to species depopulation, and even extinction in some cases. More importantly, commercial fishing practices have decreased the variety of fish species in the ocean. The study of the British Indian Ocean Territory showed that the fishing practices specifically led to significantly lower levels of marine biodiversity.\textsuperscript{26} Furthermore, the lack of limits on particular species has led to further complications in the food web. When countries have placed limits, they have traditionally been limits on total weight or approximate number of fishes without regard to species. This has led to some species such as tuna and elasmobranchs to be overfished.\textsuperscript{27} The lack of predators has in turn led to species of their prey overpopulating and causing further complications in the constantly interacting ocean habitat.

Effects of Climate Change

Climate change has also played a significant role in the history of fishing practices and marine biodiversity. One of the most visible effects of climate change is how rising sea levels have reduced the amount of land suitable for agriculture and therefore boosting the demand for fishing and aquaculture even higher.\textsuperscript{28} Climate change has already had a dramatic effect on global ocean levels and agriculture.

\textsuperscript{25} Michel, David, Sticklor
\textsuperscript{26} “Potential Benefits…”
\textsuperscript{27} Ibid.
\textsuperscript{28} Michel, David, Sticklor
Another significant effect of climate change is on biodiversity and coral reef status. Studies in 2008 claimed that 19% of the original coral reef in the Indian Ocean had been lost due to human activity without taking climate change into effect. Reports factoring in climate change push the projections even higher. The importance of the coral reef status is that it serves as a habitat for many Indian Ocean fish species. Habitat destruction leads to species depopulation which exacerbates other ongoing problems with fishing.

**Lack of Government Enforcement**

Government enforcement has also played a role in how commercial fishers operate. Many commercial fishing fleets in member states have acted with little supervision from home governments. Numerous boats have been found operating without licenses or beyond their licensed geographic constraints while fishing or conducting other activities. While home governments have made some attempts to regulate these practices, many have loosened regulations and allowed more vessels in the ocean. This comes from a historic lack of communication between member states regarding fishing and other commercial vessels in the Indian Ocean.

Disagreements have also arisen due to issues of sovereignty and economic zones. In a nearby region, the South China Sea, conflicts have sprung up over the natural resources in the area, creating a tense geopolitical landscape. This conflict has led to a lack of communication and an economic fight over fishing rights, drilling rights, and sovereignty. While the situation in the Indian Ocean is not at conflict levels, the historic lack of cooperation is an issue which the IORA must overcome in order to create more effective regulations and agreements between member states for enforcement.

**Development of Aquaculture**

Aquaculture initially developed in similar ways to agriculture. Fishing communities would revisit plentiful fishing sites and make efforts to ensure that the fish population in the area remained stable. Over time, this grew into controlled ponds and streams where fishing communities

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29 “Potential Benefits...”
30 Michel, David, Sticklor
31 “The Future...”
32 “Aquaculture”
could more easily control and allow the fish populations to grow, away from hazards such as natural predators. Today, aquaculture has grown into a practice that is implemented on both large and small scales around the world. While large scale aquaculture can have greater impacts in terms of gross numbers and environmental impact, small scale aquaculture can sometimes better serve remote communities. The history of both is relevant to the committee.

Large scale aquaculture developed alongside the mechanization of fishing. In the late 19th Century, developments such as the steam engine and other commercial apparatuses allowed larger scale fishing development. These large-scale fishing practices in turn led to larger scale aquaculture as fishing vessels began to revisit certain areas of the ocean and create artificial habitats for favored fish species.

Aquaculture also developed as mechanisms for creating these habitats and capturing the fish within them grew more efficient. Habitats developed from bays and lakes to sectors of the ocean controlled by either permanent or temporary netting. Both public and private industries developed as individual countries found policy solutions for their needs. With the development of private aquaculture, governance of these special zones also became a new issue.

While aquaculture developed to become more environmentally friendly, the practice still requires large amounts of water (in both space and use), netting, and permanent infrastructure such as ships and processing facilities. Governmental oversight, similar to the case of fishing, became a new area where member states again had varying success. The FAO developed its fishing department to incorporate aquaculture to reflect how the two practices often worked together to serve the needs of country populations.

Small scale aquaculture has also developed as a way for individual communities to become self-sufficient. As aquaculture technologies became cheaper and more readily available, individual villages and towns could afford equipment for their common use. The use of such equipment has been extremely beneficial to remote communities which can now provide food for their people despite limited access to commercial fishing. Development in these areas of small scale aquaculture still has to continue, but early signs indicate the freedom that these communities have has been significant in their socioeconomic development.

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33 Pike, et. al
34 "Aquaculture"
35 Ibid.
36 NOAA
37 FAO
38 "Aquaculture"
40 Ibid.
Past Actions

IORA Specific Actions

While there has been a call to action, in terms of responsibly regulating fishing and developing aquaculture, in past IORA summits, little has been done so far to support those ends. What is most notable is the creation of the Fisheries Support Unit (FSU) for the purpose of cooperation and creating advisory policy to member states on fishing practices.\textsuperscript{41} The FSU has held initial meetings, but with few tangible results. The FSU has laid out general plans of action, but continues to look for appropriate sources of funding to carry out projects.\textsuperscript{42}

The IORA also published a report in 2014 outlining challenges faced by aquaculture and artisanal fishing.\textsuperscript{43} The report focused on reiterating current problems with only some modest suggestions. The report also outlined the subtopics that member states perceived as priorities to examine for the future. For both aquaculture and traditional fishing, the number one subtopic was quality control and development of those industries.\textsuperscript{44} The findings of the report and the initial meetings of the FSU can set the stage for IORA specific dialogue and solution finding.

Other International Actions

Due to the open nature of the seas, and the non IORA member states that still use the Indian Ocean, other international organizations can be found which are devoted to regulating fishing. In the Indian Ocean, the South Indian Ocean Fisheries Agreement (SIOFA) and the Indian Ocean Tuna Commission (IOTC) both regulate fishing stocks.\textsuperscript{45} These organizations focus, however, on parts of the ocean not covered by states’ Exclusive Economic Zones (EEZ). Exclusive Economic Zones are areas up to 320 kilometers from shore that are considered international waters while still a part of a particular country’s natural resources.\textsuperscript{46} The IORA can better develop cooperative solutions that focus on all waters. In this way, member states will be able to ensure that the ecosystem stays sustainable throughout the entire ocean, and not just specific waters as the ocean remains a highly interconnected ecosystem.


\textsuperscript{42} Ibid.


\textsuperscript{44} Ibid.


Exclusive Economic Zones have also been featured in debates with large geopolitical tensions. In the South China Sea, debates over the limits of a country’s EEZ led to heightened tensions between many nations as nations wish to lay claim to the resources within the same waters. Different approaches to alleviate this problem of conflicting territorial claims have ranged from submitting to international mediation, to conceding economic rights, and to limiting EEZ use altogether.

**Individual Country Actions**

Many countries have also developed some form of Marine Protected Areas (MPA). These are designated parts of territorial and international waters that are set as off limits for commercial use. The MPAs found in in the Indian Ocean vary significantly, but in general, they serve to protect parts of the ocean from exploitation and to preserve natural habitats and species.

In recent discussions, many NGOs have called for easier and more frequent establishment of MPAs. While only 1% of non EEZ waters are currently designated as MPAs, discussions in early 2015 have set the goal of achieving 10% by 2020 and 30% as an eventual goal.

47 “The Future...”
48 Ibid.
49 Boyd
50 Ibid.
51 Ibid.
52 Ibid.
Possible Solutions

Spatial Management

One proposed solution for regulating fishing has been the implementation of Marine Spatial Planning (MSP). This strategy does not rely so much on heavy curtailing of fishing practices, but rather planned and deliberate use of waters for fishing. The design of MSP relies on two phases. In the “inventory phase”, implementers will determine where commercially viable fish species live and where it is easiest to catch them. In the “draft plan development and negotiation phase”, implementers will manage fisheries by promoting fishing in sustainable areas.

Marine Spatial Planning is not by itself a completely effective solution. It requires both phases to be well executed and requires plenty of international consensus to work. The benefit of MSP, however, is that it can easily be implemented parallel to a variety of other solutions. The design of MSP serves to amplify the effects of other solutions and regulations.

Development of Aquaculture

With aquaculture, the largest question remains not if it can be effective, but how it should be implemented. As previously discussed, aquaculture can be developed on both a large and small scale. Current large-scale technologies would be, however, costly to install and maintain. Large scale aquaculture would require a large deal of international consensus to be viable for the IORA to endorse the policy as a whole. Individual countries would naturally always be free to develop their own aquaculture systems. These, however, would incur a great deal of expense to a member state. Large scale aquaculture could benefit from combined funding and use were it to be adopted and supported as a collective IORA measure.

Small scale aquaculture also is a viable option for many member state countries and their respective small communities. The WIOMSA report suggests giving local communities the shared power to oversee their own aquaculture farms and be able to adjust production based on

53 “Potential Benefits…”
54 Ibid.
55 Ibid.
56 “Aquaculture”
local needs.\textsuperscript{57} This would require greater planning to integrate aquaculture facilities into a local community and would often necessitate a case by case basis implementation.\textsuperscript{58} The benefits of small-scale aquaculture include greater community agency, more reliable food production, and lessened environmental impact.\textsuperscript{59}

**Fishing Regulation**

The environmental impact of commercial fishing is also a major reason for why regulating fishing has become an important step in sustainable fishing practices. As mentioned earlier, unregulated fishing has led to negative effects on the environment and fish populations. Regulating fishing would require significant international cooperation for any effective means of enforcement. Member states may have to sacrifice some territorial or EEZ claims in order to have a chance at successful international waters regulation.\textsuperscript{50}

Some proposals also include limiting fishing to a country’s EEZ and reducing high waters fishing drastically by creating more MPAs.\textsuperscript{61} This would lead to the consequence that not all member states have proportionately large EEZs to their populations. This solution would likely require some modification to deal with the specifics of the Indian Ocean and the IORA member states.

No matter which combination of solutions, IORA member states will need to work collaboratively in order to see any progress. The foundation of international regulation and shared success is cooperation. Member states must work together and look for a common solution instead of solely individual gain in order to create a sustainable ocean for the future.

\textsuperscript{57} Ateweberhan, et. al
\textsuperscript{58} Ibid.
\textsuperscript{59} Ibid.
\textsuperscript{60} “The Future...”
\textsuperscript{61} Boyd
Bloc Positions

African Bloc

Comoros, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, Somalia, South Africa, and Tanzania

These countries generally have less developed fishing industries and aquaculture. According to an IORA workshop in 2014, many African nations in the IORA identified fish quality and storage as priorities. These states also have smaller fishing fleets and focus on subsistence fishing. Many of the island nations such as Madagascar and Comoros also rely on mostly sedentary fish species which stay in localized areas. These are places where aquaculture could have a large beneficial impact on protecting fisheries for the future.

Middle Eastern Bloc

Iran, Oman, United Arab Emirates, and Yemen

These nations are less reliant on fishing as they have other natural resources, namely oil. Additionally, these countries are in dry, desert regions which impacts the use of irrigation and aquaculture farms. Oman, in particular, has struggled to keep fish profitable in its domestic market as it is hard to maintain fresh fish. The effort required for commercial fishing in the Middle East is generally significantly larger than the returns possible. As current fishing practices over exploit the nearby seas, these countries wish to sustainably use these resources in order to provide their citizens with access to fishing and revenue from fishing for generations to come. These states generally trade fish with other Gulf nations as well. Countering environmental challenges that prevent aquaculture will be one of the main tasks for Middle Eastern states in the IORA.

Southeast Asian Bloc

Indonesia, Malaysia, Singapore, and Thailand

These countries do rely on fish as a major part of its non-agricultural food supply and exports. These countries have smaller fishing fleets but for the most part have heavily invested in aquaculture. These countries have used aquaculture as a means to ensure food security for their people. In particular, Thailand and Indonesia have ranked in the top ten fish producers in the world. In order to maintain food security, these countries will generally favor a balanced

62 “Sustainable Aquaculture...”
63 Ibid.
64 Ibid.
65 Michel, David, Sticklor
approach between fishing and aquaculture, but do have the capacity to rely more heavily on aquaculture if needed.

**South Asian and Australian Bloc**

*Australia, Bangladesh, India, and Sri Lanka*

This bloc has two strong regional powers in India and Australia as well as regional and cultural partners in Bangladesh and Sri Lanka. Both India and Australia have large and established fishing fleets throughout their respective nations. Territorial waters also become an issue for these nations as they often have to work with neighboring countries and come up with rules for sustainable fishing as their fleets sail beyond respective borders. These countries may be expected by others to share technology and infrastructure for aquaculture as well. Overall, the bloc contains a mix of both large scale and small scale fishing industries and therefore generally focuses on situation based solutions.

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Glossary

Aquaculture: the farming of aquatic organisms in both coastal and inland areas involving interventions in the rearing process to enhance production

Elasmobranch: Any members of the subclass Elasmobranchii, cartilaginous fishes with gills to the side, including sharks, manta rays, and skates

Exclusive Economic Zones (EEZ): Exclusive Economic Zones are areas up to 320 kilometers from shore that are considered international waters while still a part of a particular country’s natural resources.

Fishery: the practice of commercial fishing or the geographic region where fish are caught

Marine Protected Area (MPA): An umbrella term covering a variety of protected regions with different ranges of prohibited activity and active protection, including marine reserves, sanctuaries, and parks, no take zones, or locally managed protected areas.
Bibliography


Statement of the Problem

Utilizing Ocean Energy and Resources

The Indian Ocean has long been a site rich with natural resources that can be used to the benefit of the people in the region. These resources have also been of a wide variety and many serve specific needs for governments, communities, and other organizations. The history, climate, and geography of the Indian Ocean region have endowed it with a variety of resources unique in the world including oil, natural gas, and other fossil fuels; mineral deposits along coastlines as well as in the deep seas; and viable means of alternative energy. The need for active, rather than passive, decisions of how to best utilize these resources and cooperate has arisen in order to protect valuable deposits for the future. Member states must rely on long term planning and international cooperation in order to come up with a solution that ensures the Indian Ocean Rim will be able to continue using the totality of the Indian Ocean’s resources for generations to come.

The sheer variety of resources and potential in the Indian Ocean allows for numerous options in forming a solution. Some of these resources are described here.

Wind Energy

Wind energy is generated by solar radiation unevenly heating the earth’s surface. This causes wind to form and has fairly predictable patterns which allow people to harness the energy of the wind.\(^{67}\) Wind turbines generate electricity by the motion of the wind, but are often loud, unsightly, and dangerous for bird populations in the area.\(^{68}\) This has led to many residents protesting the building of wind farms. If the protests

\(^{68}\) Ibid.
fail, one subsequent response to building turbines is residents choosing to move away. The ocean provides an alternative to land-based wind farms, where turbines may be built offshore and away from human populations and flying wildlife. In a study of the island of Anholt, Denmark, wind farms were found to significantly reduce carbon emissions by providing homes with an alternative form of electricity. Additionally, although noise affected some wildlife in the area during the construction phase, the total detrimental effects to birds and marine wildlife were estimated to be moderate with little long-term harmful impact.

**Solar Energy**

Solar energy can be harnessed in the forms of heating water for the desalination process, or directly converting solar rays into electricity. Concentrating the sun’s rays to move a water-based turbine has more potential offshore than on land due to the amount of space required. Furthermore, placing solar panels in the ocean can ease the maintenance of solar panels and associated machinery as the ocean water can be used for cooling machinery and cleaning the panels, both of which increase the costs of solar on land. Solar energy is very costly, however, and can be an unreliable source of energy due to the changes in cloud cover over a given area or the difficulty in storing energy from solar sources for use outside of peak hours of sun. Solar energy may be best used in conjunction with other energy methods.

**Thermal Energy**

Nations can access the energy of the ocean utilizing the thermal vents found in the ocean. Ocean Thermal Energy Conversion (OTEC) requires a difference in water temperature of approximately 20 degrees Celsius in depths not further than 1,000 meters below sea level. The specifics of these requirements make thermal energy suited only for tropical waters which includes the Indian Ocean. OTEC in which IORA members are situated to tap into easy renewable energy with little competition from countries outside the region.

**Oil and Gas**

Fossil fuels such as oil and natural gas currently make up a large portion of energy sources utilized worldwide, and particularly growing economies such as those in the IORA. Member states in the Middle East rely heavily on oil for their economies and can supplement their on-land reserves with offshore drilling. Natural gas hydrates were also recently discovered in the

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70 Ibid.
71 Offshore Ocean Energy
72 Ibid.
74 Offshore Ocean Energy
Indian Ocean which can produce usable natural gas, but will require significant investment to do so.\textsuperscript{75} While oil and gas are relatively effective energy sources, their supplies are limited and contribute to climate change and pollution which adversely affects member states.\textsuperscript{76}

**Minerals**

The Indian Ocean contains several mineral deposits deep beneath sea level. These deposits contain minerals which have a wide variety of uses in manufacturing, technology, and more. Recently, China discovered new deposits on the ocean floor along hydrothermal vents.\textsuperscript{77} These vents contain both hydrothermal fluids which have a variety of chemicals, as well as solid mineral deposits. Deposits underneath the sea can be found along the ocean floor, ocean ridges, or close to the surface.\textsuperscript{78} The implications for member states is that these mineral deposits can be accessed by many nations, even those without technology for deep sea exploration. The extent of deep-sea deposits, however, is unclear and may warrant further exploration.\textsuperscript{79}

Further complicating claims over natural resources is the varying definitions of territorial waters and sovereignty in the sea. There are few universally accepted definitions of the rights to the ocean for fishing, military, mining, drilling, and other uses. In some conventions by the United Nations, territorial waters have been described as 12 miles from shore with an Exclusive Economic Zone (EEZ) of 200 miles.\textsuperscript{80} This definition, however, has been challenged and prominent global organizations have differing definitions for the extent of economic zones.

The implications for the IORA is that due to the rich mineral deposits and wide potential for harnessing energy from the ocean, territory in the sea is highly valuable and can often lead to conflict. Such conflicts as those in the South China Sea have proven to be lengthy and often remain unresolved due to ambiguity surrounding the boundaries of territorial waters.\textsuperscript{81} These conflicts are antithetical to the IORA mission of regional cooperation and it is up to member states to create a solution that allows fair negotiation over resources when disputes arise and that also respects national sovereignty.


\textsuperscript{79} Arce

\textsuperscript{80} Subsea Mineral Resources

Additionally, climate change and pollution become new issues relating to territorial waters and economic zones. While countries all seek to reap the rewards of the ocean, many will also have to work to clean and maintain their respective zones.

The future of the ocean and member states’ economies, cultures, and societies relies on cooperation and planning for the future. The ocean contains a vast wealth, but also requires member states take action to ensure that the ocean will continue to be a source of wealth and stability for the region in generations to come.
History of the Problem

The history of fuel and mineral use in the Indian Ocean goes back in many different ways and has connections with multiple aspects of the issues. Sustainability, new discoveries, traditional methods, geopolitical history, and the development of global economics all have roots within the history of these issues.

Offshore Drilling

Offshore drilling has long been a favored tactic by many energy companies. Offshore drills provided an easy and cheap (in terms of property value) means of tapping deep oil reserves within the Earth.\(^{82}\) Energy companies used offshore drilling due to lower costs of access, access to particular oil and gas reserves, and the ability to build wells without concern for local residents. Offshore drilling first began in the early 1900s with crude extensions of on land drills.\(^ {83}\) Eventually, innovations arose that allowed drills to be built further from shore, with the first drills out of sight from land being built in the late 1940s and early 1950s.\(^ {84}\)

While offshore drilling provided many benefits, health risks did begin to build. Recent studies have shown that both air and water pollutants from offshore drilling have maintained steady to rising levels within the last ten years.\(^ {85}\) This trend has been altered with any accidents or disasters. The notable Deepwater Horizon oil spill in 2010 in the Gulf of Mexico revealed how many companies still stand at a major risk of serious environmental damage were any accident to occur.\(^ {86}\) Furthermore, several spills have occurred in the Indian Ocean with one of the most notable in recent history being a Japanese tanker which spilled several thousand tons of crude oil into the Indian Ocean.\(^ {87}\)

\(^{82}\) Energy and the Environment; Oil
\(^{84}\) Ibid.
\(^{85}\) Energy and the Environment; Oil
\(^{86}\) Ibid.
Some disasters have led to regulation, however. The United States saw its oil and gas industry face new regulations for offshore drilling in the late 1960s and early 1970s due to several particularly devastating disasters. Other countries also followed suit to some degree, but with no IORA country significantly overhauling the industry.

Alternative Energy Development

Alternative energy sources to fossil fuels such as oil and natural gas were developed in order to provide the energy required by society but with less environmental impact and with a greater amount of sustainability. These developments looked promising, depending on the particular energy source, but also had their setbacks in gaining popularity and widespread use. Many are still in what could be considered developmental stages today.

Wind energy was first developed on land but faced several challenges. Residents near wind farms complained of noise. Wind farms were also considered ugly and a danger to birds in the area. The first offshore wind farm was created in Denmark in 1991 to address these issues. The program was highly successful with significant energy production with no complaints from citizens. Several countries began to develop offshore wind farms around the years 2008-2011 with government incentives providing great motivation for many of the wind farms to be completed.91

Solar energy has been a more recent development for offshore methods. The technology for floating photovoltaic cells was first developed in the early 2000s and started seeing implementation around 2007-2010. Response has been mild but promising so far.

Other alternative energy methods have had varying degrees of success. No one source however has managed to dominate the industry or see significant levels of development which would signal the potential for widespread use. More research and development would most likely be needed to see the IORA be able to use some of these methods commonly.

Climate Change

The history of climate change is extensive and far reaching. The relevant information for the IORA is the effect of climate change on energy resources, as well as the effect of energy harvesting

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88 “Offshore Petroleum History”
90 Energy and the Environment; Wind
91 Offshore Wind Energy
on climate change. The two areas are intertwined and can often have dramatic effects on each other.

Climate change has been a partial driver in the search for new energy sources for decades. As more effects are being discovered, the impetus to find new sources has quickened. One of the major effects of climate change has been the effect on seafloor life and oil reserves. Climate change has led to the instability of these areas, leaving many regions, particularly the Indian Ocean with its proximity to tectonic fault lines, vulnerable to natural disasters.\textsuperscript{93} One such example is that rising acidity in the ocean with rising carbon dioxide levels in the atmosphere, as well as general warming of the ocean’s waters, lead to the decreased health of coral reef communities. In regions with large amounts of tectonic activity, such as for Indian Ocean Rim Association nations, healthy coral reefs are an important factor in decreasing the size of tsunami waves.\textsuperscript{94} As tsunami waves come across the rough surfaces of healthy coral reefs, the strength of the wave will be stripped away by friction, thus protecting coastal communities.\textsuperscript{95} These natural disasters can have devastating effects on member countries, as well as the infrastructure for fuel sources themselves.

Alternative energy technology has helped to some degree in lessen human contributions to climate change. Many of the wind farm pilot programs reported huge success in energy gain which resulted in large carbon offsets.\textsuperscript{96} The results look promising and could continue to grow as technology becomes more efficient.

**Minerals**

Mineral use has grown over the last 50 years due to new findings of mineral deposits, ease of access, and continued developments and dependencies in technology that require the use of these mineral deposits. The recent finding of minerals on the seafloor by China represents a trend of discovering new mineral deposits in the Indian Ocean.\textsuperscript{97} The vessels used for these discoveries have become more commonplace and therefore more frequently used in this manner.

Interest in mineral use also developed due to technological advances. The development of offshore drilling first made it possible to obtain minerals from far offshore and deep beneath the water level, where many minerals sank.\textsuperscript{98} These mineral deposits have had growing value in recent decades due to their inherent value as well as their use in technology and electronics.

93 Large Deposits...
95 Ibid.
96 Offshore Wind Energy
97 Arce
98 Subsea Mineral Resrouces
In the 1960s, the growing acceptance of plate tectonic theory as a predictor of where mineral deposits may be found, as well as the growing appreciation of the value of these minerals spurred demand\textsuperscript{99} of these minerals within the tectonically active region of the Indian Ocean Rim. This created a valuable market for minerals and encouraged further innovation for their use. These developments all continue to the present day. Countries are becoming more and more aware of how and where to obtain large mineral deposits on the ocean floor, especially in the realm of the Indian Ocean.\textsuperscript{100} This continued search will require careful planning in order to preserve important deposits, and lead to responsible extraction of these resources.

\textsuperscript{99} Ibid.

\textsuperscript{100} Arce
Past Actions

IORA Specific Actions

Discussion of ocean energy and mineral resources in the IORA has generally fallen under the category of the “Blue Economy”. This refers to the primary economic and development avenues available to member states via the Indian Ocean. The IORA has issued multiple declarations on Blue Economy which have specific sections and focuses on energy and minerals.

The first of these is the Mauritius Declaration, adopted in September 2015. The Mauritius Declaration primarily served as one of the first major recognitions of “Renewable Ocean Energy” and “Offshore Hydrocarbons and Seabed Minerals” within the framework of Blue Economy. The declaration also labeled ocean energy and minerals as priority areas for the IORA and called for the creation of task forces and regulatory bodies, both in the IORA as well as in member states.

The second of these declarations is the Jakarta Declaration which was adopted in May 2017. The Jakarta Declaration was more comprehensive in addressing Blue Economy issues from all possible solution methods, and called for more focused approaches in promoting environmentally sustainable development. The Jakarta Declaration also strongly emphasized the need for member states to communicate with each other as well as with the official dialogue partners of the IORA. This multinational focus set the Jakarta Declaration apart from previous IORA publications with its focus on fixing deep rooted issues relating to ocean energy and minerals. One example for this is the declaration’s call for increased empowerment of women and children in local communities in promoting healthy economies. This community driven approach emphasizes the importance of balancing large-scale regulation with looking at persisting issues that require a concerted effort to solve.

Both of these declarations are relatively recent and their effects have yet to fully manifest themselves. However, in a publication in April 2017, the IORA released an update on the body’s focus on Blue Economy. The update noted the severe effects of climate change on the Indian Ocean and Blue Economy, and noted the progress made in IORA sessions by member states.

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102 Ibid.
104 Ibid.
105 Ibid.
Other International Actions

Outside of the IORA, the United Nations has emphasized climate change as a major factor in the preservation and sustainable use of the world’s oceans. The UN has also created a body known as UN-Oceans, which has the expressed mandate of promoting cooperation and international organization in meeting UN goals and benchmarks on ocean status.\(^\text{107}\) While the body is still young, the UN ocean focus is relatively small and relies more on regional bodies, such as the IORA, to take specific actions. Much of the UN focus is general and pertains to rights across all oceans which may not always be pertinent to the Indian Ocean and IORA member states.

Individual Country Actions

Few IORA member states have taken actions specifically relating to ocean energy and mineral use due to the nature of international waters. Some countries have focused on developing economic zones which are solely for state mandated use. However, many mineral beds and energy sources lie outside internationally accepted economic zones and cannot as easily or legitimately be regulated by individual states.

Some countries outside the IORA have experienced success in using new technologies in alternative energy sources. In the case study at Anholt, Denmark, offshore wind farms were largely successful and reduced emissions from construction by 30-41% compared to regular wind farms.\(^\text{108}\) In general, however, countries have not taken large measures to promote sustainable energy use and should look to do so.

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\(^{108}\) Energy and the Environment; Wind
Possible Solutions

Alternative Energy Technology

Many alternative energy technologies exist as possible solutions to reduce reliance on oil and other fossil fuels. These alternative energy sources can also be utilized well in the Indian Ocean but will require substantial planning in order to become viable for all member states.

Many established technologies such as solar and wind energy have been implemented in the past around the world. Denmark’s offshore wind farm increased public acceptance of the technology, and Denmark’s research and development in their wind farm increased the efficiency and ease of building the technology for wind technology adopters to come.\textsuperscript{109} In Japan, an offshore solar plant project produced substantial amounts of usable energy with high efficiency due to the fact that ocean water could cool the plant.\textsuperscript{110} However, in both cases cost became a significant drawback, that might exist as barriers to nations within IORA. This was due to the necessary long-term maintenance as well as the fact that these projects were carried out recently in relatively rich countries.\textsuperscript{111} Not all IORA member states have the resources to design and implement state sponsored projects.

The nature of eventual solutions may eventually be shaped by the willingness of member states of the IORA to share technology and infrastructure costs. Member states will also have to decide how to create investment in alternative energy, and create regulations that incentivize adoption of the technologies. This could come from state owned enterprises, private corporations, or even IORA dialogue partners and international sources of funding. More important than just cost, however, is the question of sustained development and planning. Member states must weigh the options of large and small scale projects, and decide how to best meet the needs of their own citizens.

Member states also have the option of further researching and developing newer methods of alternative energy such as tidal and salinity energy. Tidal or wave energy is the energy generated from the change in water motion due to either smaller scale waves, or the natural 12-hour cycle of the ocean’s tides.\textsuperscript{112} Wave energy in particular has more potential due to the current technology and increased output of energy that waves give in comparison to the tides.\textsuperscript{113} A recent example of a wave energy project is the CETO La Reunion project in the Indian Ocean off the eastern coast of Madagascar, which utilizes the motion of waves to drive pumps that will eventually

\textsuperscript{109} Ibid.
\textsuperscript{111} Ibid.
\textsuperscript{112} Offshore Ocean Energy
\textsuperscript{113} Ibid.
push water through turbines much like a traditional hydroelectric dam.\textsuperscript{114} Surprisingly, the CETO units in the project act to attract marine reef life, rather than displacing it, thus minimizing the environmental impact of the project, and its implementation has had some relative success so far.\textsuperscript{115}

**Mineral Regulation**

Regarding the mining of minerals, many countries face the same challenges as stated previously. Capabilities vary greatly in terms of access to the ocean floor where many Indian Ocean mineral deposits lie. Furthermore, countries must determine how to properly regulate the industry when much of the work involved lies outside traditional sovereignty rights. Member states may have some success by looking to analogous examples of international resource management, such as oil reserves, disputed territory rights, and allowed military presence in international regions.

IORA member states must emphasize international cooperation and coordination at every step in the process of handling these issues. International treaties and regulations can only hold with good faith and willful compliance of member states. Member states must remember that no matter the solution, all must be willing to properly execute and see the solution through.


\textsuperscript{115} Ibid.
**Bloc Positions**

**African Bloc**

*Comoros, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, Somalia, South Africa, and Tanzania*

These countries generally do not have large amounts of infrastructure or the capital necessary to immediately implement large scale energy projects. However, many of these countries have shown to be particularly suitable for wave and tidal energy.\(^{116}\) These countries also may have strong variances in energy potential during different times of the year, and may be best suited by a combination of some technologies.\(^{117}\) The African Bloc would most benefit from agreements allowing member states to share technologies and initial startup costs, as well as to play to their strengths of utilizing their geographic uniqueness for wave energy.

**Middle Eastern Bloc**

*Iran, Oman, United Arab Emirates, and Yemen*

These member states have traditionally relied heavily on oil as their main energy resource, and have not previously delved deeply into the potential of ocean based alternative energy sources. However, due to the instability of the global oil market, as well as the desire to transition towards sustainable resources, many of these countries have recently begun projects to explore viable options. A recent study found that the Middle East, particularly Oman, may be well suited for offshore wind farms due to wind speeds in coastal regions.\(^{118}\)

Middle Eastern countries will have to balance their desire to transition to alternative energy sources with the dependency they currently have on oil and other fossil fuels. The Middle Eastern Bloc may favor a more balanced approach, involving a mix of alternative energy technologies with traditional sources of fuel. They may also favor a longer transitional period so as to not severely disrupt their respective economies. The Middle Eastern bloc may also be a particular proponent of solutions that utilize and extract fossil fuels more responsibly, rather than abandoning them all together.

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117 Ibid.

Asian and Australian Bloc

*Australia, Bangladesh, India, Indonesia, Malaysia, Singapore, Sri Lanka and Thailand*

These countries have a mixed background, but generally have developing economies with some ability to invest in alternative energy technology. However, these countries also border significant natural gas ocean reserves. Recently, large natural gas deposits were found in the Bay of Bengal by a team including Indian scientists.\(^{119}\) These gas deposits will provide at least some incentive for member states to focus on a transitional period from fossil fuels to alternative energy technologies.

Additionally, these countries also must deal with territorial claims of both energy and mineral resources. This includes not only claims between IORA member states, but neighboring countries as well. A Chinese operated team recently discovered large deposits of ocean minerals, and has sent submarines for more research and collection.\(^ {120}\) Southeast Asian member states must deal with the presence of a hegemon such as China in the region and form international agreements accordingly. The Asian and Australian Bloc would generally favor rigorous and fast acting plans to address the issues, but must also balance grand state desires with concerns for their citizens.

\(^{119}\) Large Deposits...
\(^{120}\) Arce
Glossary

**Blue Economy**: The Blue Economy is a concept that leverages the responsible use and preservation of the ocean and its resources, as a tool for economic growth and gain.

**Natural Gas Hydrates**: A form of ice like structures wherein methane molecules are trapped within water molecules. Natural gas hydrates are highly flammable, making them both a hazard, and a potential energy source.
Bibliography


