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The politics of sustaining tuna, fisheries and livelihoods  
in the Western Indian Ocean  
A marine political ecology perspective

Mialy Andriamahefazafy

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UNIL | Université de Lausanne

Institut de géographie  
et durabilité

**The politics of sustaining tuna, fisheries and livelihoods  
in the Western Indian Ocean  
A marine political ecology perspective**

Thèse de doctorat

Présentée à la  
Faculté des géosciences et de l'environnement,  
Institut de géographie et durabilité  
de l'Université de Lausanne par

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Sous la présidence du Prof. Antoine Guisan  
Université de Lausanne

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**The politics of sustaining tuna, fisheries and livelihoods in the  
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A marine political ecology perspective**

Lausanne, le 13 juillet 2020

Pour le Doyen de la Faculté des géosciences et de  
l'environnement

Professeur Antoine Guisan



For Dan and Isabelle Miangaly



## **Abstract**

This thesis aims to expand knowledge regarding the socio-economic and political aspects of the western Indian Ocean (WIO) tuna fisheries at different levels - local, national, regional. The thesis was written at a time when ocean-based activities are high on the agenda of governments and other stakeholders in a wave of interests for the blue economy, including in Africa and in the Indian Ocean. With increasing signs of collapse of some tuna stocks in the WIO, the thesis unveils the complexities of managing fishing activities of a highly valuable and mobile marine species such as tuna. To this end, the research answers the question: How do socio-economic and political processes shape the management of tuna fisheries in the Western Indian Ocean? To respond to this question, I will look at three aspects: narratives around the state of tuna resources, access politics and regionalism.

A political ecology approach is used for the research. Political ecology as a field of study pays particular attention to politics in its attempt to understand human-environment interactions. The study focuses on three countries in the WIO: Madagascar, Mauritius and the Seychelles. These countries were used to build a regional perspective. The thesis is based on empirical data collection and analysis, notably of documents regarding the fisheries, semi-structured interviews, and observations of fishing activities, landing at ports and decision-making during regional meetings.

The thesis makes three main arguments. Regarding the state of tuna resources, the thesis demonstrates that local fishers have developed strong discursive claims that they use to contest exploitation by industrial actors. Industrial actors, on the other hand, perceive themselves as unjustly accused of being the main responsible for overfishing in the region. In the case of tuna fisheries in the WIO, discursive power is not only exercised by usual powerful actors; small-scale fishers have built over the years a powerful narrative of tuna being overfished, with the support of actors such as NGOs and the media.

As for access politics, the thesis highlights that while rights-based mechanisms set the foundations for the possibility of equal access to the fish through various legal arrangements, structural mechanisms present a clear picture of unbalanced and unequal access between the various actors of the fishery. These power relations and conflicts are aggravated by the materiality of the tuna resources and the western Indian Ocean. The thesis also argues that local and national stakeholders in the fishery are at different times and spaces both winners

and losers; the foreign industrial actors are consistent winners; and the fish - or its sustainability - a consistent loser.

With respect to regionalism, the thesis unravels the importance of both local socio-economic contexts, geopolitical interactions and their role in advancing or not regional cooperation and identity. It also shows that capitalist exploitation of the resources involving geopolitical actors strongly influences regional management and use of the resources. For regionalism to truly exist in the WIO, building stronger links between countries, the WIO people and through tuna fisheries is essential.

For the WIO countries to continue to benefit from tuna fisheries, three action points are needed: take management measures that prioritise the long-term sustainability of tuna instead of political and economic interests; assess the impact of various types of tuna fisheries on livelihoods, food security and the state of resources; and promote regional initiatives that highlight the shared socio-economic and cultural values of tuna in the WIO region.



## Résumé

Cette thèse vise à élargir les connaissances sur les aspects socio-économiques et politiques de la pêche au thon dans l'Océan Indien Occidental (OIO) au niveau local, national, et régional. La rédaction de la thèse s'est faite durant une période où les activités basées sur l'utilisation de nos océans figurent comme priorités dans l'agenda des gouvernements et des autres parties prenantes dans une vague d'intérêts pour l'économie bleue, notamment en Afrique et dans l'océan Indien. Considérant les nombreux signes d'effondrement des stocks de thons dans l'OIO, la thèse décortique les complexités de la gestion d'une espèce marine mobile et de haute valeur économique telle que le thon. La question de recherche est la suivante: Comment les processus socio-économiques et politiques façonnent-ils la gestion de la pêche au thon dans l'Océan Indien occidental? Pour répondre à cette question, trois aspects seront analysés: les récits sur l'état des stocks de thons, les politiques d'accès et le régionalisme.

Une approche Political Ecology est utilisée pour cette recherche. En tant que domaine d'étude, la Political Ecology accorde une attention particulière aux aspects politiques des interactions entre l'Humain et l'environnement. L'étude se concentre sur trois pays de l'OIO : Madagascar, Maurice et les Seychelles, qui ont été choisis afin de développer une perspective régionale. La thèse est basée sur la collecte et l'analyse de données empiriques, incluant des documents concernant les pêcheries, des entretiens semi-structurés, et des observations.

La thèse avance trois arguments principaux. Premièrement, en ce qui concerne les récits autour de l'état des stocks de thons, la thèse démontre que les pêcheurs locaux de l'OIO ont développé de fortes revendications discursives qu'ils utilisent à différents niveaux pour contester l'exploitation thonière par les acteurs industriels. En revanche, les acteurs industriels se considèrent comme injustement accusés d'être les principaux responsables de la surpêche dans la région. Dans le cas de la pêche au thon dans l'OIO, le pouvoir discursif n'est pas seulement exercé par les acteurs puissants habituels; les petits pêcheurs ont construit au fil des années un puissant récit de la surpêche au thon, avec le soutien d'acteurs tels que les ONG et les médias.

Deuxièmement, en ce qui concerne les politiques d'accès, elle souligne que si les mécanismes basés sur les droits posent les jalons d'un accès égal aux ressources par le biais d'arrangements juridiques divers, certains mécanismes structurels reproduisent un accès déséquilibré et inégal entre les différents acteurs impliqués. Ces relations de pouvoir et ces conflits sont aggravés par la matérialité des ressources thonières et de l'OIO.

Troisièmement, concernant le régionalisme, la thèse démontre que l'exploitation capitaliste des ressources impliquant des acteurs géopolitiques influence fortement la gestion et l'utilisation des ressources au niveau régional. Pour que le régionalisme existe réellement dans l'OIO, il est essentiel de renforcer les liens entre les pays et les populations de l'OIO; notamment par le biais de la pêche au thon.

Pour que les pays de l'OIO continuent à bénéficier de la pêche au thon, trois points d'action sont nécessaires : prendre des mesures de gestion qui privilégient la durabilité à long terme du thon plutôt que les intérêts politiques et économiques; évaluer l'impact des différents types de pêche au thon sur les moyens de subsistance, la sécurité alimentaire et l'état des ressources; et enfin, promouvoir des initiatives régionales qui mettent en évidence les valeurs socio-économiques et culturelles communes concernant le thon dans la région.

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## List of Acronyms

ACP	African, Caribbean and Pacific group of states
CSP	Centre de Surveillance des Pêches Madagascar
DWFNs	Distant Water Fishing Nations
EEZ	Exclusive Economic Zone
ETP	Eastern Tropical Pacific
EU	European Union
FADs	Fish Aggregating Devices
FPAOI	Fédération des Pêcheurs Artisans de l'Océan Indien
G16	A group of 'like-minded' coastal states at IOTC
IO	Indian Ocean
IOC	Indian Ocean Commission
IOTC	Indian Ocean Tuna Commission
IRD	Institut de Recherche pour le Développement
IUU	Illegal, Unreported and Unregulated fishing
MSC	Marine Stewardship Council
MTCs	Minimum Terms and Conditions
NGOs	Non-Governmental Organisations
PRSP	Programme Régional de Surveillance des Pêches
R+P	Ribot and Peluso
RFMO	Regional Fisheries Management Organisation
SC	Scientific Committee (of the IOTC)
SFA	Seychelles Fishing Authority
SFPAs	Sustainable Fisheries Partnership Agreements
SIDS	Small Island Developing States
SWIO	Southwest Indian Ocean
SWIOFC	Southwest Indian Ocean Fisheries Commission
UNCLOS	United Nations Convention on the Law of the Sea
USTA	Unité Statistique Thonière d'Antsiranana
WCPO	Western and Central Pacific Ocean
WIO	Western Indian Ocean
WWF	World Wildlife Fund for Nature



Few wild-caught food products are as ubiquitous as tuna. Annual catches for some species of tuna are in the billions of pounds! Yet, like most animal products, tuna arrives in our kitchens with little visible evidence of its natural history or the human labour that got it from sea to table. What does a tuna even look like? How and where are they caught? And by whom?

(Robbins 2014: 225)



## CHAPTER 1. INTRODUCTION

Tuna products are omnipresent in our daily lives, from tuna cans in our cupboards, tuna in our sandwiches and sushi or tuna steaks at supermarkets and restaurants. Tuna also generates an array of by-products that, probably without knowing, we are also indirectly consuming, such as fish oil in nutrition supplements or fishmeal that is used in aquaculture, currently providing most shrimp and salmon sold in supermarkets. Tuna fisheries are one of the most valuable fisheries in the world. In 2014, tuna contribution to the global economy was estimated at more than US\$42 billion (PEW 2016). The Indian Ocean generates US\$2 billion from its tuna, of which up to 80% comes from the Western Indian Ocean (WIO) (Obura et al. 2017). Tuna fisheries are therefore providing important revenues, jobs and food security for various actors in coastal countries.

In the WIO, tuna is seen as blue gold and tuna fisheries are considered a key component for the emergent blue economies<sup>1</sup> of the region. In Madagascar, tuna fisheries have long been considered a strategic fishery, due to their high value in export, and the development of a national fishery is considered as a priority (MRHP 2015). In Mauritius, tuna fisheries fit within ‘traditional ocean sectors’ that have been productive for many decades and are especially praised for their contribution to employment in the country through the cannery (Cervigni and Scandizzo 2017). In the Seychelles, tuna fisheries are considered a ‘mature’ activity providing ‘high levels of value addition and employment’ (Commonwealth Secretariat 2015).

The tuna fisheries of the WIO have three components: small-scale, semi-industrial and industrial. Small-scale fisheries provide livelihoods and food for coastal communities at an often underestimated value of US\$200 million (Obura et al. 2017). The semi-industrial segment is developing in the WIO, with the lead taken by the Seychelles and its increasing number of semi-industrial vessels, followed by Mauritius and to a very limited extent Madagascar which only has a handful of vessels. Industrial fisheries, mainly undertaken by Distant Water Fishing Nations (DWFNs), are the third income provider in the WIO blue economy (after coastal and marine tourism and carbon sequestration) (ibid). Tuna exploitation in the WIO, and more largely in the Indian Ocean has been considered generally stable, yet two episodes of collapse of yellowfin tuna biomass have been noted (in 2010 and

<sup>1</sup> the concept of blue economy, in the context of marine resource use in coastal countries, comprises “the range of economic and related policies that together determine whether the use of the oceanic resources is sustainable” (World bank 2017, p. 6)

2015) (IOTC 2015). The management of tuna fisheries in the WIO depends on interactions between various stakeholders at different scales, from local fishing villages and ports, to national governments, to the regional Indian Ocean level. This management is complicated by the fact that tuna is a multi-species resource that moves between territorial waters, exclusive economic zones and high seas. This leads to intricate relations between actors but also between actors and the moving tuna.

Tuna fisheries of the WIO represent a conundrum for the various actors involved: it is a commodity sought by distant countries but also an object of conflict, debate and management in coastal countries. The following anecdote illustrates the issue. On a visit to family in the UK a couple of years ago, I noticed my mother-in-law's routine of feeding the cats a can of tuna every day as a snack. I asked her once if she preferred the tuna she bought for the cats, she responded that it could be any brand and it cost around 0.80 GBP. I further asked her if she knew where the tuna came from. She jokingly responded, "I have no idea, you know until I knew you did your research on tuna, I did not really question those things". Interestingly, the label showed that it was manufactured in Mauritius. This mundane conversation, to me, prompts the question: how can tuna be a cheap product considering the amount of effort and labour and especially the complex processes behind its production? The consumer is often unaware that behind tuna products are not only the fishing companies that fish the resources but also countries that debate the management of the resource, negotiations of access to fishing grounds and especially local fishers denouncing the reduction of tuna resources in their waters. Studying tuna fisheries aims to shed light on these processes behind tuna caught in the WIO.

### **1.1. Gap in society and stake of the research**

Tuna fisheries have been studied in different oceans. Disciplines such as biology, fisheries economics, political economy, political sciences, international relations or geography have studied tuna fisheries from different angles. There is, however, room to expand the study of the WIO tuna fisheries within social sciences, especially in human geography. The thesis therefore aims to explore the relations between people behind the fishing, the canneries and the management decisions. It also looks at tuna resources and the sea from a natural resource's management perspective and investigates the human-nature relations. The thesis explores how humans and non-humans influence each other either in their practices, in the making of the fisheries and its management and in the making of tuna and the WIO.



There are three reasons that make studying tuna fisheries timely. First, the current state of tuna resources in the WIO and in the Indian ocean is alarming. Despite yellowfin tuna being assessed as “overfished” since 2015, fisheries managers have not yet managed to reverse the trend of overfishing. Also, the ubiquitous character of tuna in our daily lives makes it difficult to imagine that we are in an overfishing situation. The consumer, in developed countries particularly, can still find tuna everywhere, even endangered species such as bluefin tuna. Yet, fishers and coastal population in developing coastal countries like those of the WIO are seeing a decrease in the availability of tuna and other marine resources, and find it more and more difficult to sustain their livelihoods based on fishing and their food security. This divergence of views between two types of consumers makes it important to explore where tuna comes from and what processes are behind the tuna can, the sushi or steak; and especially what are the impacts of the fisheries on local coastal population and their livelihoods. The story of this thesis aims to fill this gap and unravel the complex processes behind tuna fisheries. The thesis will also discuss the issue of competition between the industrial and non-industrial segments of the fishery, considering the diversity between the different types of fisheries and their related actors.

Second, because tuna fishing takes place out of sight, the actors involved are equally out of sight. Fishers are at sea for long periods and management decisions are sometimes taken by actors disconnected from the fisheries or the fishers. The fisher in the remote coastal village of Sainte Luce in Madagascar often does not comprehend the management measures taken by the Malagasy government at an IOTC meeting in Bangkok. Similarly, crew members of purse seiners such as captains do not always understand why some management measures are taken or by whom. The management of tuna is often disconnected from the direct users of the resources and driven by economic and political processes. It can therefore be useful to understand who makes the decision, how and why, in order to understand the current challenges of management in the WIO tuna fisheries. The thesis therefore aims at looking at the different actors in the fishery and their interactions with each other.

Third, this thesis has been developed at a time when blue economy and blue growth are buzzwords used by various stakeholders at the global and national levels. Ocean-based activities are seen as providing a tremendous potential for economic growth that can also achieve sustainability (Silver et al. 2015). Tuna fisheries have been part of the blue economies of the WIO region for more than 30 years. Yet, it has not achieved the sustainability goals governments have aimed at nor strongly developed local fisheries. Tuna

fisheries therefore present an interesting case as a mature blue economy activity. It provides a reality check for stakeholders currently enthusiastic about the opportunities offered by the blue economy and blue growth. As innovative activities such as seabed mining and bioprospection will require involvement of external actors just like the involvement of DWFNs in the WIO tuna fisheries, the thesis shows that such interactions can be both beneficial and detrimental to the marine resources, as seen in the WIO.

## **1.2. Aim of the research and research questions**

This thesis undertakes a political ecology study of tuna fisheries in the WIO. It aims to expand the knowledge regarding the socio-economic and political aspects of the WIO tuna fisheries at different levels (local, national, regional) and better understand management decisions in tuna fisheries. This knowledge is relevant to help fisheries managers understand the obstacles to sustaining the tuna resources but also to tell the stories of the people and processes behind the different types of tuna fishing in the WIO, especially in Madagascar, Mauritius and the Seychelles. The three countries have been chosen because they are at the centre of the WIO tuna fishery – each having active fishing ports and canneries – but also for their diversity, as the three countries have distinctive socio-economic contexts and different levels of exploitation of tuna resources. The research uses political ecology as a theoretical anchoring mainly for two reasons – that will also be developed later in Chapter 2: it gives attention to the political and socio-economic drivers behind environmental change, but especially it allows the exploration of natural resources management with a multi-scalar approach. To achieve the above-mentioned goal, the research aims to answer the following research question: *How do socio-economic and political processes shape the management of tuna fisheries in the Western Indian Ocean?* To respond to this question, I will look at three aspects: *narratives around the state of tuna resources, access politics and regionalism*. The focus on these themes stems from three reasons. First, exploring the state of tuna resources is relevant as it is an essential element driving decision-making in fisheries management. The state of the resources is, however, viewed and established differently by actors which in turn has an impact on how and what management measures are adopted and implemented. Second, analysing access with a political ecology approach provides a multi-scalar view of who benefits or not from the fisheries. Within regional fisheries management organisations, access systems are discussed and debated. They are also determinant in how management is implemented at the national and local levels. Finally, I look at regionalism as tuna fisheries are inseparable from regional cooperation and management due to their

mobility. As tuna travels within the Indian Ocean, regionalism plays a key role in how management of fishing activities is decided and also how countries interact in the WIO region.

The thesis will then present the study of these aspects in three parts :

An analysis of the narratives surrounding the state of tuna resources:

- How do different actors perceive the state of tuna resources in the WIO?
- How do actors at different scales (locally, nationally, and regionally) build their knowledge on the state of tuna resources?
- What narratives are used by different actors to defend their story about the state of the resources and how do they mobilise these stories?

These questions will be answered in Chapter 5 with the hypothesis that local fishers maintain a narrative of overfished tuna based on struggles for livelihood and food security while other actors (governments, industrial actors) convey a narrative of stable exploitation to perpetuate the fishing of tuna in the WIO region.

An investigation of the politics of access and management of the fisheries:

- What are the socio-economic and geopolitical drivers behind access to and management of tuna fisheries at national and regional levels?
- Who benefits from access to tuna resources and who loses?
- What is the role of tuna and the WIO as actants in the making of tuna fisheries?

These questions will be answered in Chapter 6 with the hypothesis that access to tuna resources has been dominated by foreign operators who have improved their access mechanisms including through technology, capital, markets, labour, knowledge, authority, and social relations, to the detriment of local fishers.

An exploration of perceptions of regionalism among actors in the WIO:

- From this individual, yet common fishing activity, do countries see themselves as sharing a regional identity?
- Is there a regional perception regarding the resources or do fishers and individual countries only consider themselves as isolated islands?
- What influences management decisions at the regional IOTC level?

Those questions will be answered in chapter 7 with two hypotheses. Firstly, the WIO regional identity is limited to project-related initiatives and written narratives and are not adhered by individual countries and their fishers in regards to the management of tuna fisheries. Secondly, at the IOTC level governments in the WIO are influenced by strong foreign operators in agenda setting and, in the adoption or not of management measures, preventing coastal countries including the three studied from negotiating as a group within the IOTC.

### **1.3. Personal motivation**

My motivation for the thesis came from an observation I made during fieldwork in the former organisation I worked for with coastal communities in Madagascar. While attending local meetings, fishers would complain that big boats came to take their fish. They were told by the government that those boats had licences and were legally operating in our waters. As I noticed recurrent complaints from fishers, I wondered why the government would allow such exploitation of the resources. While working with other colleagues on fishing access agreements, I came to discover that big boats are either shrimp trawlers or tuna vessels. Since tuna vessels only land in Antsiranana, the rest of the country knows very little about the tuna exploitation in our waters. It is from this limited availability of knowledge that the idea of unravelling tuna fisheries emerged. The choice of Madagascar, Mauritius and the Seychelles was made because of the movement of tuna between the EEZs of the three countries but also from my personal interest in exploring relations and connections between the three islands that are relatively close in distance and yet the people know very little about each other. Finally, the choice of political ecology came from an insightful lecture by Dr. Ivan Scales during my Master's degree. The idea of exploring socio-political and economic drivers to environmental change appealed to me as key for the case of environmental management in countries like Madagascar where the political system and interventions from external actors such as donor countries have shaped various processes. The possibility of giving voices to local actors was also an important feature of political ecology that I wanted to explore and hope that I have given justice to in this thesis.

### **1.4. Structure of the thesis**

The thesis is written in a monograph format and is divided into an introduction chapter, two chapters referring to the approach of the research, a context chapter, three result chapters and a conclusion chapter.

Chapter 2 presents political ecology as the theoretical framework of the thesis. It starts by exploring the engagement of political ecology with ocean and marine issues and the limited studies of tuna fisheries. Then, it discusses contributions of other social science disciplines in the field of tuna fisheries including those from key authors in the study of tuna fisheries in the WIO. Finally, it presents the themes and concepts in political ecology that I use throughout the thesis.

Chapter 3 summarises the methodology used for the thesis, from describing the fieldwork and methods used to the collection and analysis of data. It also presents the gaps that the thesis has not been able to cover and the challenges that were faced while doing the research in the WIO region as a scientist from Madagascar.

Chapter 4 introduces the WIO and its tuna fisheries. Starting from the regional WIO level, it presents the geography of the WIO, the tuna species present, the catches and the supply chain for tuna from the WIO. It then proceeds with describing individually the three case studies: Madagascar, Mauritius and the Seychelles. After a brief presentation of each country, the actors involved in the fishery are highlighted as well as the different segments of the fishery. The chapter ends with a presentation of what I call distant actors who are the DWFNs, civil society organisations and international platforms where tuna management is discussed.

Chapters 5, 6 and 7 are the empirical results chapters. Each chapter includes a short theoretical framework describing the concepts used, the results and also a reflection on the contribution and limits of the concepts used. Chapter 5 investigates the different discourses and related narratives that are present in the WIO surrounding the state of tuna resources. It starts by presenting two discourses and dissects the narratives under each discourse. The first discourse, presenting tuna as overfished, is sustained by local fishers and NGOs. Then, it discusses the second discourses, presenting tuna stocks as difficult to assess. This is produced by government and industrial actors involved in producing technical reports and complex stock assessments. Finally, it explores the different elements that co-produce these discourses and associated narratives. The chapter ends by a reflection on the study of narratives.

Chapter 6 discusses the application of the theory of access of Ribot and Peluso (2003) to the study of the WIO tuna fisheries by presenting the rights-based mechanisms but also the relational and structural ones that apply in the fishery. It then brings the innovation of adding materiality as a contextual element key to the politics of tuna access. Using the theory of access allows us to see a broader way of accessing resources and to highlight the diversity of

benefits actors get from the resources. The chapter ends by identifying patterns of winners and losers as well as a reflection on the use of the theory of access and materiality on studying the WIO tuna fisheries.

Chapter 7 explores regionalism in the WIO region and especially between the three countries studied – gathered under the sub-WIO region labelled as the Southwest WIO. It first looks at the various manifestations of regionalism through tuna fisheries in the region. It then exposes the challenges of regionalism through geopolitical struggles, disconnected people but also presumed success stories of regionalism. It ends with a consideration of potential pathways of collaborations that consider the current socio-political context in the region. The chapter concludes by presenting the lessons learned from using political ecology as a lens to understand the WIO regionalism.

Chapter 8 reveals the conclusion of the research. Split into three parts, it starts by showing what the coastal countries and their people can learn from this thesis on the management of tuna fisheries in the WIO and a path forward for the region's tuna fishery's management. It continues with a section discussing the conservation of tuna species and how we can advance in adopting measures that might help the recovery of tuna species in the region. It finally makes claims about the contribution of the thesis to the field of political ecology and sets a future research agenda for the study of tuna fisheries in the WIO.

While this thesis is presented in monographic form, some parts have been published in articles and a book chapter as follows:

- The social relations part of Chapter 6 was published in April 2020 within the book *Sustaining the Sea* edited by Prof. Elspeth Probyn, Dr Kate Johnston and Dr Nancy Lee. The chapter was co-authored with Prof. C. Kull and my three research assistants in the field, Patsy Theresine, Safina Echa and Pamima Leste. The chapter calls for a better consideration of local livelihoods in tuna fisheries, a change of paradigm in the industrial sector and the need for a ‘care’ for tuna resources.
- Elements of Chapter 5 were published in an article in *Sustainability Science Journal* in December 2019, co-authored with colleagues met at IOTC in 2018, Dr. Megan Bailey and Hussain Sinan, and Prof. Christian Kull. The article presents the empirical case of tuna fisheries as a paradox that governments are encountering in the WIO region where sustainability is claimed to be achievable while the realities of exploitation are practices of accumulation.
- A shorter version of Chapter 6 was published in the *Journal of Political Ecology* in September 2019, co-authored with Prof. C. Kull. The article is an empirical and conceptual paper discussing the theory of access and materiality through the case of tuna fisheries.
- A condensed version of Chapter 7 was published in the *Journal of Indian Ocean Region* in January 2019, co-authored with Prof. C. Kull and Dr. Liam Campling. The article discusses the challenges to regionalism that countries of the Southwest Indian ocean are facing, using tuna fisheries as an illustration.

All these publications and especially the comments from the reviewers and the discussion with co-authors have greatly improved the content of the thesis.

Papers and book chapter from this thesis	Contribution of authors						Link to Journal/ Book	Link to Serval
	conception	fieldwork	analysis	writing	editing	supervision		
Andriamahefazafy, M., Kull, C.A., Leste, P., Theresine, P., Echa, S. Caring for Tuna of the Western Indian Ocean: Where the Politics and Ecology Meet. in <i>Sustaining the Sea</i> . Eds. Probyn, E., Johnston, K. and Lee, N. Sydney: Rowman and Littlefield	MA	MA PL PT SE	MA PL PT SE	MA	MA PL PT SE CK	CK	<a href="https://www.rowmaninternational.com/book/sustaining-seas/3-156-718e1efa-ec8c-4a20-adc7-d687d1696136#ReviewsDiv">https://www.rowmaninternational.com/book/sustaining-seas/3-156-718e1efa-ec8c-4a20-adc7-d687d1696136#ReviewsDiv</a>	<a href="https://serval.unil.ch/fr/notice/serval:BIB_E7DDD_FB3AE">https://serval.unil.ch/fr/notice/serval:BIB_E7DDD_FB3AE</a>
Andriamahefazafy, M., Bailey, M., Sinan, H. and C.A. Kull. The paradox of sustainable tuna fisheries in the Western Indian Ocean: between visions of blue economy and realities of accumulation. <i>Sustain Sci</i> (2020)15:75. doi:10.1007/s11625-019-00751-3	MA	MA MB HS	MA HS CK	MA CK HS	MA CK MB	CK MB	<a href="http://link.springer.com/article/10.1007/s11625-019-00751-3">http://link.springer.com/article/10.1007/s11625-019-00751-3</a>	<a href="https://serval.unil.ch/notice/serval: BIB_7AD3100_61E7B">https://serval.unil.ch/notice/serval: BIB_7AD3100_61E7B</a>
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Andriamahefazafy, M., C. A. Kull, and L. Campling. 2019. Connected by sea, disconnected by tuna? Challenges to regionalism in the Southwest Indian Ocean. <i>Journal of the Indian Ocean Region</i> :1-20. doi:10.1080/19480881.2018.1561240	MA LC	MA	MA	MA LC	MA CK LC	CK	<a href="https://www.tandfonline.com/doi/full/10.1080/19480881.2018.1561240">https://www.tandfonline.com/doi/full/10.1080/19480881.2018.1561240</a>	<a href="https://serval.unil.ch/notice/serval: BIB_A29898B_86F0D">https://serval.unil.ch/notice/serval: BIB_A29898B_86F0D</a>



## **CHAPTER 2. LITERATURE REVIEW AND POLITICAL ECOLOGY AS A THEORETICAL FRAMEWORK**

In this chapter, I will expand on my use of political ecology as a theoretical anchoring. I will first briefly introduce the field, then I will review the current literature in political ecology that addresses marine and coastal issues. I will also discuss how other fields have explored tuna fisheries as a topic of enquiry. I will finish by expanding on the specific themes that I will use in this thesis to assess tuna fisheries within the WIO.

Political ecology has been a fast-growing field in human geography and other disciplines such as anthropology and environmental science (Batterbury 2015). From the seminal work of Blaikie and Brookfield on land degradation in 1987, studying the socio-economic and political drivers behind land degradation, political ecology now appeals to researchers interested in the relationship between nature and society or those that aim to cross disciplines to explain environmental change. One of the foundational ideas of the field was to combine “the concerns of ecology and a broadly defined political economy” (Blaikie & Brookfield 1987: 17), an endeavour entails the use of different approaches and methods. As explained by (Gautier and Benjaminsen 2012), work in political ecology involves interdisciplinarity, working at different scales, extensive fieldwork and an analysis of discourse confronted with facts.

Political ecology has been associated with different approaches and goals. It uses an array of concepts that have been developed within fields such as peasant studies, science studies or new materialism (**Table 1**). While some authors have been key to the development of some approaches, concepts or tools, most of them also use a mix. This diversity has prompted Robbins (2012) to suggest political ecology should be seen as a ‘community of practice’ and a specific type of text, rather than a field. The field has expanded in different directions and addresses a diversity of topics such as environmental conditions, conservation and development, access, identities or political objects and subjects (Robbins 2012). The approach of this thesis aligns most with that of (Watts 2000), which sees political ecology as a way “to understand the complex relations between nature and society through a careful analysis of what one might call the forms of access and control over resources and their implications for environmental health and sustainable livelihoods” (p. 257). According to Robbins (2012), texts in political ecology “track winners and losers to understand the persistent structures of winning and losing; are narrated using human–non-human dialectics;

start from, or end in, a contradiction; and simultaneously make claims about the state of nature and claims about claims about the state of nature” (p. 87).

**Table 1: Examples of themes and approaches used in political ecology**

Concepts	Related field	Tools and theories
Moral economy, Marginalisation, Division of labour Hegemony, Everyday resistance	Political economy Cultural ecology Peasant studies Historical materialism	Chain of explanation Capital accumulation Elite capture
Commons, Collective action, Community-based management, Access, Property	Environmental management Development studies	Common property Theory of access
Social movements, gender, race	Feminist political ecology Postcolonial studies	Environmental conflict Environmental justice
Knowledge, Power Governmentality, Environmentality	Environmental history Critical science Urban political ecology	Discourse analysis Deconstruction
Non-humans, More-than-humans, hybridity, Networks, Actors and objects	New materialism Posthumanism	Actor-network theory Materiality

Source: Benjaminsen and Svarstad 2009; Forsyth 2008; Robbins 2012

Its diversity has been one of my main motivations in choosing political ecology as a framework. Also, from my practitioner’s background, I saw it as a lens to keep me grounded to the field, helped me to be immersed in theoretical concepts and also allowed for contributions to policy. The idea of being part of a ‘community of practice’ that involves not only researchers but also other actors was one of my aspirations along with the fact that the constituency of political ecology “operates in the borderlands between analysis and action, and between social practice and environmental impacts, resources, or changes” (Robbins 2012: 85). In sum, my choice of political ecology has been strongly influenced by it being both ‘a hatchet and a seed’ (Robbins 2012). A hatchet as “it seeks to expose flaws in dominant approaches to the environment favoured by corporate, state, and international authorities, working to demonstrate the undesirable impacts of policies and market conditions, especially from the point of view of local people, marginal groups, and vulnerable populations” (ibid: 99), and a seed as “it involves the detailed analysis of agrarian practices,

social systems for resource distribution, and techniques for cataloguing and harvesting non-human nature [...] with the aim of preserving and developing specific, manageable, and appropriate ways to make a living.” (ibid). Through this notion of a ‘hatchet and seed’, the aim of my research is then to unpack the complexities surrounding tuna fisheries in the WIO while attempting to provide pathways for a better management of the fishery.

The research also follows the strand of political ecology scholars that is engaged in development studies and more specifically in investigating development projects and improving development practises (Blaikie 2012; Blaikie and Muldavin 2015; Rocheleau 2008). In her analysis of development practises, Rocheleau (2008) emphasised that it was important to “recognise the limitations and dangers of sustainable development as promoted and ‘delivered’ by national and multi-national technocracies, powerful conservation NGOs and private interests” (p. 723). This brings to question the way development initiatives are practised and the socio-political drivers behind them. This approach is relevant as tuna fisheries, especially in their industrial segment, are portrayed as bringing economic development to host countries. The research therefore explores tuna fisheries as a development project within coastal countries and ultimately aims to provide policy recommendations on how to improve such practices.

As the above broadly presents political ecology in its general scope, in the following sections I will discuss in depth what I call ‘marine’ political ecology or the political ecology of marine resources and the sea. It also situates the study of tuna fisheries in the existing literature.

## **2.1. EARLY ‘MARINE’ POLITICAL ECOLOGY**

Engagement of the political ecology field with the marine environment and its resources started in the 2000s, touching on classic themes including; discussions around property and access (Mansfield 2001), environmental discourses (Campbell 2007), the use of knowledge and science (St Martin 2007), and materiality (Bear and Eden 2008).

### ***2.1.1. Challenging the narrative of ‘the tragedy of the commons’***

Much of the marine political ecology literature has questioned mainstream narratives surrounding property. One of most dominant discourse in fisheries’ management portrays the ocean as a market failure due to the issue of property (Hawkshaw et al. 2012). This discourse finds either that there is a lack of ownership in fisheries or that it is a problematic common property regime. Consequently, there is a race to fish and a foundation for “a tragedy of the commons”, in which economic actors will extract common resources until their

overexploitation (Hardin 1968). This situation leads to an economic inefficiency in which every actor, based on economic rationality, is competing over the resources without any limitation and with the only aim of maximising catches (Gordon 1954). The solution most endorsed to solve these problems is the setup of economic rents to access fisheries, to which actors will comply leading to the sustainability of production (ibid). The theory of the need for rent has dominated fisheries research and policy and has been promoted to combat overexploitation.

Mansfield (2001) challenged the static explanation of the fisheries problem as caused by property regimes and individual rationality. Moving beyond the tragedy of the commons or the tragedy of open access as an explanation to the depletion of resources, she contended that the focus should be on how specific resource use situations are shaped by specific cultural, political, and economic practices (Mansfield 2001: 388). In her study of fishing in the Pacific, while acknowledging the role of fishers, she also explained the role of national policies, territorial state control and social relations in growing the fishery, leading to an overutilisation of resources. She pursued her analysis by tracing the 50 year history of neoliberalism in the ocean, emphasising how focussing on property as at the centre of the fisheries problem has led to the enclosure of the ocean (Mansfield 2004). From a look at international policy and academic positions that put “property, rights-based management, individual behaviour, and economic rationality as the cause of and solutions to fisheries problems” (Mansfield 2004: 320), she tracked the emergence of privatisation as the solution to overfishing and overcapacity. In addition to questioning mainstream narratives – here the role of economic rationality in the fisheries crisis, this first insight of marine political ecology also points out the importance of giving more attention to practices and social relations with regards to marine resources use.

The concept of property has also been studied in the context of marine conservation. Campbell (2007) analysed the implementation of conservation at different socio-political scales. She unveiled the diversity of property regimes that can be assigned to marine turtles, often overlooked or ignored by conservation experts. She explained how local rights to use the resources are shaped by national and international policy. She also discussed how conservation of migratory species (mobile resources), such as marine turtles, involves questions of scale and space. The contribution of Campbell to the materiality of resources will be further discussed in Chapter 6. Later, Campbell went further with her argument on considering scale by discussing the use of genetics by conservation experts to claim sea

turtles as part of the commons (Campbell and Godfrey 2010). She explained how these claims of ownership have shaped international conservation policy and been used by some states to claim sovereignty of their territory through the existence of sea turtles in their water. This second input of marine political ecology shows the engagement of political ecologists in studying practices at different scales and explore the possibility of multiple property or access regimes for marine resources.

In line with others suggesting the possibility of diverse property regimes, St Martin is also one of the early political ecologists questioning dominant discourses regarding property, such as the tragedy of the commons or individual economic rationality. In his study of community-based management of fisheries in New England, he revealed that bioeconomic solutions to overfishing, based on reducing fishing effort mainly through privatisation, largely ignored environmental and social heterogeneity (St. Martin 2001). One of his findings was that fishers prefer area-based management rather than numeric management based on reducing effort. This preference favours fishers' cooperation and sharing of information rather than individual prosperity. By raising factors that are important to fishers in their management of the fishery, he highlighted "the ways subjectivity, space, environment, and economy are mutually constitutive" (St. Martin 2001:139). This focus on the perspectives of local users is an important component of political ecology studies and as shown by St Martin, provides alternative paths to solving fisheries problems.

### ***2.1.2. Debating the making of science and knowledge***

Another topic that aroused interest in early marine political ecology was science and knowledge. St Martin (2007) highlighted that local ecological knowledge had the potential to play a key role in the field of fisheries science, for example when it comes to cartography. Often reliant on scientific knowledge mainly based on individual economic behaviour, fisheries management has pushed aside the role of institutions and mechanisms within which fishing communities evolve and manage resources. He called for "the need for a parallel and complementary shift in our social science understandings of fishing towards context and interrelationships amongst and between fishermen and fishing communities; a sensitivity to locations and how they are inhabited by communities, socio-economic processes and fish harvesting practices across multiple scales" (ibid: 223). While not specifically mentioning political ecology as a framework, his promotion of local knowledge and giving attention to situated practices are common tools of political ecology. He then called for fisheries science to not rely solely on fisheries economics, which has dominated the management of fisheries,

but also to integrate and document processes within fisheries communities that have been neglected.

Contributing to the above discussion, Bear and Eden (2008) used an Actor Network Theory (ANT) approach to analyse the use of cartographies to produce knowledge in the process of Marine Stewardship Council certification. The study highlighted that the process of establishing boundaries through cartography was a result of social networks and relationships. They argued that, in contrast to the point of St Martin above, social and cultural aspects can be exposed in fisheries science, through the use of frameworks such as ANT. However, they pointed out that the production of knowledge through cartography can ignore biophysical features of marine resources as well the fluidity of the marine environment. As they put it, “[...] basing management strategies on the identification of a particular set of attributes ignores the ways in which the animals live their lives and is a poor basis for management” (ibid: 490). Ultimately, the creation of boundaries within the MSC<sup>2</sup> process results not only from the science of cartography but also from the actions of the marine resources. This consideration of non-humans is developed in the next section and represents an important component of political ecology studies.

Mansfield and Haas (2006), in their investigation of management decisions around the conservation of the Steller sea lion, explored the use of scientific uncertainty and scale framing by different actors. By analysing the actions of the State, the fishing industry and environmental groups, they were able to show how different actors use scale to frame the problem of the decline of sea lions and use uncertainty to support their narratives (Mansfield and Haas 2006). While fisheries services focused on localised issues, industry and environmental groups advocated for a broader scale to be investigated, both linked to different interests (respectively climate change for the industry and ecosystems impacts for the environmental groups). As they put it “different groups create scale frames that interpret and use uncertainty strategically to advance their views and interests” (ibid: 91). Therefore, examining the production of scientific knowledge, highlights the political interactions and power dynamics that can take place within the making of knowledge and how it can be used by different actors to promote their views.

<sup>2</sup> The MSC certification consists of an assessment of a fishery by an accredited third-party certification body based on three principles of the MSC environmental standard: the status of the target fish stock, the impact of the fishery on the ecosystem and the performance of the fishery management system (Ponte 2012)

### ***2.1.3. Acknowledging the role of non-humans***

Paying attention to the role of non-humans in resource management has also been a central theme for political ecologists. This thesis will develop the question of materiality in Chapter 6. The current section summarises early engagements with the materiality of the ocean and its resources in political ecology.

Mansfield (2003) explored the subject by looking at the debate around the label ‘organic’ for shellfish and wild-caught fish in the United States (Mansfield 2003). She highlighted the social construction of nature and especially how actors make distinctions about the world. In her study, proponents of ‘organic’ (the industry) considered the natural processes surrounding shellfish and wild fish as being the closest to nature and deserving the label of ‘organic’. Those against such labelling (those in the organic movement) contended that the organic label required a lack of control of fishers over the wild marine environment. Here the debate about labelling a product organic or not is associated with the social practice of controlling the environment where the marine resources are. This early look at materiality emphasises the role of social practices in co-producing nature.

Bear and Eden (2008) highlighted the role of fishes’ actions in the management of fisheries as well as within an MSC certification process. In calling for the fish and the ocean to “not be forgotten”, Bear and Eden (2008: 488), highlighted how the movement of the fish across established boundaries impacts fisheries management (more details provided in Chapter 6). Bear (2012) confirmed his argument in a later study of scallop fisheries. Using assemblage as a framework, he showed how the fluidity of the ocean and the actions of both scallops and dolphins render fisheries management complex and co-constituted. Debates around the management of a particular fishery “are co-produced by a heterogeneity of actants and forces, including scallops, water, wind, dolphins, fishermen, fishing technologies, regional, national and international fishing regulations and scientific investigations” (ibid, 2p. 35). The study clearly shows the role of the sea and its resources in contributing to or obstructing management actions.

Peters (2010) also raised the need to increase the engagement of geographers with studying the ocean. By tracing the different geographical works on the ocean, she highlighted the need to consider subjects such as materiality and human-nature relationships. Her call to make visible the out of sight seas also stresses the increasing prominence of the sea in our everyday life, whether through seafood or through the ship transport underlying many of our consumer goods.

## **2.2. RECENT TRENDS IN ‘MARINE’ POLITICAL ECOLOGY**

The previous sections presented early marine political ecology studies, the following section will present more current topics explored in the field, including; themes of blue economy, a revival of studies of the sea and an increasing number of studies on classic political ecology themes.

### ***2.2.1. Blue economy and blue (de)growth***

During my five years of doctoral work, I have sought to interact with researchers working on marine issues and using political ecology as a framework. This was done through the attendance of two conferences, ENTITLE (in 2016) and the biannual political ecology network conference POLLEN (in 2018). During both events, while subjects linked to the marine worlds were assigned to different panels not necessarily on the ocean, the main academic circle of those using political ecology was centred around the theme of blue economy. Defined by the World Bank as “a range of economic and related policies that together determine whether the use of the oceanic resources is sustainable”, the blue economy “seeks to promote economic growth, social inclusion, and the preservation or improvement of livelihoods while at the same time ensuring environmental sustainability of the oceans and coastal areas” (World Bank 2017: 6). The concept mirrors the green economy concept and emerged at the Rio+20 conference. It has been widely adopted in public discourses of governments, NGOs and various industries of ocean-based activities. In response to this fast-moving trend, political ecologists have brought contributions on different fronts.

First, political ecology has contributed to the analysis of the concept of the blue economy itself. Silver et al. (2015) traced the origin of the concept by attending different international events and conferences during which the concept emerged and gained traction. They uncovered how the term blue economy was used without distinction by various actors that often perceive environmental problems differently and also propose solutions that could be contradictory. The blue economy discourse is used by various perspectives of the ocean problems such as the lack of protection of natural capital, the need for good business practices, the issue of equity for Small Islands Developing States (SIDS) and the importance of preserving small-scale fishing livelihoods. This diversity of views shows how various actors can appropriate a mainstream concept to support their cause. A Silver et al. (2015), discuss “as discourses shape policies and governance practices, the reverse is also true;



specific economic sectors, development initiatives, or conservation programs may need the support that a popular term or discourse can offer” (ibid:153).

In the same endeavour of tracing the genealogy of the concept, Winder and Le Heron (2015), investigated what they called ‘the blue economy moment’ at which different actors assembled networks and knowledge to enact the blue economy according to their own interpretations. In addition to warning about the potential perpetuation of extractivism and existing power relations, they also emphasised the importance of considering the existing bioeconomic relationships. Finally, Voyer (2018) explored how actors conceived and enacted the blue economy, mainly following the categories of ocean problems developed by Silver et al. (2015). She established the different areas within which actors are in conflict or agreement regarding the blue economy. Conflicts arise mainly regarding who can be included as an actor under the blue economy umbrella (mainly questioning the role of carbon-intensive industries) and how the assets of the ocean are to be evaluated and commodified. Areas of commonalities included the need for marine spatial planning and the need for securitisation of the ocean (Voyer et al. 2018). Those sample studies show the current engagement of political ecology type studies on the topic of blue economy, examining and tracing the origin and current use of a mainstream concept.

Additionally, the political ecology literature on the blue economy investigates its current manifestations. In July 2019, John Child and Christina Hicks coordinated and published a special issue on the political ecologies of the blue economy in Africa. The editorial (Childs and Hicks 2019) and the six articles of the special issue (one of which is a modified version of Chapter 6 of this manuscript) explored how the blue economy discourse is constructed, enacted and contested in African countries. By conceptualising and placing the practices of blue economy in different parts of Africa, the various authors in the special issue highlighted current counter narratives to the blue economy that emerge in Africa (Bond 2019; Kalina et al. 2019), the role of non-humans as political actors shaping the politics of blue economy activities (Andriamahefazafy and Kull 2019; Carver 2019b), and the different influences that are at play to construct the current narrative (Schutter and Hicks 2019). In the conclusion of the introductory article, it is argued that the blue economy concept is “far from the stable development concept that it promises to be” (Childs and Hicks 2019): 336). These studies through a political ecology lens offer a first strong debate about a currently mainstream narrative of blue economy. Here the hatchet side of political ecology is used to raise

awareness of different actors in order to have better consideration of potential unforeseen issues linked to a blind adoption a blue economy discourse.

Another idea currently explored in political ecology relates to blue degrowth. The concept takes its root from the idea of degrowth, or “the equitable downscaling of production and consumption that increases human well-being and enhances ecological conditions [...] (within which) material accumulation will no longer hold a central position in the cultural imaginary” (Kallis 2017: 10). Political ecologists working on marine issues are therefore interested in questioning the idea of infinite growth and its socio-ecological consequences within the context of blue economy or blue growth. Hadjimichael (2018) has started this reflection and challenged the blue growth strategy of the EU. Through an analysis of the policies for a ‘sustainable use of marine resources’ and an evaluation of sectors promoted by the EU’s Blue Growth strategy, she unveiled that despite the presence of the word ‘sustainability’ in all policies of the EU, economic growth is still the principal driver of its activities. In a call for a blue degrowth, she reminded us that economic growth remains at the foundation of the ecological and social problems linked to the ocean and therefore requires a radical change for an “ecologically viable and socially just use of the oceans” (ibid: 163). In the same line, another call within the blue economy is the need for social justice and inclusion. Emphasising the need to include different perspectives, Bennett (2018) suggested an inclusive decision-making process as well as paying attention to the social implications and cost and benefits of policies within the blue economy. Some political ecology studies of fisheries and aquaculture have previously mentioned the need for social justice, highlighting the disproportionate impacts of some fishing practices and aquaculture on small-scale actors (Hadjimichael et al. 2014; Loring 2017). The adoption of blue degrowth as a concept as well as ensuring social justice and inclusion within blue economies can be interpreted as the ‘seed’ component of political ecology, suggesting alternative pathways. In this thesis, similar ideas will emerge regarding the implications of tuna fisheries for different actors. Considering the complex ramifications of tuna fisheries in the WIO countries, these ideas will be linked to broader socio-economic and geopolitical aspects.

### ***2.2.2. Refocussing on the sea and its people***

In the past five years, the attraction of studying the sea has largely increased (Bennett 2019). Novel approaches for ocean research are also being realised. Steinberg and Peters (2015) for example, addressed the materiality of the sea to question and integrate ideas of depth, time and volume to what they consider as having become a flat ontology of the ocean. Introducing

the idea of hydrosphere, they evoked the 3-dimensional reach of oceans as well as the interacting forces and relations that constantly occur. Considering the sea as a space of volume where sources of conflict might be in constant movement, struggles and contestations can become deep and are evolving. The authors assert that considering time and matter brings an assemblage of territory that can include various actors, human and non-human. This consideration also requires particular attention to how this materiality is used discursively. Advocating for a 'wet ontology' of the ocean, they suggested to broaden the material perspective on the ocean to include diverse fluidities with place and power always in movement within space (ibid). Following this renewed discussion on materiality, Acton et al. (2019), using the idea of wet ontologies, discussed, for example, the making of the boundaries of the Sargasso Sea. Through a mapping process', the materiality of the Sargasso Sea has been obscured to ignore its volume, depths and dynamic ecosystem. The adoption of a map with simplified boundaries, while more legible to policy-makers, obscured the complexities of social and material realities of the ocean. In line with Steinberg and Peters, Acton et al. advocated that "the production of ocean spaces that more closely represent particular oceanic materialities, or acknowledging the 'unacknowledged', will support policymakers in creating more adaptable governance institutions" (ibid: 98). This perspective of wet ontology calls for the consideration of more elements when analysing practices and imaginaries around the sea and its resources.

Given this increased interest of studying the sea, a review of the engagement of political ecology in marine and coastal management was published by Bennett (2019). Through a literature review on web of science, he highlighted the increased number of publications on what he calls 'maritime political ecology' in the past five years. His review presented existing questions linked to political ecology within marine and coastal management. The themes (**Table 2**) encompass various classical topics studied in political ecology, such as questioning the role of powerful actors in various processes like shipping, MSP or environmental policy; analysing the production and mobilisation of narratives and knowledge in policy and action; investigating the social and political construction of scale in marine policy; exploring the role of historical trajectory in current management practices and decision-making processing; and emphasising the importance of equity and justice (ibid).

**Table 2: Studies in marine and coastal management addressing political ecology themes**

	<b>Authors</b>	<b>Political ecology input</b>
<b>Power and politics</b>	Tan-Mullins 2007	Influence of unequal power relations between different groups of fishers and government officials on control over and access to resources in Thailand
	Chambers et al. 2017	Role of powerful fishing groups in consolidating ownership over fisheries and ITQs in Iceland
	Donkersloot and Menzies 2015	Powerful state actors reshaping available options to coastal fishers in Ireland under the EU Common Fisheries Policy
	Carse and Lewis 2017	Role of powerful networks within shipping in shaping infrastructure standards dependent on destructive practices
	Flannery et al. 2018	The politics of exclusion and preferential treatment to on some activities or actors in MSP processes in Northern US
	Stonich and Bailey 2000	Overcoming powerlessness of small organisation and communities by joining global coalitions
	Wrathall et al. 2014	Role of dominant institutional structures and climate stresses in coastal migration in Honduras
	Nayak et al. 2016	Power of social relations in environmental change and people's ability to adapt to change
	Vasquez 2017	Politics of coastal adaptation initiatives ignoring local perspectives and realities
<b>Narrative and knowledge</b>	Finkbeiner et al. 2017	Domination of Malthusian overfishing narrative in the scientific literature on overfishing
	Idrobo et al. 2016	Contradictory discourses between environmental legislation and tourism materials regarding Caicara coastal people in Brazil
	Boucquey 2017	Strategic deployment of certain narratives to increase access or re-territorialize the ocean in favour of certain groups/communities in North Carolina
	Osmundsen and Olsen 2017	Production of contradictory storylines by two coalitions of actors about aquaculture development in Norway
	Lehman 2016, 2018	Influence of technology on interactions of scientists with the ocean and its role in the production of science, often hiding geopolitical and social context
	Thornton and Hebert 2015	Change from an indigenous communal management system to a neoliberal regime with quota system due to a reductionist framing of solutions to fisheries crisis in Alaska
	Breslow 2014	Use and rejection of western science to advance specific agendas by indigenous tribes and local commercial farmers
<b>Scale and history</b>	Gray et al. 2014	Use of distinct global and local scalar narratives to rationalise different types of MPAs in the high seas and at the local level.
	Gruby and Basurto 2013	Mobilisation of ecological rationales by external organisations to justify high-level governance and gain influence over local decision-making.
	Gruby and Campbell 2013	Re-scaling of local imaginaries by small island developing states delegate to a global one to reformulate governance processes
	Armitage and Johnson 2006	Impacts of macro-scale changes on local property rights, institutions and resilience in coastal communities in India and Indonesia
	Bush 2004	Scalar re-alignment of fisheries from a local product to a regionally exported resource and local impacts due to a change of national law
	Hanson 2016	Work, urban development and conservation analysed through trajectories of individuals as gendered in coastal communities in Mexico
	Thomas 2016	Consideration of the impacts of historical realities on structures and policy as a key to the success of blue carbon initiatives in Malaysia.
	Hardy et al. 2017	Influence of racialised histories of coastal community and landscape formation in the southern US on present land politics, employment opportunities, and decision-making

Environmental justice and equity	Stonich 1998	Negative health impact of tourism development on marine resources and local impoverished residents
	Stonich et al. 1997	Expansion of shrimp mariculture industry leading to the destruction of marine resources and marginalisation of small producers
	Page 2007	Disproportionate exposure to risks from salmon farming on indigenous groups, more affected by environmental toxins and waste
	Frey 2015	Adverse environmental and social consequences of waste and hazard shipped to other countries, affecting local workers and communities
	Christie 2004	Social failure of MPAs established in Southeast Asia despite being considered a biological success.
	Walker and Robinson 2009	Gendered impact of MPAs in French Polynesia
	Bennett and Dearden 2014	Exclusionary decision-making and negative social impacts of MPAs undermining support for conservation in Thailand
	Kamat 2014	Negative consequences of marginalisation, and dispossession of local people from MPAs in Tanzania
	Loring 2017	Social equity impacts on small-scale commercial fishers of fisheries management decisions based on ecological rationales and favouring political and economic agendas.
	Cormier-Salem 2017	Marginalisation of women in decision-making regarding mangrove reforestation in Africa and Madagascar and leading to lack of access to benefits from mangroves
	Adusah-Karikari 2015	Marginalisation and increase of vulnerability of women and their livelihoods due to oil-related development within the 'blue economy' in Ghana
	Hadjimichael et al. 2014	Lack of consideration of social impacts on local fishers and community of aquaculture in Cypress
	Veuthey and Gerber 2012	Shrimp farm building resulting in privatisation and dispossession of customary community mangroves in Ecuador
	Murray et al. 2010	Blue grabbing through enclosure of marine space through conservation, management, development activities or planning processes that cause displacement of resource users
	Zalik 2009	Displacement of local communities due to offshore oil development
	Nichols 1999	Integrated coastal management as opening to aggressive state and global investment
Foley et al. 2015	Certain policies based on enclosure and commodification can empower community-based groups	
Fairbanks et al. 2018	MSP as providing opportunities to communities to provide different solutions beneficial to both the environment and people in the US	

Source: Summary of the survey undertaken by Bennett (2019). Authors mentioned in my own review were not repeated in the table

The review from Bennet shows the diversity of existing research applying political ecology approaches. Despite this increase of interest in marine or maritime political ecology, Bennett showed that publications in the subfield still represents less than 10% of general political ecology work (Bennett 2019). This leaves room for situated studies - such as the one presented in this thesis. My own survey of the literature combined with this review of Bennet shows that there have not been many direct works relating to tuna fisheries in the political ecology field. The following section will explore political ecology questions that have been addressed in tuna fisheries studies.

### **2.3. TUNA FISHERIES AS ADDRESSED BY POLITICAL ECOLOGY AND OTHER DISCIPLINES**

Very few established political ecologists have specifically worked on tuna and tuna fisheries as a subject of study. However, Robbins addresses the issue in a general way within a chapter of the book *Environment and Society* (a text book that introduces contemporary environmental challenges through foundational theoretical ideas illustrated with everyday examples), through looking at various questions related to tuna, its management and conservation. He describes the causes of overfishing of two species: bluefin tuna and yellowfin in the Eastern Tropical Pacific (ETP). With a political economy lens, he highlighted the role of consumer tastes and technology in driving the demand of tuna and capitalist exploitation that ultimately led to overfishing (Robbins 2014). He also looked at the role of regulations and geopolitics in the fate of the tuna. He particularly raised issues around the impact of certification, such as the Marine Stewardship Council, in creating more imbalance in terms of governance and accountability as only large-scale fisheries are able to afford the certification process (ibid). Furthermore, he questioned the conservation status of tuna. By tracing the emergence of the ‘dolphin-free’ tuna label through ecological ethics and animal rights, he highlighted how imaginaries of the public have portrayed dolphins as a species requiring protection while tunas are just represented as a commodity (ibid). Robbins rightly described tuna as a puzzle. As he put it, “the demand for tuna seems to have no ceiling, yet wild stocks of tuna are an undeniably finite resource” and “its ubiquity (for example, on store shelves) masks the declines of wild populations” (ibid: 230). Indeed, tuna is sold in all supermarket shelves and sushi shops. This prevents the consumer from knowing the overexploitation and geopolitical story that is behind each can or piece of tuna. A political ecology approach, as described by Robbins above, and as it is attempted in this thesis, tries to fill this gap and provide a fuller story for tuna resources in the WIO.

Socio-economic and political questions surrounding tuna fisheries have been studied within different disciplines that address political ecological questions and themes, without necessarily associating with the field. Political economy, as well as being a root discipline of political ecology, has also on its own been widely used to explain tuna fisheries in different oceans. Key authors that have mobilised this approach include Liam Campling, Elisabeth Havice, and Stefano B. Longo. Key themes such as commodity chains, exploration of firms’ strategies, techniques and relations of production, labour or questions of access, property and resource sovereignty have been covered. The work of Campling and Havice have been

essential to the development of this thesis as Campling has extensively worked on tuna in the WIO and Havice looks at various questions in the geography of tuna. Their insights have constituted the foundation of many arguments that are made in the result chapters.

Campling et al. (2012), for example, explored the complexity of firms and commodity chains in tuna fisheries with different levels of control, ownership, model of production, industrial organisation and competition (horizontally with other boats and vertically with processors and traders). They also presented the intricate link between techniques of production and environmental conditions with the latter often ignored by the industry and impacting on the exploitation. They explained how external factors such as global market dynamics, consumer tastes, competition or interactions with foreign fishing fleets can influence development policy and the management decision of coastal states regarding tuna (ibid). Campling and Havice (2014) also looked at the question of property in industrial fisheries and used the case of tuna. In line with the literature criticising the tragedy of the commons narrative in fisheries, they explained the historical trajectory of property rights in industrial tuna fisheries and the importance of the establishment of EEZs` in setting the coastal states as key players in the management of the fisheries and becoming landlords of tuna resources. They contended that for the case of industrial tuna fisheries, “property relations have emerged out of multilateral negotiations, geopolitical contestations and struggles over the influence of global production dynamics and the distribution of socio-economic benefits.” (ibid: 724). Contrary to the mainstream narrative picturing the states as passive actors contributing to the fisheries crisis, they presented state actors as highly influenced by socio-economic and political struggles in their decision-making and actively attempting to create and distribute surplus value from the fisheries while mediating foreign and domestic interests.

Campling has especially looked at tuna fisheries in the WIO. Through tracing the arrival of European fleets into the WIO and looking at fishing firms’ strategies, he showed that tuna represented a ‘commodity frontier’ for European fishers (Campling 2012b). He also looked at the link between capital and environmental conditions of production and presented how the intensification of exploitation of the EU fleet ultimately led to the degradation of environmental conditions key to their fishing activities (ibid). Furthermore, he exposed the horizontal relations between fishing firms within the EU fleet and their corporate strategy in order to maximise their production. Those included the use of flags of convenience, industry associations, corporate concentration and industrial organisation such as integration with canned tuna manufacturing (ibid). Through his thesis, Campling (2012b), studied the

commodity chain for canned tuna in the Seychelles (Campling 2012a). Using global commodity chain as a framework, he described the historical trajectory of the EU fleet from the production of raw material at fishing to the manufacturing and retail of canned tuna. By detailing the firms' strategies, he highlighted the importance of environmental conditions of extraction in shaping the commodity chain and the role of actors such as supermarkets and canned tuna branded firms in influencing the chain governance. He also explored the regulatory mechanisms surrounding the production of tuna, presented the political relations between states as well as states and firms, and showed how they define the economic geography of the EU exploitation. Finally, he analysed the strategies of the Seychelles in improving its production process through both policy interventions and internal politics. Going beyond the WIO, recent work of Campling in the field included looking at tariff regimes and their impact on tuna fishing activities (Campling 2016), investigating the influence of state-based regulatory regime in shaping the seafood system (Campling and Havice 2018) or highlighting the role of capitalism in territorialising the sea (Campling and Colás 2017).

With a similar political economy approach, Havice, looked at tuna fisheries in the western and central Pacific. Through an investigation of interactions of governments with DWFNs, she emphasised the importance of historical and political-economic factors in shaping institutions' performance in fisheries' management (Havice and Campling 2010). First, countering the idea that establishing institutions such as property rights leads to rational management decisions and overrides social dilemmas, she showed that such institutions are actually "a site of social struggle in which interests use political and economic power to influence outcomes in their favour." (ibid: 109). She explained how DWFNs use competitive strategies as well as economic and political power to influence Pacific states in the formulation of property rights. Additionally, she showed how the internationalisation of fisheries management, through the integration of DWFNs in management decisions, has negatively impacted the Pacific states' cooperative efforts, often agreeing to DWFNs' management proposals and leading to the erosion of resource sovereignty (ibid.). She particularly studied the issue of state sovereignty over pelagic marine resources and especially tuna. For the case of Papua New Guinea, she showed that the state's strategy of obligatory embeddedness, offering long-term licences to firms investing in the local processing industries, does not provide the expected full control over the entire tuna fishery in country (Havice and Reed 2012). The state, while maintaining control over the resources,



is also subject to global and local dynamics, influencing the material conditions of exploitation and the state's policy for tuna processing. Using the theory of access as one of her lenses of analysis, she also highlighted that state sovereignty over tuna resources is only one component of the complex webs of power and social relations involved in tuna exploitation (ibid).

Moreover, she looked at the role of mobility in shaping state practises on sovereignty in tuna fisheries in the Western and Central Pacific Ocean - WCPO (Havice 2018). In her analysis, three mobilities – the movement of tuna, the vessels and global capital – emerged in tuna fisheries as creating various state interactions and practices. As an example, tuna mobility has brought small island states to collaborate in order to strengthen their sovereignty over tuna resources. Mobility of capital allows vessels to move further in search for fishing sites as well as allow fishing companies to use arrangements such as flag states to have a better access to tuna resources. Havice made a key contribution through this work by showing that when it comes to mobile resources and especially tuna, sovereignty is “constantly renegotiated through multistate, public and private relationships and enacted through the mobilities of the “things” being sought, governed, or controlled—in this case, the fish and the mobile capital embodied in fishing vessels” (ibid:14). It shows how tuna generates “spatially and temporally dynamic configurations” (ibid:15) that allow coastal states to have political possibilities to influence geopolitical relations and negotiate with DWFNs. These mobilities also create what she called ‘more than-territorial institutional innovations’ that challenge territorial boundaries and allow state power to be enacted beyond national territory.

Other relevant contributions of Havice in the study of tuna fisheries include her various works on the commodity chain for tuna. In a study on tuna production upgrading (which is a process within which states try to gain more benefits from their resources through moving up the commodity chain by increasing involvement of lead firms in the chain), Havice and Campling (2013) showed that island states face many challenges – financial, political and labour related – issues. On contrary to the mainstream narrative that says that island states are struggling with the process of upgrading, they demonstrated that island states also succeeded in taking advantage of environmental conditions to attract investment in the country for tuna production along with setting sustainability goals for the fisheries (Havice and Campling 2013). Another of her recent publications discusses interfirm strategies in the canned tuna global value chain. With Campling, she showed the intricate link between chain governance and environmental governance in canned tuna production. They presented how firms use

strategies such as concentration or centralisation along with environmental standards and association to gain control over other firms and improve competitiveness (Havice and Campling 2017). Through this work and their other contributions, Havice and Campling demonstrate that environmental conditions are central to tuna exploitation. While environmental conditions are used by states and firms to gain access to more resources, they also shape interactions between actors as well as create various economic and socio-political configurations within the tuna exploitation.

The third author who has worked on tuna commodity chains is Stefano B. Longo, with a focus on bluefin tuna in the Mediterranean. Looking at the collapse of bluefin tuna resources in the Sicilian coast, he explained how local practices of tuna fishing have been overtaken by intensive industrial fishing, ultimately leading to a ‘metabolic rift’ (Longo 2010). His study demonstrated that the industrialisation of tuna fishing led to a degradation of environmental conditions along with negative impacts on social relations. Comparing a traditional mode of fishing ‘tonnara’ with the industrial fishing that followed, Longo showed that under a strong capitalist exploitation, human labour relations with the environment become highly utilitarian and the vast local knowledge on the resources and the ecology of the region fade in the face of capital and intensive technology (ibid). His focus on the change between traditional tuna fishing and intensive industrial fishing narrates how industrialised fishing reorganised the production and destabilised the ecological system of tuna resources (Longo and Clark 2012). Also arguing against a tragedy of the commons explanation for the collapse of Bluefin tuna in the Mediterranean, Longo and Clark contextualised and traced the history of the commodification of bluefin tuna. The switch to a capitalist exploitation led to the collapse of the resources and degradation of local livelihoods of fishing communities (ibid). Longo also brought up the idea of ‘the tragedy of the commodity’ which he developed in his 2015 book with Rebecca Clausen and Brett Clark, *The Tragedy of The Commodity: Oceans, Fisheries and Aquaculture*. The book presents tuna fisheries in the Mediterranean as one of the case studies and explains the deep contradictions between capitalism and nature with an environmental sociology lens. It also explains how capitalist economies attempt to correct ecological crises with technofixes - often not achieving the expected sustainability they claim. These contributions of Longo regarding the transformation of tuna fisheries in the Mediterranean show the drastic impacts of a capitalist mode of production on tuna resources and on local fishing systems. His approach, looking at fishing ecosystems and communities

in a capitalist exploitation, provides a key contribution that brings local tuna fishers more in the light.

Other branches of the social sciences have also looked at tuna fisheries, especially in the Western and Central Pacific Ocean (WCPO). A selection of those working on topics similar to ones in this thesis will be presented. Kate Barclay did an extensive analysis of the impact of tuna fisheries on coastal communities in the Pacific. Looking at both the benefits and problems brought by the tuna industry to the communities, she showed that communities mainly profited from the tuna fisheries through employment and business opportunities with canneries and tuna fleets (Barclay 2010). According to her interviewees, communities, also experienced negative social impacts linked to mixing with migrants in canneries and on fleet or with higher availability of cash to spend on detrimental activities such as alcohol consumption. This look at the perceptions of local communities also highlighted the strong conviction of communities that the tuna industry has caused environmental damages including the depletion of tuna stock or pollution of the ocean (ibid). An interesting feature of this research is the specificity of Pacific Islander coastal community responses to the tuna industry. Communities remained within their non-capitalist socio-economies while engaging with the tuna industry. They also had the predisposition to disproportionately blame the industry for social and environmental problems within coastal communities (ibid). This is rather similar to the views of coastal communities in the WIO that will be discussed in this thesis.

In a publication with Ian Cartright, Kate Barclay also looked at island nations in the Pacific as case studies to evaluate the wealth gained from tuna fisheries (Barclay and Cartright 2007). Their conclusion highlighted that some islands have managed to increase the benefits from tuna fisheries by requiring domestic involvement and onshore investment. The islands that struggled to improve the benefits from the fisheries were those with challenging socio-economic context or those that could not move beyond fishing access agreements. The study also showed that islanders have the common view of wanting to capture more wealth from the fisheries in a sustainable manner while they had very diverse and sometimes diverging strategy to achieve such vision (ibid). This perspective is also similar to the islands studied in the WIO, as I will show in Chapter 7. Other recent studies by Barclay analysed the place of gender norms and how gender relations shape tuna fisheries especially in post-harvest activities (Barclay et al. 2017) or investigating the international governance of tuna fisheries through practices within RFMOs and fishing companies (Barclay 2015).

Another author who has worked on tuna is Sandra Tarte. Using a political and diplomacy approach, she mainly studied the role of Japanese aid in tuna fisheries in the Pacific (Tarte 1995). She showed that Japan's aid policy in the Pacific was strongly linked to diplomatic and political considerations needed for negotiating access to tuna grounds in the Pacific. The Pacific islands in turn used collective diplomacy, regionalisation and the Law of the sea to challenge the economic dominance of Japan (ibid). She also explored the making of regionalism within Pacific Islands through the management of tuna fisheries in the region (Tarte 2002, 2014). By looking at the different regional institutions that Pacific islands created to manage tuna fisheries, she highlighted the shift in power and regional order that put Pacific islands as active participants in questions of ocean governance, away from post-colonialism and former metropolitan powers (Tarte 2014). Increased regionalism has allowed Pacific islands to gain more control over problems and solutions regarding the ocean and especially regarding the tuna resources and their exploitation (ibid). I conduct similar analyses in Chapter 7.

Transform Aqorau also uses the diplomacy lens to study tuna. He analysed the relationships between Pacific islands and their partners regarding access arrangements to tuna. While acknowledging the important development of regional collaboration in the Pacific, he also highlighted that the complexity of fisheries dynamics and relationships between different actors can challenge this collaboration. He demonstrated how the emergence of subgroups can drive the decision process or how consensus is difficult to find when one country in the region is not interested in management measures (Aqorau 2015). Such studies of tuna fisheries in the Pacific through the angle of diplomacy are relevant for the case of WIO in the way that external partners in the Pacific such as the EU or Japan are also present in the exploitation of tuna in the WIO. The geographical configuration of EEZs in the WCPO and the WIO islands is, however, very different (as will be explained in Chapter 6 and 7), thus comparing tuna fisheries in the two oceans requires caution.

Other authors have also brought interesting contributions to the study of tuna fisheries with diverse approaches. Bell et al. (2015), for example, looked at the contribution of tuna fisheries to food security and health in the Pacific. They argued for the need to increase access to tuna for local populations by developing local tuna fisheries and by improving distribution of tuna and bycatch from industrial fishing. They contended that an increased access to tuna would strongly contribute to sustaining the health of local populations in the Pacific. Elspeth Probyn in her book *Eating The Ocean* (2016), explores the various

entanglements between humans and tuna. This included looking at the history of bluefin tuna and how it became a highly valued commodity in Japan and worldwide and the global response of NGOs, fishing companies and governments when bluefin came to be overfished and endangered. She also looked at practices of tuna fishing, tuna ranching and aquaculture in Australia. Her study provided an interesting view, not only of economies, but also the tales of the people involved and their relations with the fish and the fishery. These included, for example, a detailed tale of bluefin tuna ranching<sup>3</sup> and related social practices. She also shed light on the actors behind the current fishing of bluefin tuna and raised the importance of understanding the processes that take place for bluefin tuna to arrive on consumers' plate. Another interesting concept that Probyn developed was the idea of care for the more-than-humans and how human relations with resources, including through consumption, develop our 'habitus' to care (Probyn 2014). These contributions by Probyn resonate to a relative extent with what this thesis aims to do, which is, to provide voices to 'less seen' actors in the tuna fisheries in the WIO and unpack the socio-political complexity of the fishery.

#### **2.4. BUILDING A POLITICAL ECOLOGY FRAMEWORK FOR THE WIO TUNA FISHERIES**

Discussed above are existing works on tuna fisheries in political ecology and other fields. In the following section, I will present my appropriation of the field of political ecology and the themes that I work on for this thesis. The thesis aims to explore how access politics, narratives around the state of tuna resources, and regionalism shape the management of the WIO tuna fisheries, therefore, I will address it by undertaking classical political ecology tasks, as presented by Robbins (2012). Such tasks include tracking winners and losers, exploring human and non-human dialectics and analysing claims about the state of nature. The three themes will be used throughout the thesis and will guide the different concepts used in each of result chapters.

##### ***2.4.1. Analysing claims about the state of nature and claims about these claims***

The idea of making claims about the state of nature and questioning the same claims has been one of the specificities of political ecology. Not limiting itself to describing the characteristics of an ecosystem or the state of natural resources, it also questions the production of the ideas around the natural system. It has demonstrated how the ideas and

<sup>3</sup> The process of ranching comprises the steps of capturing 2-3 years old tuna at sea with purse seiner, transferring them into towing pontoons and transporting them to ranching sites where they are fed until harvested again.

explanations upon which resource management policies are based are influenced by different epistemologies or ideologies. Typically, political ecological studies of particular environmental ideas and discourses take seriously the genealogy and contextualised production and translation of those ideas. This task, sometimes labelled as ‘deconstruction’, investigates “the conditions in which ideas about the environment are formed, about the discursive means that make certain assumptions about the environment more possible or likely, and about the way political power, social habits, and cultural norms may set human beliefs about the way the world both is, and ought to be.” (Robbins 2012: 97). This approach is not commonly applied in the study of tuna fisheries. The main discourse regarding the state of tuna resources in the WIO and in the oceans globally is one of overfishing. Questioning claims of overfishing at the current time of resource crises appears rhetorical. However, my interest was to investigate the conditions and ways within which this claim is made by various actors involved in fisheries as well as their legitimacy. To explore these views, I use the concept of co-production, developed originally in science and technology studies by Jasanoff (2006) and also discussed by Robbins (2012). Co-production is way of analysing a subject by considering natural and social orders but also the diversity of human experiences, interactions and cultures. The idea of using co-production is to explore the context and political work between actors in constructing their views about tuna including on its overfishing. This task involves taking a more constructivist stance when looking at tuna fisheries since the construction and making of ideas are examined within their socio-political environment.

In conclusion, as this chapter has shown, there is relevance of applying political ecology to study tuna fisheries for this thesis. The field offers the opportunity to assemble a diversity of lenses that address both the humans and non-humans. It also situates the perspective of the local manager in its broader socio-political and economic context. Finally, it allows me to generate a localised account of the WIO tuna fisheries.

#### ***2.4.2. Tracking winners and losers***

In the task of tracking winners and losers, political ecologists have attempted to understand the often uneven causes and consequences of environmental transformation between groups or communities. To do so, “political ecology narratives typically track the historical processes, legal and institutional infrastructures, and socially implicated assumptions and discourses that typically make unjust outcomes the rule, rather than the exception” (Robbins 2012: 87). One of the aims of this thesis is to investigate the impacts of tuna fisheries within

the WIO and establish who wins or loses with regard to resource use. Two contradictory narratives are present within the WIO. One is from the industrial segment, including from DWFNs, that asserts industrial fishing brings long-standing economic development to host countries. On the other hand, local fishers claim that they see limited benefits from industrial fishing while their livelihoods are put at risk with the depletion of tuna stocks due to the industrial exploitation. This highlights that tuna fisheries are a domain of contestations and claims between actors, making political ecology a useful analytical tool.

To explore the validity of these claims, I use the theory of access (Ribot and Peluso 2003) as a framework. As I will develop in Chapter 6, the theory of access provides a way of looking at access to natural resources not only through property but also through the various structural and relational mechanisms that are available to actors involved. It also considers the different bundles of power that are created through the interactions between actors while accessing the resources. By using the theory of access to study the WIO tuna fisheries, I will investigate winners and losers through three steps. First is a mapping of the benefits that tuna fisheries provide to the host countries and their fishers, from economic benefits to socio-political ones. The mapping will explore who gets what benefit from fisheries. Second is an exploration of the different mechanisms of access to tuna. It will establish who accesses the tuna, with what means and how. Finally, I will look at the power relations between actors in this process of access to the fish. This will establish if there is a structure of outcomes that produces losers at the expense of winners in tuna fisheries. I use the theory of access with a structuralist stance exploring the institutional infrastructures surrounding tuna fisheries while being anchored in the history of the fishery. I also use inputs from political economy since looking at access to tuna fisheries requires exploring questions of capital, markets and dynamics of production.

Another area where winners and losers will be examined is the regional interactions of countries through tuna fisheries in the WIO. As I will develop in Chapter 6, the region and especially the three islands studied are fully enrolled in what is promoted as an Indianoceanian vision for the region to work together including on tuna fisheries. With a closer look at the practices surrounding regionalism in tuna fisheries, I will establish that while the idea of an Indianoceanian is supposed to benefit the countries of the region, when it comes to tuna fisheries there is competition between countries, external actors that exercise geopolitical pressure thus generating winners and losers. While the countries of the WIO regions are portrayed as benefiting from regionalism, tuna fisheries defy this assumption and allow

DWFNs to become dominant actors and winners in the region. This exploration requires a deconstruction of the idea of regionalism in tuna fisheries by looking at practices, while keeping political economy elements in the forefront to contextualise the difficulty of achieving regionalism in the fishery.

#### ***2.4.3. Exploring human and non-human dialectics***

One characteristic of political ecology that has been important within this thesis is the attention to non-humans. While other disciplines do consider natural resources and their impacts on social practices, political ecology gives objects or animals an active role in the making of social processes and vice versa. This dialectic provides “a more processual and complex picture of the nature of things” (Robbins 2012: 94). As explained by Robbins (*ibid*), in political ecology, “non-human objects (elk, icemakers, fungi), as well as human beings themselves, contain and are constituted by their relations to other things”. This co-constitution and relation between humans and non-humans are highly relevant for the study of tuna fisheries considering the movement of the species across the region and its management implications. In this thesis, I give particular attention to the tuna and the WIO by exploring how their materiality affects tuna fisheries and vice versa – i.e. on how social practices influence the tuna resources and the WIO. I will expand on the concept of materiality in various chapters to explore how it shapes perspectives regarding degradation of the resources (Chapter 5), to see how it influences and co-produces access (Chapter 6) and to investigate its role in initiatives towards regionalism (Chapter 7). In this human-non-human dialectic, it is also important to take into consideration the various socio-economic and historical contexts that surround the relations between humans and non-humans. This enriches the “chain of explanation” regarding the use of tuna resources in the WIO. Chains of explanation allow political ecologists to “trace the contextual forces that constrain and direct more immediate outcomes, and write an explanation of these outcomes that is also, simultaneously, a map for the way value flows out the landscape, through local communities, and towards sites of accumulation far away” (Robbins 2012: 88). The thesis therefore aims to trace the use of resources at different levels by paying attention to the local, regional and global variables that impact the fisheries along with the materiality of the tuna and the WIO. This consideration of non-humans requires exploring ideas of “new materialism”, a field in which political ecology has led work in the science and technologies studies. These include investigating the co-fabrication of the socio-material world by both humans and non-humans or exploring the materialities through which web of connections and ecologies are always ‘in-



the-making' (Bennett 2010; Whatmore 2006). From this literature, I will mobilise two ideas: materiality and the role of non-humans. In the study of tuna fisheries, I see the two as complementary in understanding the making of processes linked to access, overfishing and regionalism. Considering materiality can help to better understand the processes around the fishery. As Bennett puts it, materiality "draws human attention sideways, away from an ontologically ranked great chain of being and toward a greater appreciation of the complex entanglements of humans and non-humans" (Bennett 2010: 112). I will then show in this thesis that the materiality of the fish and the ocean brings specificities to the fishery. As for the role of non-humans, I also see the tuna and the WIO as active parts of the fishery's assemblage. They are 'actants' which can be sources of action that impact the social fabric (Latour 1996). The thesis will highlight that the fish and the ocean can cooperate in or impede the fishery and its management. Through the use of materiality and non-humans' agency, I will tell the story of tunas and the WIO as actants in tuna fisheries and as shaping management.

## **CHAPTER 3. METHODOLOGY**

In this chapter, I present my strategy in undertaking the research for this thesis. I start by presenting my fieldwork and the methods. I continue with explaining how the data gathered were analysed. The chapter concludes by describing some gaps in the research and the challenges I faced in the field.

The research is based on an empirical approach with fieldwork in the three island nations of Madagascar, Mauritius and the Seychelles. They were used as case studies to build a regional WIO story. The three countries were not compared against each other as they are highly distinctive in terms of tuna fisheries, productivity of fishing grounds and socio-economic contexts. To answer the research question and address the themes studied, I conducted semi-structured interviews during which questions of access, perceptions of overfishing and practices of regionalism were asked. To understand and contextualise actors' views, I observed actors' activities related to the fishery: tuna landings and international discussions of management. To complement information gathered from the field, grey literature was also used including consultancy, NGO and government reports. Storylines in the thesis were generated according to data gathered in the field. The research has adopted a deductive approach. Starting from three research subthemes and by mobilising a theory or a concept for each theme, data and observations were gathered to establish conclusions and patterns in the different topics addressed.

### **3.1. FIELDWORK**

The thesis is based on fieldwork undertaken in the three island countries during 2017 (5 months) and 2018 (3 weeks) (**Figure 1**). The fieldwork had three main strategies: meeting fishers in their fishing villages, observing landings at ports and fishing villages and meeting with officials and NGO representatives at their offices. Fishing villages were chosen from an initial discussion with key actors in fisheries departments and statistic units who pointed out to well-known villages with tuna fishers in the three countries. In addition to those, two international meetings were also attended, in Antananarivo (Mars 2017) and Bangkok (May 2018).

For Madagascar, the two-month fieldwork in 2017 consisted of observing landings at the main tuna port (Antsiranana), meeting government officials and NGOs representatives in three administrative towns (Antananarivo, Antsiranana and Mahajanga), and meeting fishers in three fishing villages (Amborovy, Antsahabingo and Ramena). In 2018, one other fishing

village (Sainte Luce), one port (Toamasina) and two administrative towns (Tolagnaro and Toamasina) were visited to meet with fishers, government officials and NGO representatives. The village of Ramena was visited again for follow-up with fishers as it is a well-known tuna fishing village in this country.

In Mauritius, the month and a half fieldwork consisted of observing landings and meeting governmental officials in the capital city of Port Louis, meeting fishers and observing landings in eight fishing villages (Bain des dames, Grand Baie, Le Morne, Rivière Noire, Pointe aux Sables, Tamarin, Tombeau Bay and Trou aux Biches).

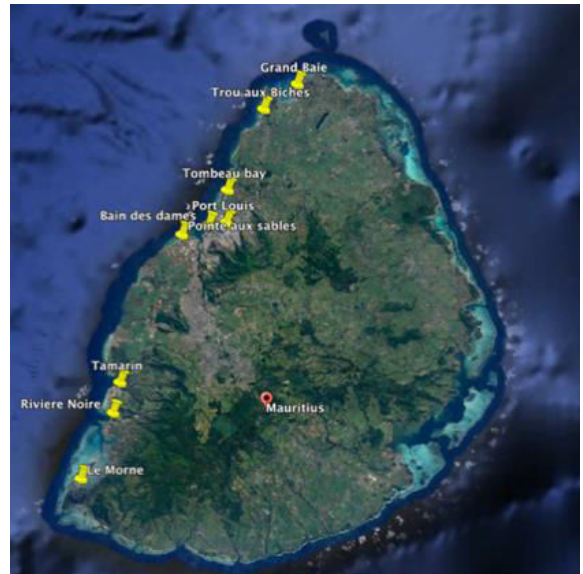
In Seychelles, the month and a half fieldwork included meeting government officials in the capital city of Victoria, observing landings and meeting fishers at Victoria and Providence ports as well as in four fishing villages (Anse à la Mouche, Anse aux Pins, Beau Vallon and Bel Ombre). Fieldwork in the two islands (Mauritius and the Seychelles), took place in 2017 only, due to smaller geographical extent of the country. Within the combined three months fieldwork in 2017 in the two islands, best known tuna fishers and boat owners were interviewed as well as government officials and NGO representatives.

One research assistant accompanied me in each country. Each of them being a local from the region or country and familiar with the field, they were able to identify well-known villages to go to. They also helped with the translation (into northern dialect for Madagascar and into Creole for Mauritius and the Seychelles). They also assisted with note taking. When interviewees were able to speak mainstream Malagasy, French or English, I conducted the interview and the assistant took notes. When they preferred to speak the local dialect or Creole, the assistant conducted the interview, translated to me and I took notes.

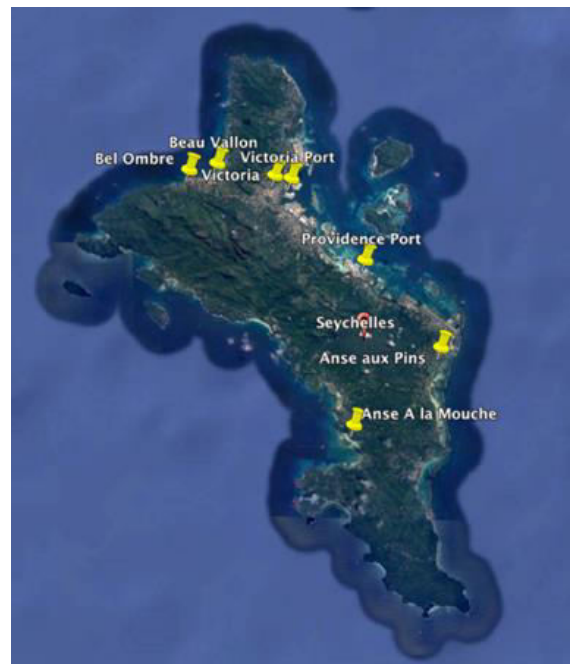
Figure 1: Map of villages and towns during fieldwork



Madagascar



Mauritius



Seychelles

## 3.2. METHODS

### 3.2.1. Interviews

The first method was semi-structured interviews with key actors in the three islands. For the thesis, interviews represented a key method to gather facts and perspectives of actors regarding the three themes of the research but also to understand the socio-economic and political context within which actors express their views and ideas. Two strategies were used to contact interviewees: the snowball technique, where my first contacts provided their own contacts, and onsite recruitment within villages and fishing ports. For government officials and NGO representatives, they were identified by contacts from other researchers in the field or by approaching the offices in countries and requesting appointments. For fishers and intermediaries, repeated visits in the fishing villages and ports were undertaken during which actors were approached to request a meeting, to have an interview or just an open discussion at the time of encounter. Nine interviews were also done via Skype, these were interviewees that were based in Europe or who were not available during the fieldwork. Six interviews also took place during attendance of international meetings. Each interview lasted between 20 minutes to an hour approximately. Here, the role of my research assistants for interviewing actors in each country was crucial. They were a key factor in the success of interviews including in the depth of discussions and the number of people we could interview. The assistant in each country was strongly invested in exploring the different topics and also assisted in my understanding of the interviewee's responses as well as the different local contexts of the interviews.

Interviews were coded according to where they took place, namely Madagascar (interviews coded as MD), Mauritius (coded as MU), Seychelles (coded as SE), Bangkok (coded BK) and online by Skype (coded as SK) (**Appendix 1**). Before each interview, the research was explained and the interviewee was asked if he/she was willing to discuss the state of the resources, access and regionalism. It was also explained that notes from the discussion will be used for the research. Interviewees consented verbally to discuss all or some of the topics. Some interviewees refused to discuss from the start. This only happened a few times amongst fishers, especially in Madagascar. Most interviewees wanted to remain anonymous, so anonymity was adopted in the writing of the thesis, by mentioning only the interview codes (BK, MD, MU, SE, SK) or the categories of actors. A total of 223 interviews were completed (**Table 3**).

**Table 3: List of actors interviewed in each country and remotely**

	Madagascar	Mauritius	Seychelles	Bangkok/Skype
Fishers – Small scale	47	24	20	
Fishers – Industrial	7	0	4	5
Fishers – Semi Industrial	0	0	14	2
Fishers – Recreational	2	2	1	
Intermediaries – Individuals	6	2	0	
Intermediaries – Companies	1	0	2	
Cannery staff member	1	3	3	
Government officials	26	8	10	4
NGO staff members	10	0	9	4
Research Institute	0	0	5	
Local retailers	2	2	5	
Total by country	102	41	68	15

Interviews took two forms: semi-structured ones and open discussions. The semi-structured interviews were guided by a pre-established questionnaire addressing the three research questions of the thesis. The questionnaire (in Appendix 2) was divided into four parts: the personal data about the interviewee – such as years as a fisher or in current official position, questions about access, perceptions about the state of the resources and questions about regionalism (Table 4). Open discussions were interviews during which only a few guiding questions were asked then the interviewee was left to provide broad views on the subject. These happened mainly with officials in fisheries departments and high-level executives of fishing companies or fishing associations. Three guiding questions were usually asked including the interviewee’s view on the state of the resources, the management of access and the potential for regionalism.

**Table 4: Categories of questions asked during semi-structured interviews**

Actor	Access	Regionalism	State of the resources
Small-scale fishers	<ul style="list-style-type: none"> <li>• Types of rights-based mechanisms of access to tuna</li> <li>• Structural access mechanisms:               <ul style="list-style-type: none"> <li>- Knowledge production</li> <li>- Technology availability</li> <li>- Capital availability</li> <li>- Types of market accessed</li> <li>- Labour opportunities</li> <li>- Other social relations needed</li> </ul> </li> </ul>	Interaction with other fishers and knowledge about other fishers in the SWIO region	<ul style="list-style-type: none"> <li>• Perception on the state of the resources in the past five years</li> <li>• Justification of perspective given</li> <li>• Perceived drivers behind the state of resources</li> </ul>
Industrial tuna boat crew		Knowledge about other crew and fishers working in the SWIO and location of fishing activity and landing ports	
Government officials		Stakes regarding tuna fisheries and interests and obstacles to a regional collaboration in tuna fisheries	
Processing company staff		Knowledge about and interaction with other cannery staff from the	

	<ul style="list-style-type: none"> <li>- accessed Labour opportunities</li> </ul>	SWIO region	
NGO representatives	<ul style="list-style-type: none"> <li>• Structural access mechanisms: <ul style="list-style-type: none"> <li>- Knowledge production</li> <li>- Types of market accessed</li> </ul> </li> </ul>	Drivers and obstacles to regional collaboration in tuna fisheries in the SWIO	

### 3.2.2. Observations

The second method used to collect data was observation of tuna landings and international meetings. For tuna landings, observation was important for the research to show the diversity of actors involved in each segment but also to investigate the potential interactions between the segments of the fishery. Landings took place in coastal villages and at ports (**Illustration 1**). In coastal villages, the process of landing and the handling of the fish was observed and recorded. This included observing the type of tuna that was landed, the quantity, where the fish was going and how it was transported. The aim of this observation was to describe local practices of tuna fishing and also observe the technological means of access as well as the market route taken by the fish. Observation lasted between a couple of hours to a full day, observing landings at different times of the day.

At ports, observation of landings was possible in Antsiranana port, Madagascar and in Victoria and Providence, Seychelles. These were done by accompanying teams of surveyors from fisheries departments which undertook the monitoring of catch on purse-seiners. This was not possible in Mauritius as the surveyors were not undertaking monitoring during the time of the fieldwork. Observation consisted of recording the practices of handling the fish including the separation of tuna from bycatch, looking at the interactions between stevedores and crew members, and the interactions between crew members and other external actors such as surveyors or research institute members. For the case of the Seychelles, where there is a growing semi-industrial sector, the observation of landing was undertaken at the local ports of Victoria and Providence. They allowed for an understanding of the supply chain for sashimi tuna from the Seychelles, the practices of longline by a mixed Seychellois-Sri Lankan crew and the handling and processing. Each observation lasted between a couple of hours to half a day.

Other sites were also visited for a couple of hours each during the fieldwork including the local fish markets in the three countries and the canneries in Madagascar and Mauritius. These observations were important in my approach of humanising the fishery and also to

describe the practices but especially the diversity of actors involved in the fishery. Fieldnotes were written and transcribed to record these practices and interactions.

### **Illustration 1: Landing in the three segments of the fisheries**



From left to right, landing by small-scale fishers (Mauritius), semi-industrial boats (Seychelles) and purse-seiners (in Madagascar). Photos by the author

Two regional meetings were attended and observed. First, the 8<sup>th</sup> Session of the South West Indian Ocean Fisheries Commission (SWIOFC) took place in Antananarivo, Madagascar, 28-31 March 2017, then the 22<sup>nd</sup> Session of the Indian Ocean Tuna Commission (IOTC) took place on 21-25 May 2018 in Bangkok, Thailand. SWIOFC meetings are held biannually for the commission members (12 countries of the region<sup>4</sup>) to discuss common issues regarding the management of fisheries in the SWIO region. During such meetings, subcommittees present their work and regional matters are also discussed. While the commission has a working party on collaboration and cooperation in tuna fisheries, another important topic discussed was the guidelines for Minimum Terms and Conditions (MTCs) for fishing access agreements. Meetings of the IOTC commission, on the other hand, take place every year for two main reasons. First, it is used as a reporting mechanism, during which the work of different subcommittees is presented to the members. It is also a decision-making mechanism where various conservation and management proposals are tabled, debated and adopted as a binding resolution for all its members. During the meetings, I was part of NGO delegations: Blue Ventures during the SWIOFC meeting and the International Pole and Line Foundation (IPNLF) during the IOTC meeting. In those meetings, NGOs are admitted as observers. While observers do not take part in the decision-making process, they are allowed to make

<sup>4</sup> Members as of 2019: Comoros, France, Kenya, Madagascar, Maldives, Mauritius, Mozambique, Seychelles, Somalia, South Africa, United Rep. of Tanzania, Yemen.

<sup>5</sup> I was able to join the NGOs' delegations by request and as having an advisory role on a voluntary basis for both NGOs.



short statements (for the case of IOTC but not for SWIOFC) to supply information. NGOs also often attend these meetings in advisory positions for countries or causes they defend. Blue Ventures attended the SWIOFC meeting to show their presence as representing the views of small-scale fishers. For the case of IPNLF, they have been engaged in building the capacity of coastal countries of the IO through support of the G16 group, a group of like-minded coastal states hosting the tuna resources. The group does not include countries like France or the UK which despite their overseas territories are not considered as 'like-minded'.

To observe the meetings, I used techniques from event ethnography which, through careful observation of things such as speeches, settings and debates, aim at capturing 'underlying forces' and the politics of environmental governance at international meetings (Corson et al. 2014). Three elements were thoroughly recorded. First, speeches and position statements from key actors – here the delegates from the three countries studied and from DWFNs – were carefully recorded and double-checked with the meeting minutes. Second, reactions of actors during debates on management measures were also recorded, including responses to statements or spontaneous interventions during topical discussions. Third, the general setting of the meeting was observed and recorded – including the setting and timing of different agenda items, the time spent on each agenda item or any switch of agenda items and the turns of speakers. The objective of this observation was to document the interactions between members, notably between the delegates of the three countries studied and the DWFNs. This helped to picture the geopolitical interactions regarding tuna fisheries. Another aim was to understand how members present and promote their position, and what narratives convince parties to come to a decision or not. Detailed note taking was done using each meeting's agenda as a structure for the field notes. They were then double-checked with the content of the minutes.

A last type of observation was a virtual one. I followed online news regarding tuna in the WIO, notably on Twitter and on the "undercurrent news"<sup>6</sup> website. Twitter accounts that were followed include those of the Indian Ocean Commission, of OPAGAC, of the Européche and of the EU ambassador in the WIO region. News from the undercurrent website were collected when they concerned the management of tuna in the Indian Ocean. Tweets and news articles were saved and were used to complement views or positions by the actors studied in this thesis.

<sup>6</sup> The undercurrent website (<https://www.undercurrentnews.com/>) provides news on supply, trade, policy regarding various fisheries including tuna

### ***3.2.3. Document analysis***

Field data were complemented by an analysis of grey literature regarding tuna fisheries in the WIO. A diversity of documents was analysed to provide data and narratives surrounding the three research questions (**Table 5**).

The first set of documents was fisheries reports from Fisheries departments in the three islands. They were collected on the departments' website (in the case of Seychelles), or copied from the libraries of each department. When available, reports between 2012 and 2017 were consulted to provide data regarding the different mechanisms of access to the resources. Catch data was also used to establish the numbers through which governments would assert their perspective on the state of resources. Finally, reports also covered the various regional initiatives in which governments were taking part regarding the management of tuna resources, which were useful to trace the trajectory of regionalism between the three islands but also to corroborate governments' positions regarding regionalism.

The second set of documents was a compilation of IOTC reports extracted from the IOTC website. These consisted of the reports of the commission and the scientific committees between 2012 and 2018. Another set of IOTC documents used was the annual national reports submitted by countries and a database of catches between 1950 and 2017. These were used to triangulate the data from national reports above. They were also used to trace the evolution of tuna stocks and especially yellowfin tuna for Chapter 5. The commission reports were used to document country positions on the management of tuna resources. They helped to establish the different ways island countries and DWFNs interact, through an analysis of submitted proposals and resolutions actually adopted. This was a key information to be able to analyse the state of regionalism at the IOTC level between the three islands.

A third set of documents analysed was produced by the Indian Ocean Commission relating to tuna fisheries in the past five years. These consisted of project reports, annual reports and meetings' reports from the IOC and press releases concerning different projects linked to tuna fisheries. They were important to present the initiatives of regionalism in the WIO region and more specifically the Southwest Indian Ocean. The reports also helped to illustrate how countries build a narrative of effective regionalism and how it is implemented in the field of tuna fisheries.

Another set of documents was linked to the EU, which has the advantage of having various online documents available for consultation and analysis. The EU-related documents were

central to explore access to the resources by DWFNs and also to frame the position of the EU in the WIO region regarding regionalism. The documents included fishing access agreements between the EU and the three islands, leaflets of the EU regarding access agreements and tuna fisheries in general. They also included consultancy reports evaluating these access agreements. The latter were particularly useful as they present information regarding the economic aspects of the fishery including the value added of tuna fisheries to coastal states' economies, even if they were written from an EU perspective.

A last set of documents was from NGOs such as the IPNLF, PEW and WWF. They included press releases on subjects related to the state of tuna resources in the Indian Ocean or regionalism at the IOTC level. They also included reports on issues such as FADs. Information from those reports were used to present the views of NGOs on the three themes of the thesis but also to explore how such actors shape the fishery and its management.

**Table 5: Summary of data extracted and analysed in the grey literature**

	Data collected	Modality of analysis
Governmental reports	<ul style="list-style-type: none"> <li>Catch data</li> <li>Access mechanisms</li> </ul>	<ul style="list-style-type: none"> <li>Comparison between years</li> <li>Extraction of information, positions and narratives</li> <li>Tracing the evolution of positions and narratives</li> </ul>
IOC reports and press releases	<ul style="list-style-type: none"> <li>Regional initiatives</li> <li>Economic investments</li> <li>Positions of actors on regionalism</li> </ul>	
IOTC commission reports	<ul style="list-style-type: none"> <li>Resolutions on tuna management</li> <li>Positions of parties</li> </ul>	
IOTC scientific committee reports	<ul style="list-style-type: none"> <li>Evolution of catch</li> <li>Management advice</li> </ul>	
IOTC national reports	<ul style="list-style-type: none"> <li>Catch data</li> <li>Evolution of national fisheries</li> </ul>	
EU Fishing access agreements	<ul style="list-style-type: none"> <li>Financial contribution</li> <li>Management measures</li> </ul>	
EU leaflets	<ul style="list-style-type: none"> <li>Narrative about Fishing access agreements</li> <li>EU procedures on tuna</li> </ul>	
Ex-post and ex-ante evaluation of fishing access agreements	<ul style="list-style-type: none"> <li>Catch data</li> <li>Economic contribution to the WIO</li> <li>Benefits gained by the EU fleet</li> </ul>	
NGO reports and press releases	<ul style="list-style-type: none"> <li>Position of NGOs</li> <li>External view of State interactions</li> </ul>	

### 3.3. DATA ANALYSIS

From the variety of methods used for the research, a diversity of data emerged. Perspectives and related narratives emerged from the interviews. These were triangulated with results from observation and analysis of various grey literatures and online content. Perceptions on the state of tuna resources were checked against written reports by the same actors or grey

literature to which actors contributed. Access mechanisms and benefits discussed with actors were verified with observations of landings and analysis of fisheries reports. Views about access politics were also verified in actors' negotiation practises during access discussions at the IOTC level. Perspectives about regionalism were triangulated with written reports of the IOC and also actors' practices of regionalism during the IOTC and SWIOFC negotiations.

Data from the interviews were analysed via content analysis by using the software Atlas.ti. After interviews were transcribed, they were imported into Atlas.ti. Within the software, a system of coding was put in place addressing the research questions of the thesis. Three main code branches were created: access, state of resources and regionalism. Each branch then had a series of codes that were created according to the most repeated responses received from the interviews (**Appendix 3**). Ninety-nine codes were generated to cover the different information from the interviews. Another category was also created to highlight the metadata about interviewees including, when provided, their age, professional status and how long they have been involved in their profession.

Coding research outputs with Atlas.ti was useful for three reasons. First, it allowed an easy location of the data on any question related to the research. For example, it was easy to look at all responses regarding the various means of access to the resources as they were entered as different codes. It also showed which mechanisms actors provided the most information on. Second, it allowed the identification of major trends in the three topics. For the study of narratives regarding the state of resources for example, the coding system showed repetitions under different views. It was then possible to see the main trends and who was behind each trend. Third, it allowed the easy retrieval of key quotes on the different questions of the research.

For data from observations, field notes were not imported to Atlas.ti and were analysed manually by first coding the different contents to the three research questions of the manuscript (access, state of resources and regionalism). Specific contents were then used to support the arguments generated from the interviews. As presented in the previous section on document analysis, data from the reports and documents were also analysed by comparing numerical data and by extracting views and positions of actors including those interviewed. Contents from documents were also used to depict facts or to support the positions of different actors as factual background.

### **3.4. CHALLENGES IN DOING THE RESEARCH**

The study has been subject to common challenges that are often faced by researchers, such as the lack of time, never enough data, the difficulty to navigate power games with officials, understanding other languages or discussing sensitive topics (Lunn 2014). Some of these challenges will be presented here as they had an impact on how the research was undertaken and led to experience-based adaptation in the field and in the collection of data.

#### ***3.4.1. Unaddressed subjects***

The research covered a significant number of actors and sites. However, the large extent of tuna fisheries in the WIO still generated some gaps. First, while the research has covered three key countries for tuna fisheries in the WIO, it did not cover other countries of the WIO. Those include for example South Africa which has increasingly taken a leadership role within coastal countries at the IOTC or Kenya which has a fairly important tuna port – Mombasa – and a local tuna fishery supported by national actors. The lack of time and resources to have an extended fieldwork was the reason for not covering other countries.

Second, the research has not looked at industrial fisheries undertaken by Asian fleets. At least three well-known Asian DWFNs – Japan, China and South Korea – fish in the national waters of the WIO countries. However, there is a lack of transparency regarding their operation. Their fishing access agreements are not public and they do not land in Madagascar and only some do land in Mauritius and the Seychelles. At the time of the fieldwork, there was no possibility to board landing Asian tuna boats nor interview fishing crew. At the 2018 IOTC meeting that was attended, two representatives of the Korean fleet were in the Malagasy delegation and were approached to ask for an interview. While one of them accepted to be interviewed, the discussion was only general without any details provided on their exploitation in the WIO. For this reason, the thesis is only based on data from the national small-scale and the semi-industrial segments and from the EU industrial fisheries.

Third, a topic that was not the subject of a deep analysis was the extent of “Illegal, Unreported and Unregulated” (IUU) fishing in the WIO region. While the manuscript analyses illegal fishing as an illegal mechanism to access the resources, it does not discuss the extent and impacts of this illegal fishing nor those of unreported and unregulated fishing. The rationale for this is the limited data available at the local and national level of such fishing and also the aggregation of data at the IOTC level which brings all data as for the IO rather than the region or the countries. Therefore, while interviews and reports confirmed that

there is IUU fishing in the WIO, an analysis of the extent of such IUU fishing at the WIO region or at the country level was not possible.

Another task that the research could not achieve was to measure the contribution of tuna fisheries to the food security of coastal communities. As the thesis aims to provide a better understanding of the local implications of tuna fisheries, food security represents an important component. However, such measuring requires a long-standing research in one or more villages that could not be achieved considering the time of the research. During the time of the fieldwork, not enough time was spent in villages to analyse and observe the impact of the fishery on food consumption and food security. Similar kinds of research have been undertaken in Madagascar regarding the impact of wildlife consumption on food security (Golden et al. 2011) or at the global level assessing the contribution of global fisheries to micronutrients intake in developing countries (Hicks et al. 2019). Such results are based on research for several years to collect the data.

As these topics have been challenging to investigate, I chose to focus my effort on deepening knowledge on tuna fisheries in the three countries by exploring the national and EU segments of the fishery, and the interactions of the countries and its people at different levels.

#### ***3.4.2. Investigating sensitive subjects, ‘at home’***

Discussing tuna fisheries with actors at different levels presented some difficulties at times. At the local level, fishers rarely wanted to be identified, including those with very strong narratives. For those who agreed to be named, some did not want their views to be shared with the government. In this instance, fishers were assured that they would be anonymised (as seen in Appendix 1). The issue of anonymity also applied to governmental officials to some extent, as some were critical of DWFNs that are also considered as partners of the coastal countries. To ensure that those officials were not compromised, they have been anonymised in the text of the thesis and in the list of interviewees. Finally, some critical views about coastal countries were also expressed by representatives of DWFNs and their fleets. To avoid pointing fingers, those views were also anonymised in the text. As I come from the region and worked for a marine conservation NGO before doing the PhD, I often faced the issue of acknowledging my position regarding the fisheries. It was at times difficult to dissociate from the home country and the struggles of local fishers or the cause of coastal countries. Interviews with representatives of DWFNs required objectivity and a full consideration of the views expressed without taking sides.

Other challenges also presented themselves and had an impact on how the research was undertaken. The first challenge is common to ‘researching at home’. There is a wide literature on doing research in one’s own country. Difficulties of such research include dealing with prejudices linked to one’s identity or social position, managing subjectivity or navigating local power relations with interviewees (Godbole 2014; Sultana 2007). For my case, being a researcher studying abroad but also originally from the capital city of Antananarivo was at times a burden to carry to the coastal communities. A historicised mistrust of people from the capital tainted my arrival in coastal villages. Despite having a local as a research assistant, it took at least a couple of days for anyone to talk to us. Also, fishers sometimes assumed that we were from the state, policing their fishing activities. It was only after repeated visits to local authorities and known fishers explaining the aim of the research that fishers felt comfortable talking to us. On the other hand, some government officials also required some introduction before they accepted to be interviewed. From a fair assumption that researchers will only come, take what they want and publish it – as it often happened in the past according to them – a few directors visited asked for either authorisation to undertake the research or what I would do with the conversation we were having. A comprehensive explanation was provided and especially providing a clear positionality that I wanted to increase knowledge on tuna fisheries in Madagascar, share local stories and provide information that could contribute to the improvement of the fisheries. With clarity provided, government officials were in the end cooperative, as proven by the authorisation I got to board landing purse seiners with surveyors from the statistic unit in Antsiranana. As expressed by other researchers doing research in their home countries (for example Godbole 2014), one’s position as a scholar from abroad sometimes was seen as carrying the same weight as a foreigner doing the research. However, reflecting on the process, interviewees did want to express their views on the subject which helped the entire process. Encouraging words came from some discussions where senior officials or fishers acclaimed the research and showed pride in contributing to a research undertaken by a researcher from the country.

The second difficulty was the challenge of data accuracy with data provided by fishers. This was due to different factors: first it was the simple fact that in the three countries the languages were different and sometimes the system of measure, too (in Mauritius fishers use pound when they discuss weight). Also, fishers do not always measure catch or revenues in a fixed way. They would navigate between catch per day, catch per fishing trip without mentioning how many times a day they would go fishing. Each time we attempted to have a

consistent way of measuring effort, the fishers would feel uncomfortable and would not know what to respond so we reverted back to what he was more comfortable sharing with us. The catch data presented in the thesis is therefore more illustrative than representative. Again, more time spent in each village would have been needed to build a consistent set of catch effort.

Another challenge was an unexpected one linked to being a Malagasy researcher, studying in Europe and doing research within the WIO and especially in the two neighbouring islands. I have always considered myself as part of the region. Having friends in Mauritius, I consider other islanders of the region as distant ‘cousins’ and was delighted to be able to do my research there. Doing research and especially on fisheries did not always open doors easily in the two islands. This was mainly due to the perception that people in the two islands have of Malagasy people, which is one of low-skilled workers in the textile industry (in Mauritius) and in the tuna cannery (in the Seychelles). An illustration of such perception from the locals was a comment I received from a boy in a café in the Seychelles asking “if you are from Madagascar, why are you not poor?”. Explaining the diversity of people from Madagascar was not always easy or comprehended. To those are added other social misconceptions. At the time of the fieldwork, drug smuggling and prostitution from Madagascar were hitting Mauritius, local newspapers depicted Malagasy women as increasing local prostitution in Mauritius and men as drug smugglers. In the Seychelles, Malagasy women are well known to migrate for marriages. Travelling as a solo woman researcher, I was lengthily questioned at the airport of both countries about the aim of my visit. To board the plane to Mauritius, two airline representatives requested that I provided extra documents to prove my status as a researcher. Entering the Seychelles, which is normally an easy process for any foreigner, was rather difficult and proof was again required by immigration officials that I was a researcher. Those different factors and the confluence of events at the time of the fieldwork did not facilitate the research at the very local level with fishers and intermediaries. During interviews, I was repeatedly asked first if I worked at the tuna cannery in the Seychelles or which factory I was working in Mauritius. Introductions during interviews became rather long and explaining my status as a researcher studying tuna took quite a while to be fully acknowledged. The situation was more challenging with fishers in the Seychelles as they would not understand why I was studying tuna and not solutions to poverty in Madagascar. To those were added subtle jokes from fishers that they had Malagasy girlfriends in the past or that Malagasy wives were more caring than Seychellois ones. A fine balance was needed



between taking the joke, not taking offence, asserting my status and yet trying to build trust to have a productive interview. In the end, the discussions with fishers were productive and I am hoping that encountering another type of Malagasy woman would have broadened a bit more the perception on Malagasy people in the two neighbouring islands.

## CHAPTER 4. TUNA FISHERIES IN THE WESTERN INDIAN OCEAN

The western Indian Ocean (WIO) represents less than 5% of the global ocean, yet it produces around 10% of the global tuna catch and generates more than US\$1,6 billion in revenue from that catch (Coulter et al. 2020; Obura et al. 2017). While small-scale and artisanal fishers have caught tuna as part of their fishing activities for at least three generations, industrial fishing only started in the 1950s. The WIO is considered to be the last frontier for industrial tuna fleets, after resources started to get scarce in the other oceans (Campling 2012b). In this chapter, I will present the tuna fisheries in the WIO both as a region and in the form of three case studies. Providing this background context is key as it allows an understanding of the importance of tuna and how each country has developed its tuna fisheries and related activities. Moreover, it sets the scene for the intricate interactions that take place between the large array of actors.

I focus in particular on three countries, Madagascar, Mauritius and the Seychelles, which are at the centre of the WIO tuna fishery, each having active fishing ports where tuna is landed or transhipped, processing companies and all hosting industrial fishing by DWFNs. As Table 6 shows, the three countries also have different socio-economic and historical contexts and different levels of tuna exploitation<sup>7</sup>.

**Table 6: Key figures on tuna fisheries for Madagascar, Mauritius and the Seychelles**

	Madagascar	Mauritius	Seychelles
Population	25,000,000	1,200,000	97,000
EEZ	1,200,330 km <sup>2</sup>	1,272,765 km <sup>2</sup>	1,331,964 km <sup>2</sup>
National GDP	\$USD 11,5 billion	\$USD 14,2 billion	\$USD 1,5 billion
Tuna fishery's contribution to GDP	<1%	2%	20%
Proportion in volume of national exports	53%	20%	90%
Annual Catch from tuna fishing:			
- Small-scale and artisanal	~100 tons	250 tons	100 tons
- Semi-industrial	~400 tons	250 tons	1000 tons
- Industrial within the EEZ	~10,000 tons	4,300 tons	76,200 tons
Number of fishers:			
- Small-scale/artisanal (all species)	85,000	1,620	2,000
- Semi-industrial (tuna and other pelagics)	42	78	180
- Industrial EU vessels - annually (tuna)	13	0	40
Employment in tuna processing	1,600	750	2,500

Source: Compilation from Breuil and Grima 2014a, 2014b; Caillart et al. 2018; COFREPECHE et al. 2015; IOC 2018b; IOTC 2018a; Marsac et al. 2014; Rakotosoa 2017; SFA 2016; Sea Around Us database; Sweenarain 2012; USTA 2017; World Bank 2017

<sup>7</sup> For the catch data, figures in Madagascar refer to annual catch whereas in Mauritius and the Seychelles they relate to 2016 and 2017 respectively.

**A note on figures used regarding the WIO and the three case studies.**

There is a multitude of grey literature that discusses numbers about the tuna fisheries, especially regarding the catch of different segments of the fishery in the WIO in general and in the three case study countries in particular. At times these data proved confusing and difficult to interpret. However, they were needed to describe the different segments of tuna fisheries in each country.

Regarding the WIO as a region, various reports present figures on the fisheries. However, they do not always refer to a stated year. Numbers that are used to value the fishery or to depict the catch can therefore be misleading. For clarity, I use the year of 2016 as a reference and 2014 when data was not available for 2016. This choice was made as data was available (albeit to varying extents) in different reports and on the IOTC website for these two years, which allowed triangulation.

Regarding the three case study countries, catch data was the most challenging as various reports present different figures and reference years. For that reason, I again chose 2016 as a reference year; and I also used the five-year period of 2012 to 2016. For the catch of national fleets, when I started the research, I first referred to reports of fisheries departments as they distinguished the different segments of the fishery. Those were triangulated with national reports submitted to the IOTC and reports evaluating fishing access agreements, often providing more details on the semi-industrial and industrial segments. In February 2019, the IOTC released a database on historical catch between 1950 and 2017 that gathers data by gear, contracting parties, and EEZ. I used that database to estimate the catch of DWFNs in each EEZ. During the final year of writing this thesis, I also referred to the IOTC database when cross-checking information in national reports that were vague (for example lacking a reference year or not specifying the fishery segment or gears).

The chapter will proceed as follows. Section 4.1 briefly presents the geographic configuration of the WIO and the catch from the region. Sections 4.2, 4.3 and 4.4 go into detail on the three countries studied. This will include a description of key actors in tuna fisheries in each country, including a detailed presentation of each segment – small-scale, semi-industrial and

industrial – of the fishery. This will highlight how different the fisheries are in the three countries but also how the same external actors have been involved in all three countries. The chapter ends with Section 4.5 which presents what I categorise as distant actors. These include industrial fishing companies, civil society organisations and research centres that are active in the WIO and also intergovernmental organisations regional forums where the management of tuna is debated and decided. The section will show that tuna fisheries very much involve distant actors that are not directly involved in the fisheries and that interactions of these actors within the intergovernmental organisations regional platforms shape the management of the fishery and access to the resources.

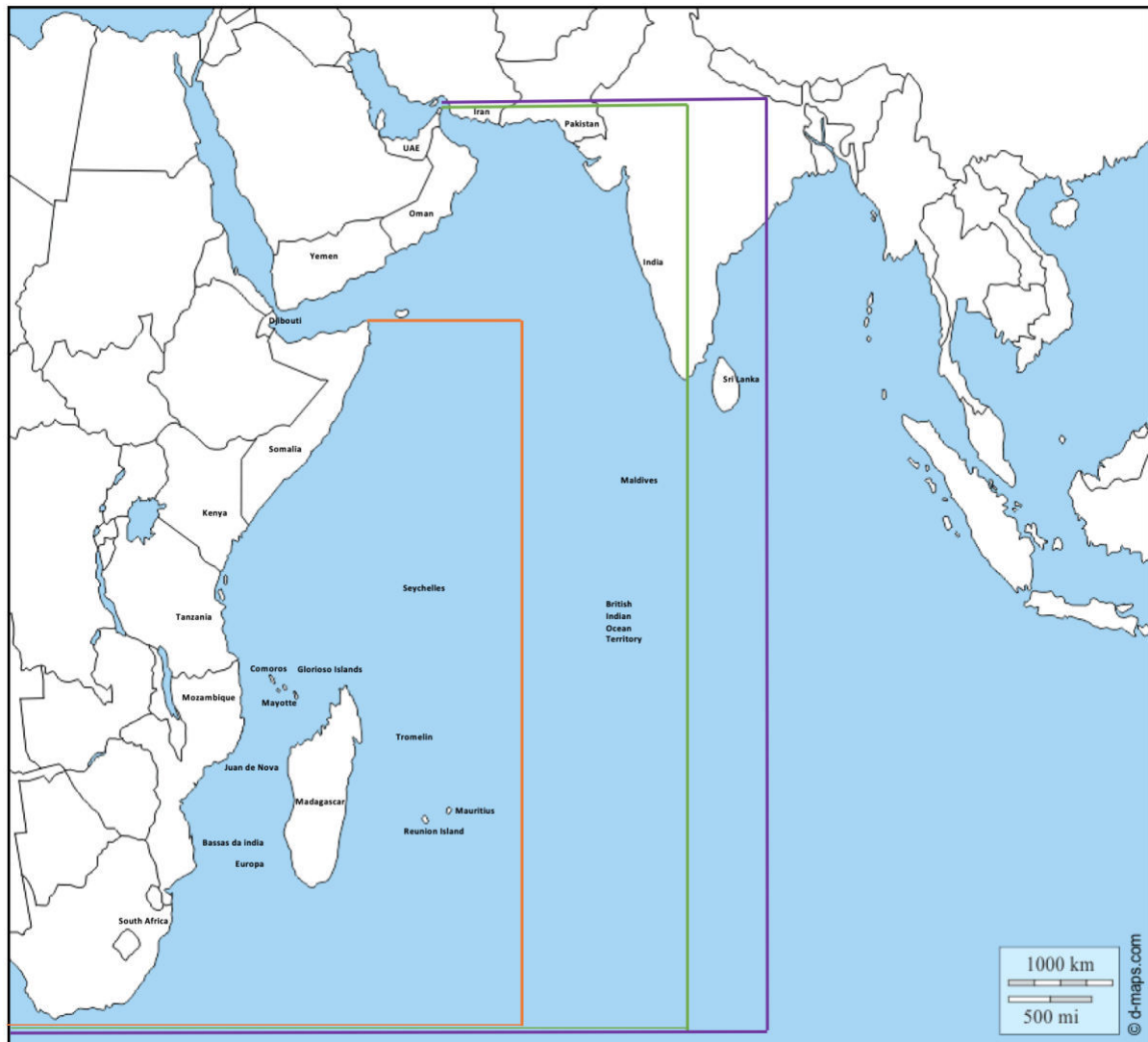
## **4.1. THE WESTERN INDIAN OCEAN REGION**

### ***4.1.1. Geography of the western Indian Ocean (WIO)***

The western Indian Ocean region is typically considered to include the territorial waters and exclusive economic zones (EEZs) of around ten coastal countries as well as a large area of high seas. The determination of which countries belong to the WIO region varies according to the different entities that describe it (**Figure 2**). For the UNEP and WWF, for example, the WIO region includes ten countries – Comoros, Kenya, Madagascar, Mauritius, Mozambique, the Seychelles, Somalia, South Africa, Tanzania, and the French overseas territories (Obura et al. 2017; Paula 2016). Others, such as the FAO or practitioners or researchers, extend this list to include countries like the British Indian Ocean Territory (or the contested territory of Chagos), Djibouti, India, Iran, Maldives, Oman, Pakistan, Sri Lanka, the United Arab Emirates (UAE) and Yemen (FAO 2017; POSEIDON 2014; Walker et al. 2017). The WIO also hosts contested territories assembled under the Scattered Islands in the Indian Ocean or *Îles Éparses* (including the islands of Bassa da India, Europa, Glorioso, Juan de Nova and Tromelin).

To ensure availability of data on tuna fisheries, my use of the WIO countries in this thesis aligns with the wide definition of the WIO (purple limit in Figure 2) covering 19 countries which are Comoros, Kenya, Madagascar, Mauritius, Mozambique, the Seychelles, Somalia, South Africa, Tanzania, Djibouti, India, Iran, Maldives, Oman, Pakistan, Sri Lanka, Yemen, the French and British Overseas Territories and the contested islands.

**Figure 2: Map of the WIO region with countries considered part of the regions**



In orange as used by the UNEP and WWF, in green by the FAO and consultants of POSEIDON, in purple by some researchers. Source: adapted from d-maps.com

#### **4.1.2. The tuna of the WIO**

The region hosts eight main tuna species, of which four are considered key commercial species: albacore, bigeye tuna, skipjack tuna, and yellowfin tuna. The other four main species, namely bullet tuna, frigate tuna, kawakawa and longtail tuna, are considered coastal (or ‘neritic’) tuna and are mainly caught by small-scale fishing. Each species has its own ecological niche, migration behaviour and feeding patterns (**Table 7**). Tuna species are diverse and are present at different depths, distances from the coast and at different times of the year (Dagorn 1994; Nikolic and Bourjea 2013). Due to upwelling along coastal areas and energetic eddy processes, the WIO is an area of biological productivity, favourable for tuna species (Dagorn 1994).

<sup>8</sup> Coloured borders are indicative of coastal countries included, not specific spatial areas

**Table 7: Description of main tuna species found in the WIO**

Common and scientific name	Maximum length, weight and age	Water Depth	Water temperature	Prey
Albacore ( <i>Thunnus alalunga</i> )	1,40m 60,3kg 13 years	0-600m	10°C-25°C	fishes, crustaceans and squids
Bigeye tuna ( <i>Thunnus obesus</i> )	2,50m 210kg 16 years	0-250m	13°C-29°C	fishes, cephalopods and crustaceans
Bullet tuna ( <i>Auxis rochei</i> )	0,50m 1,6kg 5 years	10m and deeper	21°C-30°C	small fishes - particularly anchovies, crustaceans - especially crab and stomatopod larvae, and squids
Frigate tuna ( <i>Auxis thazard</i> )	0,65m 1,7kg 5 years	50m and deeper	27°C - 28°C	small fish, squids, planktonic crustaceans (megalops), and stomatopod larvae
Kawakawa ( <i>Euthynnus affinis</i> )	1,00m 13,6kg 6 years	0 - 200m	18°C - 29°C	small fishes, especially on clupeoids and atherinids; also on squids, crustaceans and zooplankton
Longtail tuna ( <i>Thunus tonggol</i> )	1,45m 35,9kg 18 years	10m and deeper	27°C - 28°C	variety of fishes, cephalopods, and crustaceans, particularly stomatopod larvae and prawns
Skipjack tuna ( <i>Katsuwonus pelamis</i> )	1,10m 34,5kg 12 years	0 - deeper	15°C - 30°C	fishes, crustaceans, cephalopods and molluscs, do cannibalism
Yellowfin tuna ( <i>Thunnus albacares</i> )	2,4m 200kg 9 years	0 - 250m	15°C - 31°C	fishes, crustaceans and squids

Source: Compilation from Collette 2011; Froese and Pauly 2012

Tunas of the WIO are present at tropical and subtropical temperatures (an average of approximately 20°C) though some species like albacore can accommodate colder temperatures for a short period. Some species are deep swimmers (yellowfin, southern bluefin tuna, longtail tuna, adult bigeye) whereas others swim more at the surface and associate with floating objects (skipjack, young yellowfin and bigeye, frigate tuna, kawakawa). Albacore is mostly caught in the Southern Hemisphere especially in the 30-45-degree S regions and across the broader Indian ocean. Bigeye tuna is more abundant in the regions close to the Equator, and regions beyond the WIO, such as those close to Indonesia. Yellowfin tuna mostly concentrates on the western coast of India, and the regions around Madagascar, especially the regions across the Mozambique Channel and the Horn of Africa (FAO 2006; Kaplan et al. 2014).

Some species, such as skipjack or yellowfin, undertake long-distance migration within the region and between oceans. Other species are more sedentary, such as coastal tunas which are found in the national waters of coastal countries (Fonteneau 2010; Nikolic and Bourjea

2013). Scientists attribute the movement of tuna schools to the search for food in a heterogeneous environment. Interactions between tuna schools and their local environment guide their migration and can create complex distributions. Tuna schools use elements from the heterogeneity of their environment such as water circulation, light, temperature and contrast of colours to guide them towards favourable areas and to stimulate their long-distance migration. They move with high sinuosity and low speed in rich feeding areas, and with low sinuosity and high speed in poor feeding areas in order to quickly pass those areas and find better areas of predation (Dagorn 1994).

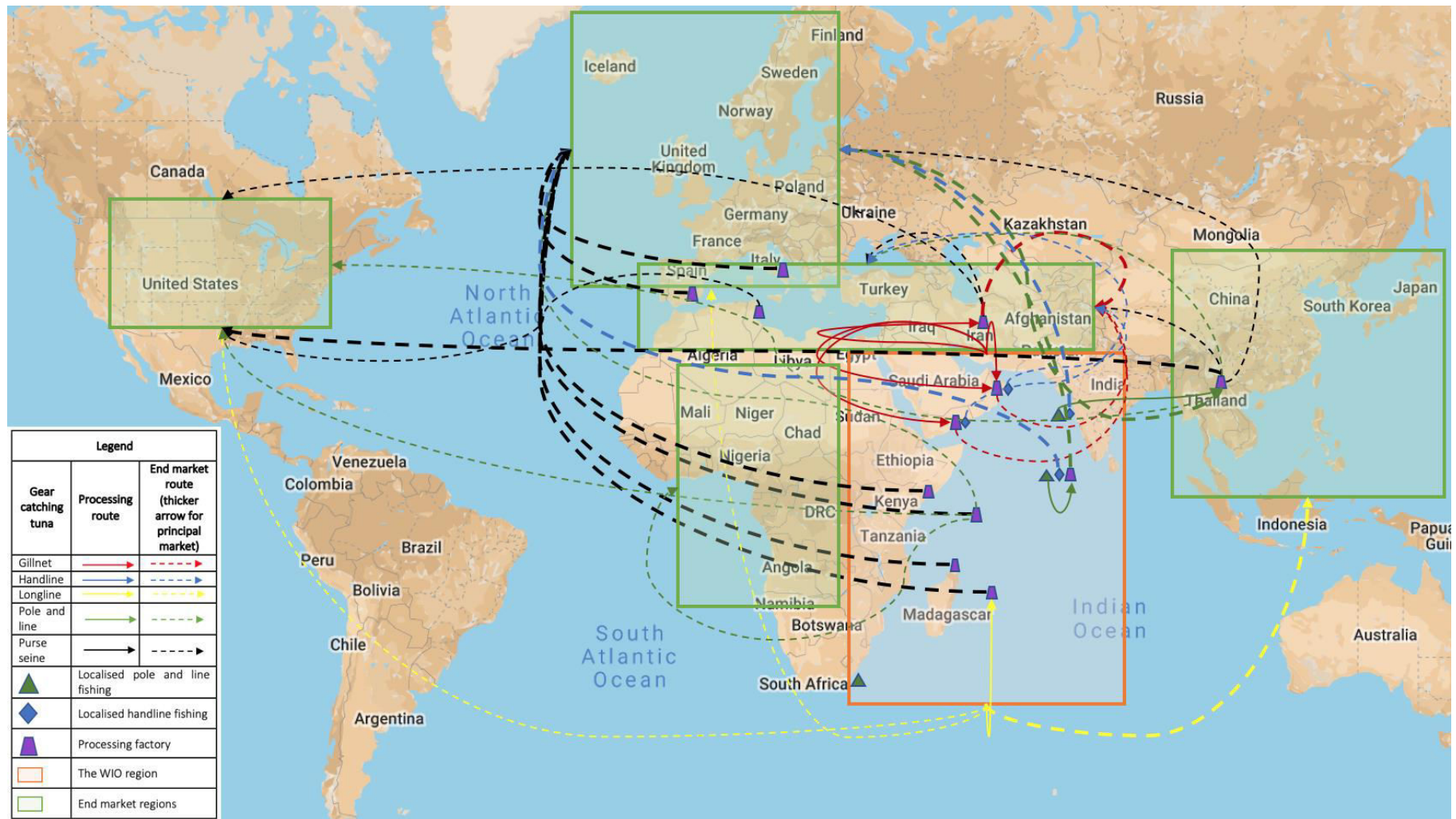
The catch of tuna in the Indian Ocean was estimated at around 700,000 tons in 2016, contributing to approximately 12% of the global catch of tuna (Coulter et al. 2020). Obura et al. (2017) estimate that tuna catch from the WIO (delimited in orange in **Figure 2**, with around ten countries) represents around 80% of the Indian Ocean catch. If we consider a broader geographical delimitation of the WIO than that used by Obura et al. (2017), the EEZs of India, Maldives, and the Seychelles are the most productive in the region, with a total catch of approximately 61,000 tons, 126,000 tons, and 116,000 tons respectively in 2016 for the main commercial species (IOTC 2018a). While all four commercial species are present in the region, the most caught species across the region are skipjack and yellowfin, followed by bigeye tuna. Yellowfin and skipjack tuna represented 88 % of the catches made in the WIO in 2011, with purse seine vessels accounting around half of that catch (van der Elst 2015). Other gears are also used in the region such as gillnets, handline, longline, pole and line and trolling (see description of gears in **Appendix 3**). If compared at the global level, the stock status of the Indian Ocean's albacore, bigeye, and yellowfin is considered as presenting long-term declining trends in biomass along with the Atlantic Ocean bluefin and yellowfin tuna stocks (Gilman 2014; IOTC 2015).

Tuna from the WIO is processed and consumed in coastal countries in the region and also in distant countries. For the three case study countries, the majority of the tuna caught in the EEZs is exported, mainly in the form of cans and other products. The journey of the tuna caught in the WIO can involve different countries until it arrives on consumers' plates (**Figure 3**). Fishing countries include those of the WIO, countries of the Indian Ocean (Iran, Indonesia, or Malaysia) but also DWFNs including countries of the EU (mainly Spain and France – including territories, and to a lesser extent Italy), Japan, South Korea, China, or Taiwan. Processing factories are present in Madagascar, Mauritius and the Seychelles as well

as in Thailand, Iran, Tunisia, Italy, Spain, Kenya, Yemen or Oman. End markets for tuna products caught in the WIO include countries of the WIO for domestic consumption and distant countries like France mainland, Italy, Germany, Spain, the USA, countries of the Middle East, Southeast Asia, Eastern Europe, and Africa mainland. As there is limited information on the tuna exploitation by the Asian fleet, the best known export market of tuna products from the WIO is the EU.



**Figure 3: Production route of tuna from the WIO**



Source: Compilation from Poseidon et al. 20014 (Route of tuna caught by longliners might be underemphasised due to the limited knowledge on the activities of Asian longliners)

The following sections will present the three case study countries and their tuna fisheries, including the different actors and segments of the fisheries involved. The last section will then present the distant actors that are present in the region.

#### **4.2. MADAGASCAR: A SEA OF FISHERS BUT A LIMITED TUNA FISHERY**

Madagascar, the fourth biggest island in the world (more than 580,000 km<sup>2</sup>), has a large coastline of more than 5,000 km and an EEZ of 1.2 million km<sup>2</sup>. With an increasing population of around 25 million, the population living within the thirteen coastal administrative regions represents more than 50% of the country's population (INSTAT 2011). A census by the department of fisheries estimated in 2013 that around 600,000 people lived in fishing villages and that the number of fishers amounted to 245,000 in those villages (MRHP 2013). Socio-economically, Madagascar is much poorer than Mauritius and the Seychelles, with a Human Development Index ranking of 162 (out of 189 countries) in 2019 (UNDP 2019). Having an extensive land mass and coastline along with an array of natural resources, the case of Madagascar's poverty remains a paradox for various scholars. A recent political economy analysis of the country explained that poverty is rooted within political instability through periodical political crises, persistent failure of economic and political strategies to improve the situation and a long-standing marginalisation of the rural population which forms the majority of the country's population (Razafindrakoto et al. 2017).

In this setting, fisheries and especially small-scale fisheries have long received little attention from the state. The contribution of tuna fisheries to the economy is almost 10% of the agricultural GDP but less than 1% of the national GDP (the economy being more focused on agricultural cash crops). The annual tuna production of around 10,000 tons is below the potential of tuna catch estimated at 15,000 tons (Breuil and Grima 2014; USTA 2017). The country has an underdeveloped national tuna fishery mostly composed of small-scale coastal fishing and a handful of semi-industrial boats. The tuna cannery, 'Pêche et Froid de l'Océan Indien' (PFOI) - a private company based in Antsiranana, represents the main asset of Madagascar linked the tuna exploitation in the region, followed by its boat repair company, the SECREN.

### ***4.2.1 Key players***

#### **A vast number of local fishers**

For clarity, I have divided local fishers in Madagascar into three types: small-scale fishers that undertake fishing in a ‘traditional’ way by pirogues; those that are part of a fishing crew on a larger wooden artisanal boat (**Illustration 8**); and fishers that work on semi-industrial vessels.

It was estimated in 2012 that there were around 85,000 fishers (those fishing with traditional pirogues and larger wooden boats) who supported 245,000 people in the country (MRHP 2013). Spread across the coastal administrative regions, a significant majority of fishers are located on the west coast. No fishers specialise in tuna in Madagascar. Instead, most fishers merely target tuna when it is the tuna season. However, some villages are well known for their tuna fishing activities. Three of those villages (Amborovy, Ramena and Ste Luce) were visited for the fieldwork. According to the national census of 2012 (MRHP 2013), fishing was the sole activity of 85% of fishers nationwide and only 15% had a secondary activity. This corresponds to the reality observed in the field where fishers interviewed involved in tuna fishing had fishing as their sole livelihood. Within fishing communities, the household size is of four to six members. The age of fishers varies considerably in Madagascar, based on what was observed in the field. The majority of fishers were in their mid 20s, but some fishers – the more experienced - were 50 years old or more. Boat owners that were also fishers were in their mid-40s or more. Tuna fishing is mainly an activity undertaken by men, apart from in the north of the country where women actively take part in fishing. In all the villages visited, however, women played roles as intermediaries, boat owners or as the person in charge of the sale of catches. Most fishers have gained their fishing skills from their elders and have been involved in fishing from a very young age. Due to the degradation of the socio-economic context in general, migration from cities also takes place and brings new fishers from the city to coastal villages. Locals in the three fishing villages visited explained that many new people arrived from the city to become fishers as there was no job for them elsewhere. A fisher interviewed in Ramena, originally from the city, explained that he used to work as a security guard for a bank in the city, lost his job and as he could not find other opportunities he came to the village to fish as part of a fishing crew.

Very little information is available about semi-industrial fishers. Information regarding this segment is limited to its catch (as presented in section 4.2.2). Attempts to meet with boat owners and semi-industrial fishing companies during the fieldwork did not succeed so the profile of these fishers is difficult to establish. There are two fishing companies in the country (REFRIGEPÉCHE EST and SPSM) that have 7 semi-industrial vessels and employ fishing crews. While both are national companies, principally owned by Malagasy interests, they both have French shareholders and are often led by French nationals (APOI 2016; [GAPCM website](#)) (APOI 2016). Both companies target various species of deep-sea and offshore fish, and not only tuna. While they do not specialise in tuna fishing, the companies catch, process, sell and export tuna.

According to the national legislation of Madagascar, all fishers should register with the state, have a fishing card and register their boat and fishing gear. While the registration process is well known by most small-scale fishers, registration was mainly done by those who owned boats or sold fish. The rest were not registered as they considered themselves as part of fishing crews that did not require registration. In the case of semi-industrial fishers working for a fishing company, registration is not necessary as crew members are hired under an employment contract (MD 10<sup>10</sup>).

Another type of Malagasy fisher – while not fishing locally but comes from different parts of the country – is the one that works as a seaman on European purse seiners. While they do not fish within the territorial waters, they fish within the Malagasy EEZ under a work contract with fishing companies. Around 13 Malagasies works as seamen on Spanish and French vessels every year (Caillart et al. 2018).

### **A diversity of intermediaries**

Intermediaries play a key role in the supply chain of tuna in Madagascar, especially in the small-scale segment of the fishery. Intermediaries can be categorised into five groups. First, there are representatives of local fishing companies, fish shops or associations that come to collect the fish from landing sites. That was the case in Ste Luce where a representative of an exporting company (Le Martin Pêcheur SARL) came every day to collect the fish; and in Toamasina where a representative of a fishing association (TAZARA) was in charge of

<sup>9</sup> REFRIGEPÉCHE EST is described on the following page: <https://www.gapcm.org/refrigepeche-est/>

<sup>10</sup> This is a code for an interviews. Interviews were coded according to where they took place, namely Madagascar (interviews coded as MD), Mauritius (coded as MU), the Seychelles (coded as SE), Bangkok (coded BK) and online by Skype (coded as SK) (see **Appendix 1** for full list)

buying and selling the fish. Secondly, there are individuals who are long-term contacts of fishers and who buy the fish. In Ste Luce such individuals walked 15 to 20km to sell the fish in more remote areas inland (**Illustration 2**). Thirdly, there are fishers' wives who buy the fish from their spouse and sell it to the local markets or to their regular clients. Various women met in Ramena and Amborovy had such a role. They were usually also in charge of managing the finances linked to the fishing including managing budgets for repairs, crew members' salaries and equipment (MD 25, MD 63). Fourthly, there are boat owners. In all sites studied, some intermediaries also owned boats and fishing gear. The price of the fish is agreed in advance and intermediaries have exclusivity of the catch. Boat owners called 'patrons' take care of the whole supply chain from funding the construction of boats, recruiting fishing crew members and having a member of their team in charge of selling the fish at fish markets or to individual clients. The fifth type of intermediary is applicable only to Antsiranana: the stevedores. They work on landing European purse seiners to sort out the fish and unload it to the cannery. They also buy or get offered bycatch fish from the purse seiners. The bycatch concerned consists of either small or damaged tuna that are not taken by the canneries or non-tuna species. Every evening when there is a landing, stevedores sell the fish outside the port to other intermediaries and to local residents. A typical landing evening in Antsiranana port consists of around a hundred men and women waiting for the fish to be brought by stevedores out of the port. These tunas also go from the port to local markets or is transported inland to remote villages through intermediaries.

**Illustration 2: Intermediaries (second type) in Sainte Luce**



Photo by the author

### **An underused cannery**

There is one tuna processing company in Madagascar, the cannery called PFOI (Pêche et Froid de l'Océan Indien). It is based in Antsiranana. The cannery was built in 1990 with financial assistance from French companies (Gilbert and Rabenomanana 1996). PFOI is owned by both the state and French interests. The main shareholder is the French holding “Thunnus Overseas Group” (TOG), a tuna processing and distribution group that processes, packages, and sells canned tuna. The holding is based in France and has two processing companies, one in Madagascar (PFOI) and one in Ivory Coast (SCODI). PFOI’s cannery has a capacity of processing 160 tons of raw tuna/day and a capacity of 15,000 tons in its cold storage. As of 2017, it was estimated that PFOI took 25,000 tons of tuna/year from European purse seiners fishing in the Indian Ocean or in other oceans. This represents less than half of its processing capacity. The cannery employs approximately 1600 people, of which 80% are women (It is the main employer in Antsiranana). Tuna is landed at the port of Antsiranana (in front of the factory).

The cannery exports its products mainly to the EU. In terms of products, it makes frozen loins or pouches<sup>11</sup> for other processing companies in France, Italy, Spain or Greece as well as cans and pouches for restaurants and other food businesses via wholesalers in France, Italy, UK, Belgium, Netherland Luxembourg, Germany, Spain, Greece and Morocco (**Illustration 3**). A smaller part of its production is sold as cans for supermarkets in France and Germany. PFOI’s tuna brand is ‘Pompon rouge’. It exports, annually, and in all sizes, 20,000,000 units in cans, 4,000,000 units in pouches, and 400,000 units in frozen loins. The cannery also produces fishmeal with tuna waste.

<sup>11</sup> Tuna pouches are vacuum-sealed tuna in different forms, weights and brands according to the client’s requests and needs.



### **Illustration 3: Sample of PFOI products**



Photo by the author

### **A decentralised government with structures in place for tuna fisheries**

As of January 2020, tuna fisheries are managed by the Ministry of Agriculture, Livestock and Fisheries (‘Ministère de l’Agriculture, de l’Élevage et de la Pêche’). Prior to that, between 2011 and 2019, they were managed by the Ministry of Fisheries, i.e. a ministry dealing exclusively with fisheries. Every change of government has brought different names to the Ministry and with a change of government in 2019, it was re-merged with the Ministry of Agriculture and Livestock again. Activities of departments linked to fisheries are funded by the state budget including through revenues generated by fishing access agreements and licences (developed in Chapter 6). Management of tuna fisheries takes place at two levels: the national level and the regional level. At the national level, there is a Division of Tuna Fisheries (‘Division Pêche Thonière’) mainly in charge of the industrial and semi-industrial segments, administering fishing access agreements and licences. The small-scale tuna fishing is managed by the General Directorate of Fisheries and Aquaculture (‘Direction Générale de la Pêche et de l’Aquaculture’). Regarding the regional level, Madagascar is divided into 22 regions of which 13 have coastal access. Each of these coastal regions has a Regional Directorate representing the Ministry and is in charge of providing licences and permits, registering fishers and their gears and monitoring fishing activities.

For tuna fisheries specifically, the Ministry also has a Statistic Unit (Unité Statistique Thonière d’Antsiranana – USTA) based in Antsiranana within the Regional Directorate, by the landing port of Antsiranana. The USTA was originally created by the Ministry in

collaboration with the French National Research Institute for Development (Institut de Recherche et de Développement – IRD). The IRD trained surveyors and developed protocols to monitor the catch of European purse seiners' landings in Antsiranana. The same protocols of catch monitoring are used in the Seychelles where the IRD assists the Seychelles' Fisheries department's statistic unit. Since 2017, the USTA has attempted to open other offices to record and monitor local catch including in the towns of Mahajanga and Tolagnaro. As of October 2018, the offices were not operational yet, with surveyors waiting to receive their training (MD 107).

Another important department within the Ministry is the Monitoring, Surveillance and Control division (Centre de Surveillance des Pêches – CSP). The CSP is in charge of the surveillance and control of the EEZ of Madagascar. Established in 1999 it has the mission to conduct fisheries monitoring and control operations at sea, ashore and in the air. It has three large vessels to undertake surveillance of fishing activities in the EEZ and seven speed boats for surveillance of activities within territorial waters. The CSP was originally funded by the EU and the French Agency for Development and is currently funded mainly by the state budget<sup>12</sup>. The CSP also enforces laws and regulations regarding activities linked to fisheries that are undertaken on land. This includes checking licences and permits for transport and sale of fish. In the WIO region, the CSP is an active actor in undertaking regional surveillance. For example, two of the CSP's vessels are often used for regional patrolling missions within the WIO region, organised by the Indian Ocean Commission.

#### ***4.2.2. The segments of the tuna fishery***

##### **A diverse small-scale and artisanal tuna fishery**

The small-scale tuna segment in Madagascar is a multi-gear and multispecies one. While most fishers catch tuna when it is the season, during the fieldwork it was observed that some fishers invest more means into tuna fishing activity. Tuna fishing, compared to fishing for other species, tends to involve more time at sea, longer distances and specific equipment.

The main species caught by the small-scale tuna segment are neritic tunas, and more specifically frigate tuna, bullet tuna, kawakawa and longtail tuna. During specific months, big tuna are also caught, such as yellowfin tuna, albacore or skipjack tuna. A few fishers interviewed and presented with the pictures of tuna species mentioned that they catch bluefin

<sup>12</sup> At the time of the writing (2019), the information came from the shrimp producers association "Groupement des Armateurs à la Pêche Crevetrière de Madagascar" (GAPCM) website at <https://www.gapcm.org/gouvernance/>



tuna on very rare occasions and especially in the south of the country. Neretic tunas – locally called ‘bonit’ – are considered as present most of the year, but more plentiful in the periods July to October and March to April. Commercial tunas – locally called ‘ampoho’, ‘loako thon’ or ‘lamatra’ – are also present between March and April, which is also the season for tuna in the Mozambique Channel.

The main vessels used by the small-scale tuna segment are wooden pirogues and wooden boats between 2 and 15 metres. These are built locally. Fishers that use wooden pirogues catch tuna only by chance and usually fish alone or with another fisher. They go for one or two fishing trips per day, at sunrise and sometimes at night. They use trolling with one to three lines. On a good fishing trip, fishers may catch up to ten tunas of around 15 kg each trip. Those that use larger 8 to 15m wooden boats target tuna when it is the season and have crews of 8 to 15 fishers. In the north of Madagascar, this type of tuna fishing involves one or two fishing trips per day; fishing nets are used (a practice that is contested by the regional fisheries department as the use of small meshes is prohibited by the Fisheries Code); and during tuna season and on a good fishing trip, a fishing crew can catch from 250 kg to a ton of tuna (MD 24, 25, 26). On the west coast of Madagascar, fishing using a larger wooden boat involves fishing trips lasting one to three days; trolling is used; and on a good trip during tuna season, catches can be up to 1,5 tons (MD 51, 52, 69). In Toamasina, a fleet of fibre glass boats of around 10 metres also catch tuna along with other species such as snappers, jacks and red mullet. The boats were donations by the Japanese government to the local fishing association called TAZARA. Fishers on the fibre glass boats use trolling and go for day trips. During the season, these fishers catch up to 500 kg of fish in one boat, per trip (MD 94, 96, 97).

There has been limited data regarding the extent of catches of small-scale fisheries, especially those fisheries’ catches of tuna. This is due partly to the limited capacity of the government to collect data given the large number of fishers and the large size of the country. However, it is also due to the lack of disaggregation of species of tuna and associated species in existing catch monitoring (MD 71), with the result that tuna and associated species are often lumped together, for the purposes of official data, under a single generic “tuna” label. As an illustration of catch data, a monitoring of tuna catches in three villages in the North of the country by the surveyors of the USTA during 6 months in 2016 described a total catch of only 18 tons of tuna (USTA 2017).

### **A limited semi-industrial segment**

While Madagascar has a high number of small-scale fishers and boats, its semi-industrial segment is the least developed compared to Mauritius and the Seychelles. With only 7 vessels in 2018, the semi-industrial fleet mainly fishes in the northeast of Madagascar, within the EEZ. The vessel sizes are around 12 metres and use longline or drifting longline as fishing techniques. Although the fleet belongs to nationally based fishing companies (SPSM and REFRIGEPECHE EST), those companies have to conclude access agreements with the state. The agreements have similar terms as private agreements with DWFNs (developed later in section 4.5) apart from the access fee, established at a different price.

The semi-industrial fleet reports its catch to the USTA periodically and is required to do so in order to have its licences renewed (MD 10). The number of hooks deployed by the fleet in the past 15 years has been fairly stable at around 650,000 every year apart from in 2012 where a substantial decrease in effort and catch was noticed (USTA 2017). Species caught include tuna – albacore, yellowfin and skipjack – for about 50% of the catch volume, followed by swordfish, sharks and other species. The annual catch rate is estimated at 0,76 tons/1,000 hooks. The USTA reports that the catch in this segment averages around 500 tons every year (USTA 2017). Fishing is undertaken all year although the highest catches are between September and March, with a peak in December. The different species caught are processed by the fishing company concerned and is then sold nationally, as well as to La Reunion and Mauritius, in the form of pouches, filets and cubes, either fresh or frozen.

### **A dominant industrial sector with foreign interests**

The industrial exploitation of tuna resources in the waters of Madagascar started with Japanese research in 1954 on tuna. In October 1960, 30 Japanese ships and several Chinese ships were looking for albacore tuna around Madagascar (Crosnier 1961). More research took place in the 1970s, led by The National Oceanographic Research Centre (CNRO) a state-affiliated research centre, around Nosy-Be and Mahajanga. While the exploration targeted tuna in general, yellowfin tuna constituted more than 80% of the catch in Mahajanga during the research period of one year. In 1971, there was fishing exploration by a Japanese company (KGKK) followed by a Japanese-Malagasy cooperation company (COMANIP) (Gilbert and Rabenomanana 1996). In the 1980s, the European fleet entered the Malagasy EEZ and started fishing tuna under fishing access agreements. In the early 1990s, a regional western Indian Ocean Tuna Association was created (see Chapter 7). As part of a project to establish a regional WIO tuna fleet, a vessel operated by the Seychelles and funded by the

European Commission also fished in the national waters. However, the project lasted five years and did not manage to bring substantial quantities of catches (MD 55). Since these explorations, Madagascar has not managed to have a national or flagged industrial tuna fleet.

The industrial segment in Madagascar is now undertaken mainly by DWFNs, through fishing access agreements (**Table 8**). In 2017, six countries were fishing in the waters of Madagascar: Spain, France, South Korea, Taiwan, Japan and Malaysia (USTA 2017). Vessels flagged to the Seychelles and Mauritius were also fishing in the EEZ. While Spain and France access the EEZ through a public access agreement between Madagascar and the EU, some of its operators have private agreements with the Malagasy government. These are not accessible to the public. Private agreements are made with associations such as JAPAN TUNA, ANABAC and OPAGAC or with fishing companies such as Interatun and Dae Young fisheries. In 2017 and 2018 and according to surveyors interviewed on site, only Spanish vessels were landing in Madagascar, the rest preferring to land in Mauritius or the Seychelles (MD 48).

The USTA estimates that the annual catch of tuna by the industrial fleets in the Malagasy EEZ is around 10,000 tons per year, of which the majority is caught by Korean and Taiwanese longliners (6,000 tons in 2016) (mostly albacore, yellowfin and bigeye tuna) and a minority is caught by European purse seiners (2,600 tons in 2016) (mostly skipjack, yellowfin and albacore). The remaining 1,400 tons were caught by European longliners, Japanese and Malaysian fleets (USTA 2017). The purse seiners are present in the Malagasy EEZ mainly between March and June in the Mozambique Channel whereas the longliners are present between October and March especially in the eastern and southern parts of the EEZ. The USTA also records the quantity and species caught as bycatch by purse seiners landing in Madagascar. It reports that an average around 500 tons of bycatch is landed every year. Within this the species caught include a mix of undersized or damaged skipjack and albacore, various non-commercial tuna species, frigate tunas, bonitos, triggerfish, barracuda, and sharks (USTA 2017).

**Table 8: List of fishing access agreements concluded by Madagascar in 2016**

Party to the agreement	Flag state	Type of agreement	Type of vessels	Vessels authorised in 2016	Active in 2016
European Union	Spain and France	Public	Purse seiners	40	23
			Longliners	54	24
Dae Young Fisheries	South Korea/Taiwan	Private	Purse seiners	4	1
		Private	Longliners	82	74
Japan Tuna	Japan	Private	Longliners	20	4
ANABAC	Seychelles/Mauritius	Private	Purse seiners	7	7
OPAGAC	Seychelles/Mauritius	Private	Purse seiners	1	1
Interatun	Seychelles/Mauritius	Private	Purse seiners	3	3
Islanders Ventures	Malaysia	Private	Longliners	15	3

Source: Data I collected from a public presentation by the Ministry of Fisheries in 2017.

To conclude section 4.2, it can be said that the small-scale segment is vast and important to the livelihoods of thousands of fishers and their families. However, there is a very limited knowledge still on the extent of the catch despite ongoing efforts of the state to collect the data. The semi-industrial segment is underdeveloped due to the limited number of vessels active in the fishery. The industrial segment, which covers the majority of tuna catch in the Malagasy EEZ, consists mainly of DWFNs, especially Asian longliners.

#### **4.3. MAURITIUS: FACILITATED INFRASTRUCTURE AND INSTITUTIONS FOR TUNA EXPLOITATION**

Mauritius is ranked 66th in the 2019 Human Development Index report (UNDP 2019). Despite its small land mass of 2,040 km<sup>2</sup>, Mauritius has a large EEZ of 1,272,787 km<sup>2</sup> within which two territories – Tromelin island and the Chagos archipelago – are contested with France and the UK respectively. Mauritius has a strong economy. Its GDP is 10 times higher than its neighbour the Seychelles, mainly through the high development of its tertiary sector focused on services provision (Sellström 2015, UNDP 2019). With a population of just over 1,200,000 in 2018, Mauritius is well known for its diversity with people originating from India, Madagascar, China and Europe. Mauritius also has the history of having been colonised sequentially by the Dutch (1598-1710), the French (1715-1810) and the British (1810-1968). It gained independence in 1968 and since has had a relatively stable political environment characterised by political alliances amongst different parties (Sellström 2015).

The tuna fishery forms the basis for local fish processing industries and is a valuable contributor to the country's economy. Tuna is consumed locally and by tourists and is also imported frozen for canning and then re-exported. Revenues from the fishery contribute to less than 2% of the GDP as the country's economy focuses on the tertiary sector of services.

With a production from the fishing of around 4,000 tons/year, tuna constitutes around 20% of exports in volume (COFREPECHE et al. 2016; GoMU 2017). The tuna fishery is much more developed than in Madagascar with a better-equipped small-scale fishery and a larger semi-industrial fleet. Mauritius also provides the main transshipment port (Port Louis) for longliners operating in the WIO.

#### **4.3.1. Key players**

##### **A few but vocal tuna-specialised local fishers**

Local tuna fishing is carried out principally on the western part of the island out of key villages such as Rivière Noire, Tamarin, Bain des Dames, Tombeau Bay or Pointe aux Sables where there are well-known tuna fishers. During the fieldwork, we were often redirected to meet or wait for a specific fisher who is well known for tuna fishing. In 2006, it was estimated that there were around 2,300 registered small-scale fishers in Mauritius of which 764 were using line as a fishing gear (line is one of the gears used to catch tuna, notably handline and longline) (GoMU 2011). A project document dated 2016 estimated that 350 local fishers were engaged in tuna fishing (IOC 2016b). Some tuna fishers of Mauritius hold leadership positions either as heads of cooperatives or as advocates for small-scale fisheries. One of them for example, based at Bain des Dames, has been in several television documentaries about tuna fisheries in the Indian Ocean and the role of artisanal fishers. Another one, in Tombeau Bay, is the head of a fishing cooperative.

##### **An array of trading companies and intermediaries**

According to the government database, there are three Mauritian companies that trade tuna that is landed or transhipped in Mauritius. Those are IBL International, Mer des Mascareignes and Island Marine Enterprises Ltd. The first two are associated with canneries in Mauritius (described further below). There is limited information regarding the third one. However, a news piece<sup>13</sup> about a dispute over Japanese vessels fishing illegally around Tromelin indicates that the company is “Asian” and catches tuna in the waters of Mauritius. Two other companies were found through an online search of Mauritian seafood companies and tuna (Interview requests were sent to the two companies concerned but without any positive response.). They are Coruscan Seafood Ltd and Hassen Taher Seafood Ltd. Both companies have processing facilities in Mauritius and also work as traders of seafood

<sup>13</sup> Article in L'Express.mu titled “Giichi Onda Chairman of Islands Marine Enterprise Ltd”, published in October 2004. Available at <https://www.lexpress.mu/article/giichi-onda-chairman-islands-marine-enterprise-ltd>

including tuna at the national level. They source their fish through imports but also from catches of longliners and local catches of small-scale fishers.

At the local level, there are individual intermediaries who collect tuna from artisanal fishers. These are called by the artisanal fishers prior to landing. Intermediaries use the tuna in three ways: by selling to private individual clients, by selling to hotels or by keeping it in their own cold storage. This last method according to an interviewee is very profitable when tuna is abundant because when it is out of season, the tuna stored sells at a higher value. Two other types of intermediary, similar to Madagascar, are boat owners who collect the catches from the fishers they hired and wives of fishers that buy the fish from their spouses and then sell it in small shops (**Illustration 4**) or to their usual individual clients. Three local intermediaries were interviewed during the fieldwork and although they do not trade only tuna, they asserted that tuna provided a good revenue when it was the tuna season. One interviewee, involved in selling at the market for the past 30 years, stated that tuna added up to approximately 20% of his annual revenue (MU 08).

**Illustration 4: An intermediary and fisher’s spouse in Tombeau Bay**



Photo by the author

**Well-established processing companies**

Mauritius has been an attractive place for investment including for tuna processing companies, mostly due to the facilitated administrative procedures that the government offers and also due to its socio-political stability. In the fiscal year of July 2016 to June 2017, Mauritius exported a total of 46,074 tons of tuna products mainly in cans (37,183 tons) but also in jars (628 tons) and in pouches (8,263 tons) (GoMU 2017). Until 2015, there were two main processing companies in Mauritius: Princes Tuna and Thon des Mascareignes.

Princes Tuna is a subsidiary of the British group Princes Ltd, which is part of the Japanese multinational company Mitsubishi. Originally established with the assistance of Japanese investments in 1972 as Mauritius Tuna Fishing and Canning Enterprises, the cannery was bought by Princes Ltd in 1999 and rebranded as Princes Tuna (PT). With an original investment of 12 million GBP (Campling 2012a), it has grown to be the largest single employer in the country with more than 4,000 employees (COFREPECHE et al. 2015). Skipjack and yellowfin tuna are the main species processed by PT. The cannery imports tuna from various oceans including the Indian Ocean. Tuna provided by purse seiners comes mainly from the Spanish fishing companies Albacora and Echebatar (ibid). PT produces mainly canned tuna, with a capacity of approximately 800,000 cans per day (Havice and Campling 2018). Most of their products (around 70%) are exported to the UK and the rest to the EU and US markets (ibid). PT also produces tuna in loins for the EU and US markets.

Thon des Mascareignes (Tdm) was established in 2005 by the Mauritian company Ireland Blyth Ltd (IBL) - which owns 75% of the cannery – and by the Spanish fishing company Pesqueras Echebatar – owning 25%. The factory produces products other than just canned tuna, including tuna meat in pouches and glass jars and semi-finished products to be used by other canneries (COFREPECHE et al. 2015). The cannery employs around 750 people and has the capacity to process 200 tons per day (Campling 2012a; Havice and Campling 2018). Albacore, skipjack and yellowfin tuna are the main species processed by Tdm and it exports its products to the EU including for supermarkets in Spain, Italy and France as well as the US.

In early 2015, PT and Tdm merged into one as Princes Tuna Mauritius (PTM) to position themselves more competitively in the global tuna industry (Undercurrentnews 2014). PTM is majority owned by Princes Ltd. With its two factories, PTM produces around 500 tons a day of tuna mainly in cans (280 tons) and loins and pouches (210 tons) (COFREPECHE et al. 2015).

At the time of the fieldwork (2017), there were three other companies known to process tuna in the country: Mer des Mascareignes (Mdm), Pelagic Process and JLR Fisheries. Mdm is a joint venture between IBL and the French fishing company SAPMER. The factory specialised in dry frozen tuna at -40 and -60 degrees that are aimed for the Asian market. The tuna is fished by SAPMER vessels (7 vessels flagged to France and Mauritius) and is frozen on board. Species processed include yellowfin, bigeye, albacore and skipjack and products include tuna in tins or pouches for the Asian and EU markets, especially French supermarkets

in contract with SAPMER (MU 26). On the company's website<sup>14</sup>, MdM estimates its production as being around 3,600 tons of finished products. Pelagic Process (PP) is not solely focused on tuna. While incorporated as a Mauritian fishing business, PP is part of the Dale Capital Group, a holding company working in Sub-Saharan Africa in various sectors. PP operate longliners in the Mauritian EEZ which catch albacore, bigeye and yellowfin tuna. Products are exported mainly for the EU market and include frozen and packaged whole fish, loins, cubes and steaks (Pelagic export international website<sup>15</sup>; Seafood hub website). JLR Fisheries<sup>16</sup> has Mauritian-flagged longliners that fish albacore, bigeye and yellowfin and sells tuna products in the form of chilled or frozen whole, halves, loins, steaks or portions. According to its website, JLR Fisheries has diverse distribution markets including the EU, the US, the Gulf region and Asia.

### **Government agencies favourable for tuna exploitation**

Tuna fisheries are managed by the Ministry of Ocean Economy, Marine Resources, Fisheries and Shipping. Considering its much smaller size compared to Madagascar and the size of the fishing industry, Mauritius have a more centralised system for the management of fisheries including tuna. While important decisions are taken within the fisheries division of the Ministry such as the conclusion of fishing access agreements or the allocation of grants and allowances to fishers, the operational activities linked to tuna fisheries management are undertaken by two key entities: the Seafood Hub and the Albion Fisheries Research Centre (AFRC).

The Seafood Hub, while not an official sub-division of the Ministry, is a key part of it. It is a joint public-private sector initiative and works as a "one stop shop service" for trading, processing and distribution of seafood (according to the Seafood Hub website). It includes in one building various divisions in charge of the administrative procedures for the loading, unloading and export of fish and fish products. It also includes subsidiary services such as ship chandlery, bunkering, vessel husbandry, ship agency, ship building and repairs. Through the Seafood Hub, industrial vessels can, in one place, obtain the necessary permits, land, have their catch processed and have their vessels repaired. The Seafood Hub also hosts the division of Monitoring Control and Surveillance and the Port state Control Unit which undertakes inspection of fishing vessels that land and tranship at the port.

<sup>14</sup> <http://www.mdm.mu/en/company>

<sup>15</sup> <http://pelagicexp-intl.com/portfolio-items/big-eye-tuna/?portfolioCats=6>

<sup>16</sup> <https://fisheriesjlr.com/products/pelagic/tuna>



The AFRC, based in the coastal village of Albion, is a research centre established in 1981 with the support of the Japanese government. Amongst its activities, the AFRC is in charge of monitoring small-scale fishing activities as well as catches from industrial vessels. For this monitoring, the AFRC has surveyors that collect data from local landing sites and in cold stores for the industrial and semi-industrial segments. The research centre also has the task of undertaking stock assessments and producing reports for the IOTC committees and commission. The Vessel Monitoring System (VMS) Monitoring Centre is also based at the AFRC and is in charge of the monitoring of fishing activities of local and foreign licensed fishing vessels in the EEZ of Mauritius.

A branch of the Ministry that is relevant to local-level tuna fishing is the Fisheries Training and Extension Centre (FiTEC) which has as one of its objectives to develop off-lagoon fishing and the training of fishers. The FiTEC aims “to provide basic knowledge and skills to new entrants for a career in the fishing industry” and “to upgrade knowledge and skills of fishermen to operate in the off-lagoon area” (according to its description on the Ministry’s website). One of the training courses of the FiTEC is FAD fishery (fishing using Fish Aggregating Device) training which encourages fishers to target pelagic fishes including tuna through the use of FADs. The deployment and monitoring of FADs off the lagoons are also part of the tasks of the FiTEC.

#### ***4.3.2. The segments of the tuna fishery***

##### **A limited but resourceful artisanal segment**

Local tuna fishing in Mauritius is considered artisanal fishing takes place along the western part of Mauritius from the north around Trou aux Biches to the Southwest at Le Morne. Fishers state that the Southwest is especially favourable for tuna as it has good sun that warms the water. The fishing is often undertaken in a team composed of two to three other fishers in one boat. Crew members are relatives, neighbours or friends from the same village.

Typical fishing vessels are fibre glass boats between 8 and 12 metres with engines from 8 to 25 horse power (GoMu 2011). In 2016, it was estimated that tuna fishing was undertaken by a total of 115 small-scale fishing boats (IOC 2016b). Fishing techniques include handlines and longlines and the use of FADs set up by the FiTEC. Fishers have GPS devices that also have the coordinates of FADs. Fishing trips last around 12 hours with tuna fishers preferring to leave early morning around 3-4 am and landing at around 4-5 pm.

The catch composition varies according to the season. According to the fishers interviewed, albacore is caught between November and January while skipjack and yellowfin are abundant between March and June. These periods also correspond to the seasons during which the industrial vessels are present in the Mauritian EEZ (Kaplan et al. 2014). Fishers describe that during the tuna season, they might catch between 3 and 15 units of fish amounting sometimes to a total of 200kg, per day. The total annual catch of the small-scale segment was evaluated at 250 tons in 2014 (IOC 2016b).

### **A developing semi-industrial fleet**

Semi-industrial fishing in Mauritius started with experimental longlining for tuna, which also caught swordfish, between 1986 and 1988. The segment is composed of a fleet of longliners of 13 to 24 metres. Mauritius has increased its semi-industrial fleet from 6 longliners in 2016 to 13 in 2019 (Sheik Mamode et al. 2018). This increase of the semi-industrial fleet in Mauritius is a less well-known story in the region. However, during the fieldwork, it was not possible to observe any landings by longliners nor interview any longliner fishing crew or fishing companies' representatives.

The increase in number of semi-industrial longliners has increased the fishing effort. Around 250,000 hooks were deployed in 2011 inside the Mauritian EEZ, the number has increased to more than 950,000 hooks in 2017 (Sheik Mamod et al. 2018). The semi-industrial fleet operating outside the Mauritian EEZ also increased its effort from around 300,000 hooks in 2016 to more than 700,000 in 2017 (ibid). In 2017, the Mauritian longline fleet undertook 69 fishing trips and spent 824 days at sea (ibid). The semi-industrial longliners mainly catch Swordfish (38% of the catch) followed by yellowfin (29%), bigeye (12%) and albacore (6%) with the remaining 15% consisting of billfishes, sharks and dolphinfish (Sheik Mamod et al. 2018).

In 2015, the catch of the semi-industrial segment was estimated at 250 tons. By 2018, the catch had increased to 821 tons (IOC 2016b; Sheik Mamode et al. 2018). Four vessels belong to the Mauritian fishing company Pelagic Process, and others belong to joint ventures between Mauritius and holdings based in East Africa (IOC 2016b). Most vessels operate inside the Mauritian EEZ, but three operate in the EEZ of Mozambique.

### **A foreign-interest led industrial sector**

Industrial fishing in Mauritius started in 1979 with a Mauritian-flagged purse seiner, and then with two more vessels until 1997 when the vessels were sold off. Mauritius started granting

fishing access to DWFNs in 1989. The industrial fleet can be divided into two categories: Mauritian-flagged purse seiners and foreign-flagged longliners and purse seiners. The composition of the catch of the industrial longliners is mostly albacore followed by bigeye and yellowfin tuna. Catches of purse seiners are yellowfin, skipjack and bigeye tuna.

Regarding the Mauritian-flagged purse seiners, these vessels are operated by Spanish or French fishing companies, notably Albacora or SAPMER. In 2013, Mauritius reflagged two purse seiners that catch skipjack, yellowfin and bigeye. In 2018, two vessels were still active. In terms of catch, in 2016, the catch of the two Mauritius-flagged purse seiners was estimated at 11,722 tons (Mootosamy et al. 2017). This catch figure includes tuna caught within the Mauritian EEZ and across the WIO region.

Regarding the foreign-flagged longliners and purse seiners, they are present in the Mauritian EEZ under fishing access agreements (**Table 9**). In 2014, around 40 purse seiners and 104 longliners were fishing in the EEZ (COFREPECHE et al. 2015; Shung and Sheik Mamode 2019). The longliners undertook 167 fishing trips, totalling almost 6,000 days at sea (Shung and Sheik Mamode 2019). The fleets are mainly operated by Taiwanese, French and Spanish fishing companies (COFREPECHE et al. 2015). According to IOTC data, the total tuna catch in the Mauritian EEZ by the foreign industrial fleet in 2016 was an estimated 1,683 tons for longliners and 2,629 tons for purse seiners (IOTC 2018a).

The port of Port Louis is a hub for landing and transshipping by longliners and reefers. Reefers are carrier vessels that transport frozen tuna from the Seychelles and also take the catches from the Asian longliners. Tuna longliners fishing in the Mauritian EEZ land and tranship mainly albacore. In 2016, of a total of 847 vessel calls at port, 671 were by longliners and only 10 were by purse seiners (GoMu 2017). European vessels usually stop at Port Louis to perform maintenance or repair and to unload catches. There were also purse seiners registered in Mayotte which land their catch, mainly from the Seychelles, into Mauritian canneries (Oceanic Development and MegaPesca 2011).

**Table 9: List of fishing access agreements concluded by Mauritius in 2014**

Party to the agreement	Flag state	Type of agreement	Type of vessels	Vessels authorised	Active in 2014
EU	France and Spain	Public	Purse seiners	27	27
			Longliners	16	16
Seychelles	Seychelles	Public	Purse seiners	25	9
Japan	Japan	Private	Longliners	2	2
Fishing company	France	Private	Purse seiners	1	unknown
Fishing company	Spain	Private	Purse seiners	9	unknown
Fishing company	Korea	Private	Purse seiners	1	1
Fishing company	Indonesia	Private	Longliners	6	6
Fishing company	Malaysia	Private	Longliners	5	5
Fishing company	Taiwan	Private	Longliners	74	70
Fishing company	Comoros	Private	Handliners	5	5

Source: COFREPECHE et al. 2015:67

To conclude section 4.3, there is an active tuna fishing in Mauritius, in the three segments of the fishery. There is a limited small-scale segment, the semi-industrial fleet is increasing and Mauritius is a key country for transshipment by the Asian fleet and for tuna processing. Mauritius has also developed its industrial fleet by flagging European operated vessels.

#### **4.4. SEYCHELLES: THE WIO CENTRE FOR TUNA EXPLOITATION**

Seychelles, like its neighbour Mauritius, is classified as a country with high human development, ranked at 62 in the Human Development Index (UNDP 2019). With a small population of just over 97,000 inhabitants in 2018, the Seychelles has a small land mass of 457 km<sup>2</sup> spread over an archipelago of 116 islands, and an extensive EEZ of 1,3 million km<sup>2</sup>. It is a fairly new nation that gained independence in 1977 after British colonisation between 1908 and 1976. The population of the Seychelles has mixed origin from Africa, Madagascar, India, China and Europe. It is also well known for its high number of migrant workers (8,6% in 2010) and tourists (up to 350,000 in 2017)<sup>17</sup>.

In the Seychelles, tuna fisheries are at the centre of the economy. In 2011, tuna fisheries constituted approximately 20% of the GDP as well as more than 90% of exports (Marsac et al. 2014). the Seychelles has an important semi-industrial tuna fleet, and a small-scale fishery that catches tuna without targeting it. In 2015, the tuna catch in the Seychelles' EEZ was estimated at around 60,000 tons (SFA 2016).

The economy associated with tuna fishing activities began to develop from the 1980s with the improvement of port infrastructure at Victoria as a result of fishing agreements (Campling

<sup>17</sup> Population data: <https://www.populationdata.net/pays/seychelles/>

2012a; Martín 2011). In the early 1980s, the Seychelles opened access to its EEZ to other countries' fleets, mainly to the Soviet Union. In the mid-80s, other countries, including Japan, South Korea, France and Spain, joined while vessels of the Soviet Union began to decline. Today, Spain and France achieve the highest catches. Fish processing started in the late 1980s. The Seychelles plays a key role in the tuna fisheries of the WIO, having the most important port for the purse seine vessels to land and tranship as well as being in the middle of tuna fishing grounds.

#### **4.4.1. Key players**

##### **Experienced local fishers**

Local fishers in the Seychelles can be divided into two categories: those engaged in small-scale or artisanal fishing and those involved in the semi-industrial segment. Small-scale fishers do not target tuna; their preferred catch is mainly composed of demersal and small pelagic species. During the tuna season, however, they also catch tuna. The number of small-scale fishers in the Seychelles has been estimated at around 2,000 in 2014 of which more than half-use handline which can catch tuna (Breuil and Grima 2014b). The small-scale fishers in Seychelles currently face the challenge of declining stocks due to increased fishing efforts in the past 20 years (Robinson et al. 2020). With smaller scale vessels having more difficulty to fish in offshore grounds, the tuna season can bring additional catch.

In contrast to Madagascar and Mauritius where semi-industrial fishing is undertaken by fishing companies, in the Seychelles individual fishers own semi-industrial vessels. A handful of Seychellois boat owners and fishers have been involved in tuna fishing for more than 15 years at the same time as doing more general artisanal fishing. Three of them were interviewed during the fieldwork. They have family members, friends or members of their villages that take part as crew members. The rest of the semi-industrial boat owners are fairly new to tuna fishing, involved in the fishery in the past 7 years. They are either artisanal fishers that upgraded to semi-industrial vessels or local entrepreneurs that invested in the semi-industrial segment. Oceana Fisheries, a processing company, has also invested in some semi-industrial vessels. The newly arrived boat owners employ a mix of Seychellois and Sri Lankan crew for tuna fishing.

Seychellois fishers and crew members have to register as fishers with the Seychelles Fishing Authority (SFA) and are then able to access subsidies from the state, such as a fuel

reimbursement scheme, sickness benefits, concessions and loans. Sri Lankan crew members are managed by the boat owner under a work contract.

Another type of Seychellois fisher is the ones who work as seamen on purse seiners. They do not fish within the Seychelles banks. Instead they often fish within the Seychelles EEZ under work contracts with foreign fishing companies. In 2014, 45 Seychellois worked as seamen on 16 Spanish vessels and 29 French vessels (SFA 2014).

### **Processing companies as key to the economy**

There are two types of processing companies in the Seychelles: the main cannery that produces tuna cans; and the processing companies that specialise in other types of tuna products, such as sashimi grade tuna or tuna by-products.

Indian Ocean Tuna (IOT) is one of the largest canneries in the world, with a production of 1,5 million cans of tuna per day (Havice and Campling 2018). Established in 1987 as ‘Conserveries de l’Océan Indien’ (COI) with investment from French manufacturers and the Seychelles government, the cannery was bought in 1995 by Heinz in a joint venture agreement with the Seychelles government (Campling 2012a). Heinz invested heavily in the cannery to increase its processing capacity, which is estimated at an annual 70,000 tons (POSEIDON et al. 2014). In 2010, Heinz brands were bought by Thai Union, a key actor in the global seafood business with USD 4 billion in seafood sales in 2017 (Havice and Campling 2018). IOT processes 20% of the tuna that passes through the Seychelles with the rest being transhipped (POSEIDON 2019). IOT employs around 2,500 people and is considered the largest single employer in the Seychelles, although, in 2014, it was estimated that 70% of this workforce was made up of foreign nationals (Goulding 2016; SFA 2014). The IOT cannery has two subsidiary companies, one that makes fishmeal using the cannery’s by-products and bycatch from the fleet, and one that extracts fish oil from tuna heads (POSEIDON 2019).

There are two well-established Seychellois companies that also process tuna, along with other species. Those are Oceana Fisheries and Sea Harvesters. They have been present in the market for the past 20 years. Both companies have arrangements with specific semi-industrial vessels and process the tuna catch either for the local market or for the export market. They are the principal trading companies for tuna that is not canned. They also take bycatch species such as dorado, kingfish, sailfish or other pelagic species from purse seiners. According to an interview with a representative from Sea Harvesters, the company exported

around 400 tons of frozen fish in 2016 with the catch mainly exported to the US, the EU, Japan and other Asian countries. According to its website<sup>18</sup>, Oceana Fisheries exports to the EU, China, southeast Asia, the UAE and La Reunion. Clients of the company in the local market are mainly branded hotels in the Seychelles. Tuna products that are exported are sold as whole or packaged in loins, steak or cubes<sup>19</sup>. Until other companies became established to process tuna, Oceana Fisheries and Sea Harvesters were dictating the pricing of tuna from the artisanal and semi-industrial segments (SE 15, 45).

At the newly built port of Providence, two other processing companies have recently been established with funding assistance from the EU. One is Ocean Basket which processes bycatch species from purse seiners and exports them to the non-EU market in the form of dried fish (POSEIDON 2019). The other one is Fresh Seafood, established in 2016. It takes catches from the semi-industrial fleet and exports to the US, the UK and Reunion Island (SE 44).

Seychelles also has individual intermediaries, who take the catch from fishers and resell it at the local markets to individual clients or to hotels. During the time of the fieldwork, one of these intermediaries was spotted at the local port but he was not available for an interview. Some small-scale fishers were also met at the local market where they directly sold their tuna catch of the day.

### **An administration well designed for tuna exploitation**

Two entities are key to the management of tuna fisheries within the Government of the Seychelles. First, there is the Ministry of Fisheries and Agriculture which is in charge of establishing policy and legislation such as the National Food and Nutrition Security Policy and The Fisheries Act. The Ministry is also in charge of international relations with other countries, for example when it comes to concluding agreements with other countries regarding fisheries trade agreements.

Second, there is the Seychelles Fishing Authority (SFA). This is the implementing arm of the Ministry and the main governmental actor for tuna fisheries. Established in 1984, the SFA is a parastatal organisation with autonomous legal and financial status. Its functions include issuing fishing authorisations, data collection and analysis, fisheries research, policy

<sup>18</sup> <http://www.oceanafisheries.com/en/export>

<sup>19</sup> <http://www.oceanafisheries.com/product/yellow-fin-tuna/>

development and planning and fisheries infrastructure development (SFA website<sup>20</sup>). Another important activity of the SFA is monitoring, control and surveillance. There is a monitoring and evaluation system between the Ministry and the SFA with the latter planning and implementing actions that are reported regularly to the Ministry (SE 12). The SFA gets its funding directly from the Ministry of Finances with a program-based approach determining its budget (SE 12). The SFA plays a key role in providing management advice to the Ministry as well in generating revenue for the state through the negotiation of fishing access agreements and flagging arrangements.

Another entity, the Seychelles Ports Authority (SPA), plays a significant role in tuna fisheries. It is in charge of managing the industrial fishing port in Victoria especially by ensuring that transshipment and landing operations take place efficiently. Transshipment is made between tuna vessels and reefer vessels or tuna vessels and containers. The SPA manages the landing of fish including the offloading of tuna into containers that go straight to the cannery. The SPA charges 4 Euros per metric ton for transshipment and 3 Euros per metric ton for landing of fish (Anon. 2017).

The government of the Seychelles has also invested in a Maritime Training Centre. The Centre was originally built in 1979 as the Seychelles Maritime Academy with funding from the French government. The centre aims at providing “quality maritime training and professional qualification for participants with international standards leading to career paths in the maritime and related industry” (Tertiary education commission website<sup>21</sup>). During interviews, fishers stated that young Seychellois, although they know about Centre, were not interested in professions linked to fisheries. Due to this situation, the Centre has not had much impact on the development of the local workforce in fishing jobs.

#### ***4.4.2. The segments of the tuna fishery***

##### **An artisanal segment mainly catching tuna along with other species**

The small-scale fishery, also called artisanal fishery in the Seychelles, is a multi-gear and multi-species fishery. The fishing is undertaken by fibre glass boats of 5 to 15 metres, usually whalers, outboard or schooners with outboard engines and using mainly handline and trolling as the fishing technique. Some boats have echo sounders and GPS devices. Around 400 artisanal vessels are active annually in the waters of the Seychelles: 425 were operating in

<sup>20</sup> <http://www.sfa.sc/index.php/about-us/our-activities>

<sup>21</sup> <https://www.tec.sc/seychelles-maritime-academy>



2015 (SFA 2016). Artisanal fishers operate around the Mahé Plateau and the Amirantes Plateau, as well as on the offshore banks, around the southern Coralline islands.

The artisanal fishing effort has been evaluated as rather stable in the Seychelles with no significant increase over the years. The Seychelles is suffering from a crisis of lack of fishers despite the presence of the Maritime Training Centre. Two boat owners and fishers (SE 15, 45) explained that the problem lies in the fact the young Seychellois do not see fishing as profitable enough and perceive it as requiring too much effort, especially regarding days needed at sea.

The artisanal catch consists mainly of demersal fish such as snappers, groupers, emperors, bourgeois or mackerels. Fishers catch tuna as bycatch, especially during tuna season. The tuna catch often consists of small skipjack tuna and neritic tuna such as frigate and bullet tuna, all considered as “bonitos”. At times, yellowfin or bigeye tuna also get caught by the lines of fishers but rarely. From interviews with fishers, tuna season especially for yellowfin and bigeye tuna is between November and June. While the total artisanal catch was estimated at around 3,200 tons in 2015, only 103,6 tons was bonitos and 116,2 tons other pelagic species (SFA 2016). 50,604 days at sea was recorded in 2015 for the handline fishery (ibid). The catch of the artisanal segment is sold at local markets or hotels. Some fishers also have contact with trading companies that take the fish at an agreed price.

### **A recent and fast growing semi-industrial sector**

The semi-industrial fleet in the Seychelles is composed of longliners from 14 to 22 metres long that catch large pelagic fish, mainly tuna and swordfish. Semi-industrial fishing in the Seychelles started in 1995 with a trial using an exploratory longline vessel of the Seychelles Fishing Authority. The number of vessels increased until the beginning of the 2000s, whereupon it drastically decreased in 2002 due to fishing products from the fleet not meeting EU quality standards and so not being able to access the EU market (Marsac et al. 2014). In 2006, the Seychelles had one semi-industrial vessel (ibid). The increase in semi-industrial vessels is fairly recent. As of 2016, the fleet was composed of around 30 vessels (SFA 2016). Five of these are also fishing other non-pelagic species on the Mahé Plateau. The others are solely doing offshore semi-industrial fishing, not fishing within the Mahé Plateau (ibid). Each fishing trip lasts around 10 days and the majority of the crew is Sri Lankan. The fleet concentrates on fishing for swordfish and tuna off the Mahé Plateau, but without going beyond the EEZ of the Seychelles. Through discussion with long-term fishers involved in the

semi-industrial segment, they stated that production is at its best between September and June (SE 19, 50). There has been a significant increase in fishing effort, proportional to the increase in the number of vessels. 400,000 hooks were deployed in 2013 compared to more than 2,000,000 in 2017 (Assan et al. 2018). The 2018 report of the Seychelles to the IOTC showed that despite this increase of effort, the catch rate was variable and dropped from 0,66 tons/1,000 hooks in 2013 to 0,57 tons/1,000 hooks in 2017 (ibid).

Swordfish used to be predominant in catches of the semi-industrial fleet followed by yellowfin and bigeye tuna, until 2015. The catch ratio used to be 60/40 of swordfish/tuna (Martín 2011). Since 2015, yellowfin replaced swordfish and became the dominant species caught, as more than 50% of the catch, followed by bigeye tuna and swordfish (SFA 2016). Up until 2015, the catch was estimated at an average of 400 tons per year (IOC 2016b). By 2017, the catch increased to more than 1,000 tons (Assan et al. 2018). The catch is generally refrigerated and exported to the EU (France, Italy and the United Kingdom) and, to a lesser extent, to Japan and the US (Martín 2011).

#### **A national industrial segment fueled by foreign fishing companies**

Industrial fishing in the Seychelles started in the early 1980s with exploratory fishing. First there was Japanese longline prospecting in 1978, then two pole and line vessels funded by the French government in 1979 which failed to operate efficiently and then the arrival of purse seiners, French ones in 1980 followed by Spanish ones in 1983 (Marsac et al. 2014). After three failed attempts of having its own fleet in the 1980s, due to lack of financial and human resources, the Seychelles mainly concluded fishing access agreements. Then, in the 2000s, the Seychelles started to flag (flagging will be developed in section 4.5) around 25 foreign-owned purse seiners and longliners (ibid). The contemporary industrial fleet of the Seychelles belongs to foreign fishing companies of DWFNs mainly France, Spain, Taiwan and Japan. Flagging allowed the Seychelles to generate flagging revenues from Asian longliners and European purse seiners operating in the Seychelles EEZ and beyond. It also brought investment from the European fleets into Victoria port. Through flagging, DWFNs increased the number of vessels in their fleet without being subject to effort restrictions from the EU and less subject to IOTC measures (as developed in Chapter 7).

The number of the Seychelles flagged vessels has increased over the years from 7 purse seiners in 2013 to 13 in 2017, and from 33 longliners in 2013 to 48 in 2017 (Assan et al. 2018). Purse seine fishing activity focuses mainly on skipjack and yellowfin tuna whereas

longline vessels target tuna that are present at a certain depth, like bigeye tuna but also yellowfin tuna. Industrial tuna fishing takes place almost all year round in the EEZ of the Seychelles, especially March to June for the purse seine activities and the rest of the year for both types of fishing (Kaplan et al. 2014). Accordingly, the fishing effort has increased for the fleet, from less than 2,000 fishing days in 2013 for purse seiners to more than 3,000 in 2017 and from 23 million hooks to 35 million for longliners (ibid).

The Seychelles purse seiners' catch has increased from just above 57,000 tons in 2013 to more than 120,000 tons in 2017. In 2017, 69,994 tons of skipjack were caught (representing 57% of the total catch) followed by yellowfin (41,711 tons), bigeye (9,761 tons) and albacore (56 tons) (Assan et al. 2018). The annual catch rate has not increased substantially between 2016 and 2017, with 31,69 tons/fishing day to 36,36 tons in that period. The purse seine fishing takes place within the EEZ of the Seychelles and across the WIO region from the Mozambique Channel to the Horn of Africa. For the catch inside the EEZ only, the purse seine catch in 2016 was estimated at around 29,000 tons by the IOTC (IOTC 2018a). Purse seiners operate mainly around FADs (97% of the catch) and to a very limited extent on free schools (3%) (Assan et al. 2019).

For the Seychelles longline fisheries, the catch has not increased significantly despite the increase of vessels. While just over 11,000 tons were caught in 2013, the catch increased to just below 15,000 tons in 2017. Bigeye tuna used to dominate the catch in the longline fishery with more than 6,000 tons caught in 2013 followed by yellowfin, swordfish, marlin and shark. In 2017, the major composition of catch was a mix of albacore, sailfish, skipjack and mackerel, amounting to a total of 4,400 tons (representing 30% of the catch) followed by bigeye tuna (3,897 tons) and yellowfin (3,423 tons) (Assan et al. 2018). The annual catch rate of the longline fleet varied between 0,49 tons/1000 hooks in 2013 to 0,42 tons in 2017 (ibid). The longline fishing takes place within the EEZ of the Seychelles and across the WIO region including in the southern part and along the Horn of Africa. For the catch inside the EEZ only, the longline catch in 2016 was estimated at around 4,000 tons by the IOTC (IOTC 2018a)

In addition to its flagged vessels, the Seychelles has also concluded fishing access agreements that provide access to the Seychelles EEZ to DWFNs. The agreements are concluded with governments (e.g. China, EU, Japan and Mauritius) or directly with fishing companies and associations (e.g. some Asian companies) (**Table 10**). Under these agreements, the catch by the foreign purse seine fleet in the Seychelles EEZ in 2016

amounted 71,300 tons while the catch by foreign longliners totalled 8,500 tons (IOTC 2018a).

**Table 10: List of fishing access agreements concluded by the Seychelles in 2015**

Party to the agreement	Flag state	Type of agreement	Type of vessels	Vessels authorised in 2015	Active in 2015
EU	France, Spain and Italy	Public	Purse seiners	30	30
China	China	Private	Longliners	19	19
Mauritius	Mauritius	Public	Purse seiners	2	2
Japan	Japan	Private	Longliners	2	2
TTA and TFI <sup>22</sup>	Taiwan	Private	Longliners	85	85
Fishing company	Thailand	Private	Longliners	2	2
Fishing company	Indonesia	Private	Longliners	1	1
Fishing company	Tanzania	Private	Longliners	1	1
Fishing company	Philippines	Private	Longliners	1	1

Sources: Breuil and Grima 2014b; POSEIDON 2019:22; SFA 2016

To conclude section 4.4, the Seychelles is considered to be at the centre of the WIO tuna fishery not only for its productive EEZ but also for its important processing companies and the contribution of the industry to the national economy. This place of the Seychelles was built progressively and was facilitated by a government that has promoted the tuna industry since independence and the continued interests of fishing companies and investors in the fishery. The development of its semi-industrial fleet and the considerable number of the Seychelles flagged vessels illustrate how the country has promoted the development of the fishery.

## 4.5. DISTANT ACTORS

### 4.5.1. Distant Water Fishing Nations, their fishing firms and fishing associations

DWFNs and their fleets play a central role in tuna fisheries in the WIO. They record important levels of catch and have also invested in the development of the different processing companies and infrastructures (**Figure 4**). Foreign fleets cross the different EEZs of the WIO countries. While the waters of the Seychelles are the most visited, the fleets also pass through the EEZs of the two other islands.

<sup>22</sup> TTA stands for the Taiwan Deep-sea Tuna Longline Boat Owners and Exporters Association (TTA) and TFI for Top Fortune Agreement (TFI).

**Figure 4: Timeline of involvement of DWFNs in the WIO**

1952-1954	Experimental fishing by Japanese longliners in the WIO
1972	Cannery established in Mauritius with Japanese investment
1974	Pole and line trial in Madagascar by Japanese companies
1979	Pole and line trial in the Seychelles by French companies
	Purse seiner trial in Mauritius by French companies
1980	Mauritius and the Seychelles start flagging DWFNs vessels
1982	The United Nations Convention on the Law of the Sea is signed
1980-1983	Arrival of French and Spanish purse seiners in the WIO
1986	First access agreement between the EU and Madagascar
1987	First access agreement between the EU and the Seychelles
	First access agreements between Japan and Madagascar
	Cannery established in the Seychelles with French investment
1989	First access agreement between the EU and Mauritius
1990	Cannery established in Madagascar with French investment
	Regional WIO purse seiner funded by the EU
	Start of reciprocity agreements between Mauritius and the Seychelles

Source: compilation from Campling 2012b; Gilbert and Rabenomanana 1996; Marsac et al. 2014

The EU fleet plays an important role in the WIO and in the Indian Ocean in general. It records the highest catch amongst all fleets, estimated at more than 210,000 tons in 2016 in the Indian Ocean (IOTC 2018a). The EU fleet consists mainly of Spanish and French fleets, and at times the Italian fleet. The Spanish and French fleets in particular have dominated the catch since their arrival in the WIO in the 1980s (Campling 2012b). The Spanish fishing companies are gathered under two producers' associations, OPAGAC and ANABAC while the French ones gathered under the fishing association ORTHONGEL (**Table 11**). Producers and fishing associations represent and defend the interests of tuna vessel owners to their government and to various regional fisheries management organisations. They also manage the use quotas amongst fleets and aim to improve fishing methods and conditions of sale of tuna products of its members. They can also contract private agreements with coastal countries in addition to their fleets being part of the EU agreement. That is for example the case for ANABAC in Madagascar. To increase catch but also competitiveness, intricate interactions take place between fishing firms, producers associations, processing companies, brands and the governments of coastal islands. These relationships and processes will not be analysed in this thesis and have been developed in the various works of other scholars (see for example Campling (2012a), (2012b); Havice and Campling (2017)). Fishers on EU

vessels are a mix of Europeans and crew members from ACP countries. In 2014, it was estimated that 344 EU nationals were employed on tuna vessels under EU fishing access agreements in the WIO and 308 nationals from third countries (Goulding 2016).

**Table 11: European producers’ associations, active in the WIO, as of 2015**

Fishing associations	Fishing company	Vessel flags	Number of vessels active in 2015
OPAGAC	Albacora Group	Spain and the Seychelles	30
ANABAC	Inpesca	Spain and the Seychelles	
	Atunsa		
	Echebatar		
	Pevasa		
ORTHONGEL	Compagnie Française du Thon Oceanique (CFTO)	French and Mauritian	15
	Saupiquet		
	SAPMER		
	Industria Armatoriale Tonniera	Italian	1

Source: Campling 2012a; SFA 2016

The next group of DWFNs that has an important place in the WIO tuna fishing is the Asian one. However, since they rarely land in the region, there is limited information available regarding their operation. According to the IOTC data, the tuna catch of China – including Taiwan, Japan and South Korea combined in 2016 was at around 99,600 tons in the Indian Ocean (IOTC 2018a). The Asian fleets fish in the WIO mainly through fishing associations and also directly through fishing companies. Two fishing associations have fishing access agreements with countries of the region: Japan Tuna Fisheries and Taiwan Deep-sea Tuna Longline Boat Owners and Exporters Association. Three fishing companies are also known to operate in the region: Dae Young Fisheries (South Korean), Top Fortune (Taiwanese) and Top Marine International Trading (Taiwanese). The more recent scrutiny that Asian fleets have been under due to poor labour standards and cases of slavery has led to various reports that show notably that Asian fleets are often composed of nationals from Philippines, Indonesia, Cambodia, Vietnam and China (Yea 2014).

For the case of Mauritius and the Seychelles, the flag of convenience system blurs the identification of the national and foreign fishers. While both countries have flagged purse seiners and longliners, all the purse seiners are operated by French or Spanish fishing companies. The fishers are then principally Europeans (French or Spanish) and to a limited extent from the three island countries. For the longliners, these are operated mainly by Taiwanese fishing companies. In 2015, the Seychelles industrial longline fleet was operated

by the Taiwanese company Top Fortune (SFA 2016). Here the fishing crew does not include any nationals from the WIO region.

#### 4.5.2. Civil Society Organisations (CSOs), NGOs and research centres

An array of organisations is active in the WIO. **Table 12** describes key organisations involved in tuna fisheries and which were also encountered during the time of the research process.

**Table 12: Main organisations active in the WIO region on tuna fisheries.**

Organisation	Description	Samples of activities on tuna in the WIO
Federation of artisanal Fishermen of the Indian Ocean - FPAOI	Association of small-scale fishers in the Indian Ocean	<ul style="list-style-type: none"> <li>• Promotes the interests of small-scale fishers at IOTC through statements</li> <li>• Gathers small-scale fishers in the region for workshops and exchanges on management and valorisation of tuna resources</li> </ul>
Greenpeace	Non-profit campaigning on diverse issues including biodiversity, ocean, energy or agriculture	<ul style="list-style-type: none"> <li>• Campaigned against tuna brands in Europe that sourced their tuna from the Indian Ocean</li> <li>• Made documentaries about tuna fisheries</li> <li>• Concluded an agreement with Thai Union for better management of tuna fleets supplying Thai Union</li> </ul>
International Pole-and-line Foundation - IPNLF	Non-profit promoting pole and line as well as handline fisheries and aim to increase the market share of sustainably and equitably caught pole and line tuna	<ul style="list-style-type: none"> <li>• Supports the G16 group at IOTC</li> <li>• Supports countries like Maldives and Indonesia for the MSC certification of their pole and line and handline fisheries</li> <li>• Makes position statements calling for particular actions before IOTC meetings</li> </ul>
International Seafood Sustainability Foundation - ISSF	Association of tuna branded processors, NGOs and scientists promoting tuna conservation, bycatch reduction, illegal fishing and capacity management	<ul style="list-style-type: none"> <li>• Provides various guidelines and workshops for a sustainable tuna exploitation</li> <li>• Makes position statements calling for particular actions before IOTC meetings</li> </ul>
Marine Stewardship Council - MSC	Non-profit implementing and promoting the MSC certification program	<ul style="list-style-type: none"> <li>• Certification body that has certified fisheries in the WIO including the Spanish Echebstar tuna fisheries in the Indian Ocean and the Maldives pole and Line fishery</li> </ul>
PEW Charitable Trusts - PEW	Global research and public policy organisation with a large portfolio including environmental, health, state and consumer policy initiatives	<ul style="list-style-type: none"> <li>• Published key reports on FADs and the value of tuna including in the Indian Ocean</li> <li>• Promotes the use of biodegradable FADs in the Indian ocean</li> </ul>
World Wide Fund for Nature - WWF	Environmental non-profit working on forests, oceans, wildlife, food, climate & energy, and freshwater and addressing issues linked to markets, finance and governance	<ul style="list-style-type: none"> <li>• Partner in a tuna fisheries improvement plan in the Indian ocean led by the Seychelles with Spanish and French fleet</li> <li>• Established a platform for CSOs and private sectors involved in tuna fisheries</li> <li>• Supports IOTC members on proposals</li> <li>• Makes position statements calling for particular actions before IOTC meetings</li> </ul>

Sources: Organisations' websites and personal observation

Other actors that play a non-negligible role in the WIO tuna fisheries are the researchers that are mandated by the DWFNs to monitor the fisheries and the evolution of tuna resources in the Indian Ocean. These are from the Institut de Recherche pour le Développement (IRD) for the French fleet and the Instituto Español de Oceanografía (IEO) for the Spanish fleets. Both research centres have offices in the Seychelles, with the IRD based at the SFA offices. In addition to monitoring the activities of DWFNs fleets (level of catch and management of FADs for example), the researchers are also active at the IOTC working parties. The IRD has also been pivotal in setting up the catch monitoring procedures that surveyors in Madagascar, Mauritius and the Seychelles are using as well as their training. IRD-based researchers have published reference works that are used within the IOTC for example on the movement of tuna resources, their stock status and the use of FADs in the Indian Ocean.

This diversity of work undertaken by civil society and research organisation in the WIO region shows the important role played by external actors, not involved directly in the fisheries, in shaping the management of the fishery of the WIO. CSOs in particular have various interests and impacts on the WIO and Indian Ocean tuna fisheries. While organisations such as the ISSF, PEW or the MSC are mainly targeting the improvement in the practice of tuna fishing especially in the industrial sector, organisations like the FPAOI, Greenpeace or IPNLF have put their focus on the role of small-scale and artisanal tuna fisheries in the Indian Ocean. The WWF, on the other hand, has been involved on both fronts and engaged on different initiatives both regarding industrial fishing and other segments of the fishery in the region. All NGOs have in common the pursuit of sustainability of tuna fisheries in the WIO and the broader Indian Ocean. However, the way to achieve it has been varied, often with different target audiences. At the IOTC in particular, CSOs have often supported one specific member party or another and have been involved in various advocacy activities, according to their interests. A more detailed example of this will be provided in Chapter 7,

#### ***4.5.3. International forums***

The management of tuna fisheries is mainly decided at the regional level due to its migratory nature. Different regional organisations and forums are then available to discuss tuna fisheries. This diversity has been presented in various reports and studies, for example (POSEIDON 2014) have described the following organisations and platforms as relevant to tuna fisheries:

- the Indian Ocean Tuna Commission (IOTC)



- the Southwest Indian Ocean Fisheries Commission (SWIOFC)
- the South Indian Ocean Fisheries Agreement (SIOFA)
- the Southern African Development Community (SADC)
- the Indian Ocean Commission (IOC)
- the New Partnership for Africa's Development (NEPAD)

Governments are also key actors at the regional level within the above cited platforms. As it will be seen in Chapter 7, the regional dynamics surrounding tuna fisheries are different to national politics. Two intergovernmental platforms and one intergovernmental organisation are key to this thesis: the IOTC, SWIOFC and the IOC. They will each be presented briefly as follows.

The IOTC is the most relevant platform for the management of tuna in the WIO. It is an intergovernmental regional fishery management organisation mandated under the FAO framework to manage tuna and tuna-like species in the Indian Ocean. Established in 1996, the objective of the Commission is “to promote cooperation among its Members with a view to ensuring, through appropriate management, the conservation and optimum utilisation of stocks” (IOTC 1993, Article 5(1)). It has the mandate to manage 16 migratory species including different types of tuna, associated species and other pelagic species such as sharks as well as bycatch species such as marine turtles and seabirds. The IOTC has 31 members, which include coastal countries of the Indian Ocean as well as DWFNs that undertake fishing in the region. The commission also has a large number of observers that are admitted to the different meetings. Observers currently include 12 other intergovernmental organisations such as the IOC or SWIOFC and around 30 NGOs including those described above (IOTC website<sup>23</sup>).

While the management of tuna is discussed within the different branches of the IOTC (**Table 13**), its most important branch is the Commission. To discuss tuna fisheries, representatives from coastal governments are present either as delegates negotiating during the commission's annual meetings, or as members of the different committees and working parties. High-ranked officials of fisheries departments are usually the main negotiators at the plenary session and heads of tuna divisions and staff members of departments are members of subcommittees.

<sup>23</sup> List of observers at IOTC. Available at <https://iotc.org/node/6378>

**Table 13: IOTC structure linked to the management of tuna resources.**

IOTC branches	Mandate linked to management	Provides advice on the status of stocks and management actions
The Commission (of contracting parties)	Decides by consensus on management measures and recommendations from the different committees and working parties	
The Compliance Committee (CoC)	Monitors the compliance of members to adopted Conservation and Management Measures (CMM)	
The Scientific Committee (SC)	- Recommends policies and procedures for the collection, processing, dissemination and analysis of fishery data - Assesses and report to the Commission on the status of stocks of relevance to the Commission and the likely effects of different fishing patterns and intensities	
Seven working parties <sup>24</sup>	Analyse technical problems related to the management goals of the Commission	

Source: IOTC website <https://iotc.org/about-iotc/structure-commission>

The IOTC has long been criticised for its lack of advancement in the management of tuna fisheries compared to other RFMOs (Campling 2012a; Cullis-Suzuki and Pauly 2010). Up until recently, the commission was monopolised by proposals, reports and statements mainly emanating from DWFNs and with no strict measures towards tuna management (Sinan and Bailey 2019). In the past 8 years, coastal countries have started to be more involved, under the lead of countries like Maldives, South Africa and Australia, with proposals such as harvest control rules and discussion of allocations (ibid). One of the difficulties faced by IOTC is its own decision-making mechanism. While resolutions are legally binding for its members, their adoption needs to be by consensus, which is very challenging to achieve especially when DWFNs and coastal countries set themselves as two antagonist sides within the IOTC (Abolhassani 2017). As of 2019, the IOTC is facing the challenge of managing the overfishing of yellowfin tuna. Its decisions in the next five years will be key to the state of tuna resources. As seen in other overfished fisheries such as the Atlantic cod, scientific challenges in stock estimation and delays in adopting and implementing measures resulted in the collapse of the fishery (McGuire 1997).

The SWIOFC is another regional fishery body that is relevant to tuna fisheries in the WIO. Established in 2014 also under the FAO, the Commission is composed of coastal states (12 in the WIO region<sup>25</sup>) “whose territories are situated wholly or partly within the area of the Commission” which is all waters of the Southwest Indian ocean from the East African coast

<sup>24</sup> List of working parties: on Billfish (WPB), on Data Collection and Statistics (WPDCS), on Methods (WPM), on Neritic Tunas (WPNT), on Temperate Tunas (WPTmT), on Tropical Tunas (WPTT), and on Ecosystems and Bycatch (WPEB)

<sup>25</sup> Members as of 2019: Comoros, France, Kenya, Madagascar, Maldives, Mauritius, Mozambique, the Seychelles, Somalia, South Africa, United Rep. of Tanzania, Yemen

and its parallel to the longitude 80° 00 E on the East side (SWIOFC website<sup>26</sup>). The commission has an advisory function to its members. It aims to “promote the sustainable utilisation of the living marine resources of the Southwest Indian Ocean region, by the proper management and development of the living marine resources, and to address common problems of fisheries management and development faced by the Members of SWIOFC, without prejudice to the sovereign rights of coastal states” (ibid). The governing body of SWIOFC is the Commission, composed of all its members. There is also a scientific committee and other committees and working parties, established on an ad hoc basis, depending on what the commission considers necessary.

The SWIOFC differs from the IOTC on two fronts. First, it discusses fisheries matters other than tuna. Tuna matters are discussed within a working party on tuna collaboration and other items can be brought to the agenda if considered needed. Second, the commission only has the coastal countries as decision makers. Contrary to the IOTC, where DWFNs are full deciding members, DWFNs are only allowed to be observers within the SWIOFC. The only exception to this is France who sits as a full member because of its overseas territories in the WIO region. Observers are also not allowed to make statements; discussions and speeches are reserved to the coastal states, members of the commission. Due to its advisory status, the SWIOFC members do not adopt binding resolutions regarding the regulation of the fisheries, as it happens at IOTC. The SWIOFC has discussed different subjects regarding tuna fisheries such as regional monitoring, surveillance and control; minimum terms and conditions for fishing access agreements, and resolutions of coastal states to be submitted to the IOTC (FAO 2018a).

The last entity that will be discussed in the thesis is the Indian Ocean Commission (IOC). The IOC was established in 1984. It originally consisted of three island countries: Madagascar, Mauritius and the Seychelles, which, two years later, were joined by Comoros, and France (for Reunion Island) (Selltröm 2015: 199). A formative objective of the IOC was to improve relations and cooperation between these countries. Funded by diverse sources including the member countries and especially major donors such as the EU, the African Development Bank, the United Nations or the World Bank, the IOC has carried out various projects and collaborations between the member countries. Those initiatives gravitate around four strategic aims that cover an array of interventions and projects (**Table 14**), ranging from

<sup>26</sup> <http://www.fao.org/fishery/rfb/swiofc/en>

diplomacy to external trade and economic development, and from environmental protection to regional cultural interactions.

**Table 14: The large array of intervention of the IOC**

Strategic Axis	Area of intervention	Samples of project
1 - A political and diplomatic force for human development	- Stability and Diplomacy, Health, Gender and Mobility	- Health monitoring - Capacity building in gender
2 - A secure region that promotes smart economic growth	- Economic Area and Regional Infrastructure - Blue and Green Regional Growth Centres, Specialisation and Economic Development	- Regional integration projects - Maritime security - SmartFish - Regional plan of fisheries Surveillance - SWIOFISH
3 - Resilient and sustainable island and ocean environments	- Environmental Sustainability and Climate Change	- ISLANDS - Supporting Sustainable Development in the Indian Ocean Region - Monitoring for environment and Security in Africa - Sustainable management of coastal zones
4 - Promoting Indianoceanian and its identity	- Indianoceanian Identity and Development of Human and Natural Resources	- ENERGIES - Renewable Energy and Energy Efficiency Programme in Indian Ocean Commission Member states

Source: IOC 2016a

From the diversity of activities presented above, it can be said that the IOC intervenes in all areas possible and at different scales, from local interventions of health and capacity-building activities around gender to national and regional initiative covering coastal management or maritime security.

To conclude this chapter, I showed that there is a vast array of processes, actors and interactions that take place within the WIO tuna fisheries. Each country has a diverse and multi-actor tuna fishery. The management of the WIO tuna fisheries is discussed within different regional platforms where more actors enter the scene. Each segment of the fishery in each country or each actor would be enough to study for a whole thesis. To focus the content of the thesis and make a pertinent academic contribution, the next three chapters will address specific questions associated with the field of political ecology. In addition to contributing to the field of ‘marine’ political ecology, it will also expand the knowledge on the WIO tuna fisheries with a multi-scalar approach.

After this presentation of the design and background of the research, I will now move to the result chapters of the thesis which will be the next three chapters. I will start with an analysis of how different actors, present at different levels, view the state of tuna resources in the WIO.

## **CHAPTER 5. THE STATE OF TUNA RESOURCES IN THE WIO AS PERCEIVED BY DIFFERENT ACTORS**

“We urge the [IOTC] Commission to meet the IOTC Scientific Committee’s recommendation to reduce catches of yellowfin tuna by 20%. Member states must immediately adopt measures to start rebuilding the depleted stocks of yellowfin tuna.”

WWF Press Release, May 19, 2016

The state of our oceans has received enormous media attention in the past ten years. News articles, reports and scientific reports display catastrophic declines in marine species populations, including tuna, with a decline of more than 70% between 1970 and 2010 (FAO 2014; CBD Secretariat 2014; WWF 2015). One of the recognised drivers of the crisis is overfishing, especially by offshore industrial fishing. Beyond taking their targeted species, industrial vessels also catch huge amounts of other species as accidental catch (Coulter et al. 2020; WWF 2015). Such stories are also present in the WIO at the regional, national and local levels, where I interacted with diverse actors involved directly or indirectly in the fishery.

This first result chapter of the thesis will respond to the part of the research question that asks, “How do narratives around the state of tuna resource shape tuna fisheries management in the WIO?”. To address this, I will proceed in four phases. First, I will introduce the theoretical framework that will guide the chapter, explaining my use of the concepts of discourses, narratives and co-production as lenses of analysis.

Second, through two subsections, I will paint an overview of the types of discourses circulating regarding the state of tuna resources, produced by the different actors at various levels of the fishery. Within each discourse, I dissect the narratives maintained by actors promoting a particular discourse. I will also present the way discourses and narratives are (co-)produced, identify the rationale behind each narrative and explore the implication of each narrative on the management of the fishery and access to the fish. I will show that while the discourse of depleted tunas is maintained by all the main actors, the narratives behind each representation of the state of the resources are diverse and sometimes conflicting. At the national level, local fishers convey a strong discourse of tunas being depleted by industrial

actors while fisheries departments focus on the idea of stable catches in their reports without establishing an increase or decrease of tunas in the national waters. On the other hand, at the regional level, tuna stock assessments are discussed and debated, with industrial actors claiming the unjust consequences of limited data available in other segments of the fishery. Narratives about the tuna stocks are then highjacked by bureaucracy and scientific language of probabilities that make the stock status difficult to determine.

Third, I will present how the different narratives interact and how actors, including governments local fishers and industrial actors, mobilise narratives at different levels to the same end of perpetuating access to tunas.

I will conclude the chapter with a summary of the discourses and narratives identified and their political implication in the management of fisheries and access to the fish. I also present a brief reflection on how using political ecology as a theoretical anchoring has helped expose the diversity of claims at different scales from an analysis of actors' representation of the state of resources.

## **5.1. BUILDING A FRAMEWORK EXPLORING NARRATIVES AROUND THE STATE OF TUNA RESOURCES**

### ***5.1.1. Discourses and narratives in political ecology***

Political ecology has a substantial engagement with questioning dominant discourses and narratives in environmental issues such as deforestation, biodiversity use or overfishing (Adger et al. 2001; Escobar 1998; Mansfield 2011). Studies have highlighted that mainstream discourses on environmental problems have often unjustly burdened resource users (Bryant 1998). They also produced solutions that further marginalise local users and have not addressed other important factors such as global production systems or colonial history (Campbell 2007; Vaccaro et al. 2013). Discourses have had an impact on how natural resources are accessed, such as limiting access to the resources for conservation, sometimes leading to conflicts; or promoting neoliberal approaches for access rights (Adams and Hutton 2007; Budds 2004; Escobar 1998). In dominant discourses such as deforestation or desertification, political ecology has been used to analyse the structure of narratives sustaining these discourses and to present similarities, such as local actors being portrayed as the villains, exploiting the resources due to a cycle of poverty (Adger et al. 2001).

The definition of discourse used here is “a specific ensemble of ideas, concepts, and categorisations that is produced, reproduced, and transformed in a particular set of practices

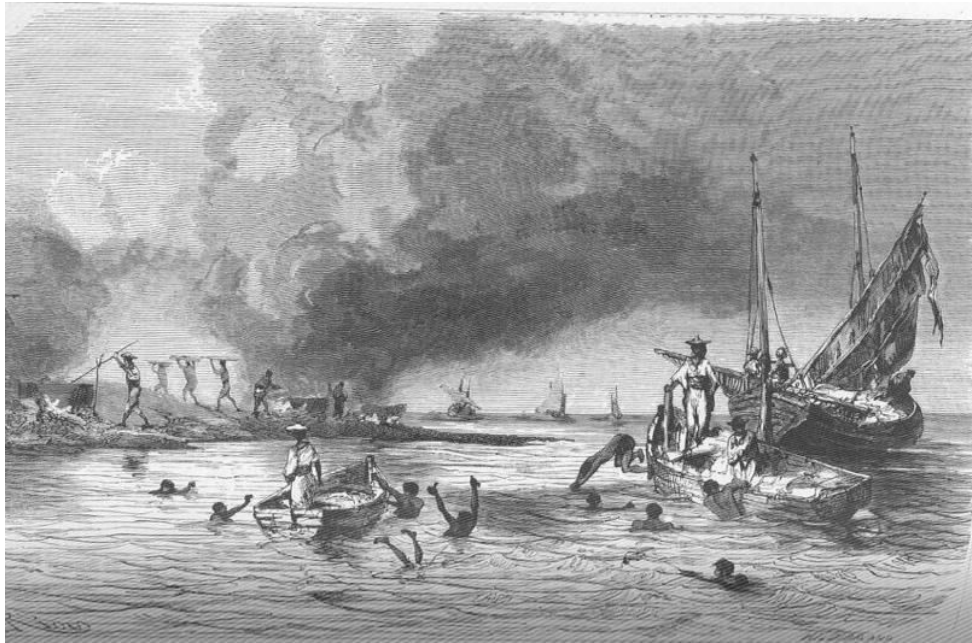
and through which meaning is given to physical and social realities” (Hajer 1997: 16). As explained by Adger et al. (2001), discourses imply shared knowledge and perceptions of a phenomenon or shared beliefs about the causes and solutions to a particular problem. A discourse then contains homogenous messages or expressive means such as narratives and metaphors (ibid). Discourse analysis in social science often involves considering discourses as “a place of struggles and negotiations between actors who support each specific discursive formation linked with various strategies of power” (Pochet 2014: 2). My use of discourses in this chapter is more as an umbrella concept that helps me understand marine resource management by analysing the diversity of representations that various actors have (Svarstad 2012). To this end, I pay particular attention to the narratives involved in the discourses about the state of tuna stocks. The concept of narrative used here is “a story with a chronological order (beginning, middle and end)” as well as an argument within which a problem is described with a corresponding solution (Adger et al. 2001: 685). A narrative also involves a particular structure regarding the role of actors in a specific phenomenon. This can generate a pattern of actors’ cast often categorised as heroes, villains and victims in an environmental issue (Adger et al. 2001). While investigating narratives can be used to analyse specific discourses, this section will focus on the narratives generated by different actors under two parallel discourses about overfishing of tuna in the WIO. The analysis aims at tracing patterns within the discourse used by actors and analysing in a realist perspective how mobilising specific narratives leads to a specific social outcome or practice (Adger et al. 2001; Scoville-Simonds 2009).

Discourses about the state of marine resources at the global level have been diverse and evolving. Fishing has long been at the centre of various civilisations and communities. From coastal communities of the Mediterranean or the North Atlantic, to island nations in the Pacific or in the Indian Ocean, the abundance of the ocean has provided bounty to many communities over many centuries (**Illustration 5**). Historically, discourses surrounding the state of fisheries resources in general have evolved and changed drastically. From an original idea of the ocean being plentiful and inexhaustible, it was assumed that their exploitation would not have any significant impact on fish stocks (Gordon 1954; Huxley 1883). After World War II, fishing activities intensified and industrialised in all oceans which eventually led to the decline of different species (Pauly and Le Manach 2012). The iconic case of the North Atlantic cod illustrates the situation of many fisheries in different oceans (McGuire 1997). The overfishing discourse in the case of the North Atlantic cod contains an



industrialisation narrative of the fisheries as the cause of overfishing. This was facilitated by government policies and the difficulty to establish accurate scientific evidence regarding the stock status (ibid).

**Illustration 5: An example of the sea's bounty – fishing and curing for sea cucumber**



Source: Drawing by Bevalet, M. (1868)<sup>27</sup>. Image available on the Freshwater and Marine Image Bank

Discourses of overfishing are still widespread at present time and are commonly used by different international organisations like the FAO or the WWF (FAO 2014; WWF 2015). The reproduction of such discourse has prompted government, scientists and civil society organisations to discuss and adopt measures to manage marine resources. This has been achieved for example through international treaties such as UNCLOS, or the adoption of conservation measures such as setting up marine protected areas or through the management of access to the fish by quotas, 'total allowable catch' systems or access agreements (Campling and Havice 2014; Mansfield 2004). From this global discourse, various actors have also seen their practices impacted. Industrial actors, for example, are increasingly promoting the sustainability or the low impact of their fishing activities (Bailey et al. 2018), local coastal communities are often being depicted at the global level as being highly affected by the decrease in supply of protein (FAO 2015; Hicks et al. 2019). The overfishing discourse has therefore had numerous impacts on perceptions, practices and ways of using

<sup>27</sup> in Figuiet, L. 1868. *Ocean World : Being a Descriptive History of the Sea and its Living Inhabitants*. P. 297. New York: D. Appleton & Co.

and managing the resources at different levels. The discourses analysed in this chapter focus on the state of the WIO tuna resources.

### ***5.1.2. The analysis of discourses and narratives in this thesis***

In this chapter, I will explore the different discourses regarding overfishing of tuna in the WIO. Considering that tuna fishing is undertaken with various types of gears and techniques for more than 50 years, I therefore ask what discourses exist in the WIO regarding the state of tuna resources? What narratives are produced by different actors to support the discourses they maintain? Do some actors share the same discourses or the same narratives? The aim in the chapter is to present the discourses regarding the state of tuna resources and to dissect the diversity of narratives that supports actors' perspectives on the state of tuna resources (**Table 15**).

I start by presenting the main discourses present in the WIO regarding overfishing of tuna and the state of resources. In line of similar analyses undertaken by Adger et al. (2001), I identify the key elements of each discourse and the actors that are involved in producing or reproducing it. After this presentation, I analyse the different narratives that actors maintain to support their discourses. Four key actors and their narratives are analysed: the local fishers, NGOs, governments at both national and regional levels and industrial operators. Each narrative is described in its key contents, then a cast of actors is associated with each narrative and the solution envisaged by each actor under each narrative is also presented.

The next step of the analysis consists of investigating how each discourse is co-produced based on the different narratives presented. I explore this co-production through three elements: (1) personal experience of actors and their link to the fishery, (2) the socio-economic context they evolve in, and (3) the social practices that they are involved in when constructing their idea of the state of tuna resources. Co-production as envisaged by Science and Technology Studies is a way of interpreting and accounting for complex phenomena in a more holistic vision, avoiding deletion of some approaches. It shows the "appropriation of existing discourses [...] and their selective retailoring to suit new needs" (Jasanoff 2006: 41). It also addresses questions such as how socio-technical objects "swim into our ken, achieving cognitive as well as moral and political standing" (ibid: 42). Co-production helps us to understand how some forms of knowledge are absorbed by different parts of society and shape discourses and representations. Co-productionist accounts allow us to investigate various phenomena with a rich description and explanation. This involves considering natural and social orders but also the diversity of human experiences, interactions and cultures that

shape socio-technical subjects such as climate change, endangered species or for this chapter, overfishing. Jasanoff (2006) contends that co-productionist stories present the opportunities of discovering new possibilities or alternative pathways in human development (ibid). In resource management, co-production, as described by Robbins (2002), sees the construction of the environment as the “scaffolding of knowledge that allows us to understand the material context of that knowledge [...] this is further subject to the political work amongst people, as well as between people and the objects of their interaction” (Robbins 2012: 141). Robbins emphasised the role of ideas, even those rooted in material activities, in the production of landscapes. After establishing how the discourses are co-produced, I then present how the various narratives interact and analyse the potential overlaps and similarities.

In this chapter, the analytical framework is then not based on a classic deconstruction of hegemonic discourses as usually done within political ecology (Adger et al. 2001; Escobar 1998; Robbins 2012). It rather focuses on analysing different narratives that actors use regarding the resources and how social practices are influenced by and have influenced these stories. The analysis will highlight distinct, competing and sometimes congregating narratives from actors at the local, national and regional levels.

**Table 15: Flow of work on narrative analysis**

Stage of the analysis	Elements investigated
1. Presentation of actors' discourse	<ul style="list-style-type: none"> <li>- Pattern of regularities</li> <li>- Means of expression</li> </ul>
2. Analysis of narratives	<ul style="list-style-type: none"> <li>- Key elements - beginning, middle, end</li> <li>- Cast of actors - heroes, villains, victims</li> <li>- Solution to the issue</li> </ul>
3. Analysis of co-production elements	<ul style="list-style-type: none"> <li>- Personal experience</li> <li>- Socio-economic context</li> <li>- Social practices</li> </ul>
4. Analysis of interactions between different narratives	

From the fieldwork I did and interactions with various actors during tuna landings and at international meetings, I identified 5 sets of actors and two major discourses that are present in the WIO. The first one is of tuna being overfished in the WIO and the second one is about the stock of tuna resources being difficult to assess. Both discourses have a number of narratives that are associated to specific actors (**Table 16**). In the following subsections, each discourse and narrative will be described and analysed through the above elements.

**Table 16: Discourses and narratives regarding the state of tuna resources in the WIO**

Actors	Discourses		Narratives
	Tuna resources are depleted and overfished	Tuna stocks are difficult to assess	
Local fishers	X		- Tuna as overfished by industrial actors
Industrial operators	X	X	- Overfishing cannot only be blamed on industrial operators - Lack of data on other fleets - Scientific evidence of overfishing at the IOTC level
NGOs	X		- Scientific evidence of overfishing at the IOTC level
Governments		X	- The state of national tuna stocks is unknown but levels of catches are stable
IOTC members	X	X	- It is difficult to predict the trajectory of tuna stocks - Scientific evidence of overfishing after consecutive assessments

## 5.2. TUNAS AS OVERFISHED IN THE WIO

As most stocks of fishes have been assessed as fully exploited, the ecological footprint of fishing has also been evaluated as leaving severe damages to the marine ecosystems (Coulter et al. 2020). Tuna fisheries have not been spared by this discourse of depleted resources including in the WIO. The discourse of tuna being overfished in the WIO is produced by specific actors. After detailing more the elements and actors involved in this discourse, I will present the narrative that these actors maintain about overfishing.

### 5.2.1. Elements of the discourse: local perceptions and written assessments

The discourse of overfishing in the WIO contains three elements: strong local perceptions by fishers of tuna being depleted, the conflict between small-scale and industrial fisheries, and written evidence of tuna being overfished as presented in NGO and the IOTC reports. Regarding the first element of local perception, I analysed regularities within the discourse by interviewing actors regarding the state of tuna resources in the three countries studied. During interviews in the field, 88 actors provided their perceptions regarding the subject. Amongst these, 59 mentioned they noticed a decline in tuna resources, while the rest thought the situation was rather stable (15), the quantity of tuna increased (5) or that it was not possible to know (9). The 59 interviewees who spoke of decline included 35 artisanal fishers, 6 semi-industrial fishers, 3 sport fishers, 6 intermediaries, and 9 surveyors within statistic units. When asked upon what their perception of reduced stocks was based, responses in the three

countries were similar. They included the following, ranked according to the repetition of the response:

1. Fishers need to go further to fish, tuna used to come close to shore; now it is only caught by chance
2. The quantity of catch has reduced a lot as well as the quality, the size of the fish is getting smaller, fishers do not catch big tuna anymore
3. Fishers need a longer time to fish now, they used to catch tuna after few hours; now they need a whole day or stay at sea three to four days
4. The price of tuna has increased, tuna used to be given away when caught by fishers, it is now a luxury product

Amongst the interviewees, small-scale fishers recurrently mentioned the first three explanations as the basis of their perceptions with some were able to provide comparison of present and past catches (**Table 17**). Fishers in the semi-industrial sector in the Seychelles also told similar stories of a strong reduction in catch along with the need to fish longer to get tuna (SE 19, 21, 23, 42). The reduction in quantity of catch was also strongly expressed by those not directly fishing. They included intermediaries within the small-scale sector (MU 08, 19; SE 44), processing companies within the semi-industrial sector (MU 33, SE 16), and surveyors of statistic units (MD 31, SE 02, SE 53). The latter did not perceive a decrease in volume of catch (SE 02, SE 30) but had a common remark on the decrease in quality and smaller sizes of fish caught in the national waters.

**Table 17: Perceptions about quantity of catch during tuna season now and ten years ago**

	Interviewee	Catch 10 years ago	Current catch - as of 2017
Madagascar	MD 02	30 tuna/day	10 tuna/day
	MD 19	400 kg to 700 kg/fishing trip	0 to 10 tuna/fishing trip
Mauritius	MU 04	10 to 15 tuna/day	2 to 3 tuna/day
	MU 07	30 tuna/day	12 tuna maximum/day
	MU 17	10 tuna/day	3 to 6 tuna/day
	MU 18	10 to 12 tuna/day	6 to 9 tuna/day
	MU 24	18 tuna/day	15 tuna maximum/day
Seychelles	SE 08	50 to 80 tuna/day	30 tuna maximum/day
	SE 09	2 or 3 tuna/day	0 to 2 tuna/day
	SE 10	40 tuna/fishing trip	0 to 13 tuna/day
	SE 11	20 tuna/day	0 to 5 tuna/day
	SE 24	5 to 6 tuna/day	0 to 4 tuna/day
	SE 58	1 ton/day	0 to 2 tuna/day
	SE 32	15 tuna/day	0 to 14 tuna/day

As we can see from **Table 17**, fishers in the small-scale sector, who are most vocal about overfishing, were catching very variable amount of tuna even 10 years ago (some days zero, some days 30, to take the outer bounds). However, as the catch has dwindled 5 to 10 times less than what was caught in the past, coupled with the increase of fishing distance/time and the lack of presence of tuna at shore, small-scale fishers of the WIO have constructed a legitimate claim regarding the state of the resources.

The second element of the overfishing discourse is the imbalance and lack of equity between small-scale and industrial fishing. As it will be developed in Chapter 6, industrial fishing actors have means and resources that provide a tremendous advantage to industrial fishing fleets in catching more tuna in highly remote areas of the Indian Ocean. The investment of fishing companies in their fleets but also the subsidies provided by DWFNs produce a highly efficient industrial tuna fishing. Small-scale and semi-industrial tuna fishers feel systematically overtaken in the tuna exploitation. This is a venue for debate where fishers denounced the state of neglecting local fishers. In Madagascar, fishers make recurrent comments that they did not have the right boats nor enough equipment to fish tuna. One fisher explained that in Ramena village:

“People work as crew members because having your own boat is way too expensive. An average boat such as speedboat costs at least MGA5,000,000 (~EUR1,200) and to this you have to add the engine, the equipment. If you use nets, you need at least five people because it is a big net to manage. Only the few ‘bosses’ in the village can afford that and the government does not help us.” (MD 18).

In a country like Madagascar where the socio-economic context is of poverty and limited means, the state can only contribute to fishing development through funding from donors who sometimes provide nets or a few speedboats. In Mauritius and the Seychelles, however, the state has made several investments to improve local tuna fishing. These include, for example, the set-up of anchored FADs in Mauritius to attract pelagic species, the improvement of local ports in the Seychelles or the establishment of loan schemes in Mauritius and the Seychelles to help local fishers upgrade into semi-industrial vessels. However, fishers claim that these investments have been limited compared to the attention given to the industrial fishing. Local fishers state that industrial vessels enjoy a highly serviced port in the Seychelles and facilitated formalities through the Seafood Hub in

Mauritius. Local fishers therefore claim that there is an apparent inequality of treatment by the state and it has caused them a reduced access to the tuna resources.

A third element of the ‘overfished tuna’ discourse emerges from written reports of the IOTC and NGOs, where tuna species in the Indian Ocean are portrayed as declining. For the case of WIO and the broader IO, the status of the stock being overfished has been established through stock assessments. Since the stock assessment of 2015, one of the key species of the region – yellowfin tuna – has been assessed as overfished and subject to overfishing. The scientific committee of the IOTC reported that this was due to a “large and unsustainable catches [...] over the last 3 years” (IOTC 2015: 84). In the 2015 report, the MSY was established at 421,000t. From the reported catch of 2014 (430,327t) and the updated catches of previous years, the status of yellowfin tuna changed to ‘overfished and subject to overfishing’ at a 94% probability (ibid). The IOTC assessments represent the basis of the view of the scientific committee of the IOTC, the NGOs and also the industrial operators.

Other reports also present the state of tuna resources as having decreased including in the Indian Ocean. These corroborate local stories of overfishing. The 2018 report of the FAO regarding fisheries and aquaculture (The State of World Fisheries and Aquaculture report) described that more than 40% of the global tuna stock was fished at a biologically unsustainable level (FAO 2018b). For the Indian Ocean, the FAO described that between 1950 and 2015, the trend of fish landings – including tuna – has been on a continuously increasing trend” (ibid: 42). The WWF, in its 2015 report “The Blue Living Planet”, presented that tuna species and associated species were globally declined by 74% between 1970 and 2010 (WWF 2015: 9). A regional report of the WWF regarding the WIO region confirmed the stock status presented by the IOTC (**Illustration 6**).

**Illustration 6: Presentation of yellowfin as overfished in a 2017 WWF report**



Source: Obura et al. 2017

Finally, the ISSF, in its tool of assessing tuna stock health, also confirms the stock status of yellowfin as presented by the IOTC. It presents that as of October 2019, 25% of the tuna stock in the Indian Ocean, including for the four commercial species, require improvement in its management while the other 75% of the tuna stock is in a healthy state. Regarding Yellowfin in particular, the stock health tool of the ISSF describes yellowfin as 100% needing improvement in its management (ISSF 2019).

### ***5.2.2. Actors (re)producing the overfishing discourse***

As we can see in the elements above, the discourse is present amongst local actors and also maintained by indirect actors. At the local level, the discourse of tuna being overfished is produced by local actors, namely fishers and intermediaries claim that overfishing by industrial vessels leads to a loss of livelihood and a risk to their food security. This is in line with the growing acknowledgement of the role of small-scale fisheries in contributing to livelihoods but also supporting thousands of coastal communities in the world (FAO 2015; IPNLF 2018b; Pauly 2018). It also aligns with the increased knowledge produced regarding the negative impact of the reduction of fish availability on health and nutrition amongst coastal people especially in developing countries (Golden 2016; Hicks et al. 2019). In the WIO, fishers reiterate the story of overfishing amongst themselves and to outsiders including researchers such as myself when tuna fisheries are discussed or to the press and civil society organisations. For the case of Madagascar for example, the story of local fishers being deprived from their fish has been the subject of various news articles including one in October 2019 criticising fishing access agreements for not being transparent and for being a source of reduction in fishing resources (Carver 2019a). In Mauritius and the Seychelles, well-known local tuna fishers have often told the story of overfishing by industrial vessels through documentaries. Three of them have been featured in documentaries regarding tuna fisheries in the Indian Ocean. The documentaries are: ‘Tuna Wars’<sup>28</sup> in 2013 (an investigative journalist following a Greenpeace tuna campaign in the Indian Ocean), ‘Océans, la Voix des invisibles’<sup>29</sup> in 2017 (a narration of the struggles of small-scale fishers against industrial fishing in different parts of the world including in the WIO) and ‘Cash Investigation, Pêche industrielle, Gros Poissons en eaux troubles’<sup>30</sup> in 2019 (an investigation of the French

<sup>28</sup> A documentary presented by David O’Shea, produced by SBS Dateline. Available at <https://www.sbs.com.au/news/dateline/tvepisode/tuna-wars>

<sup>29</sup> A documentary produced by Mathilde Junot. Available at <https://www.youtube.com/watch?v=YklYotq2f9o>

<sup>30</sup> A documentary presented by Elise Lucet, produced by France Tv. Available at <https://www.france.tv/france-2/cash-investigation/881123-peche-industrielle-gros-poissons-en-eaux-troubles.html>



industrial tuna fishing including in the Indian Ocean). Through these media tales, the narrative of overfishing by industrial vessels and the challenges in daily livelihoods of tuna fishers are spread globally and provide to the local actors, especially fishers, a public venue to maintain their narrative.

The next set of actors who reproduce the overfishing narratives is composed of civil society and international organisations. The FPAOI, the federation of small-scale fishers in the Indian Ocean, for example, attempts to bring the story of local fishers to the IOTC discussions by highlighting the importance of tuna for small-scale fishers and their strong concern regarding the reduction of tuna resources in the Indian Ocean (FPAOI 2017). Similarly, NGOs like IPNLF and the WWF tell the story of local fishers as suffering from the reduction of tuna available. They provide their assistance to coastal states by supporting proposals that ask for the opportunities of fishing tuna in the Indian Ocean to be mostly allocated to coastal countries (IPNLF 2018a; Obura 2017). International organisations such as the FAO or the ISSF also produce elements of the overfishing discourse. However, the discourse is a global one or a regional Indian Ocean one. An interesting specificity of these broader perspectives is the lack of agency in the storyline. While entities such as FAO or the ISSF recognise the overfished status of some tuna species, the reduction of resources is not assigned an agent responsible of the situation.

### ***5.2.3. The narrative of the WIO local fishers: “they take all our tuna”***

In this section, I dissect the structure and cast of actors within the narrative of local fishers which blame industrial vessels of DWFNs for the overfishing of tuna. The narrative is structured in the following set of events: the sustained fishing by industrial actors, the continuous decline of tuna available in the EEZs, and the current loss of livelihoods linked to tuna fisheries at the local level. The narrative also sets a precise role to actors involved in the fisheries notably putting industrial fishers as ‘the villains’ and local fishers as ‘the victims’.

#### **Content of the narrative**

While fishing by industrial vessels started in the WIO since the 1950s, industrial vessels are often active offshore, out of sight of local fishers. Nonetheless, when industrial boats are close to the coast local fishers are questioning their presence in the EEZs. Discussions with fishers regarding their knowledge about industrial vessels highlighted their acknowledgement

of the long-standing presence of industrial vessels in the WIO. Older fishers made statements such as:

“I remember many Taiwanese vessels came in the 70s, we were really worried about what they would do in our waters” (MD 68)

“the government has allowed those big boats in our waters for a while; with their agreements with the EU and other Asian countries in the 2000s, they allowed so many boats in our waters that have had big impacts on our marine resources” (MU 25)

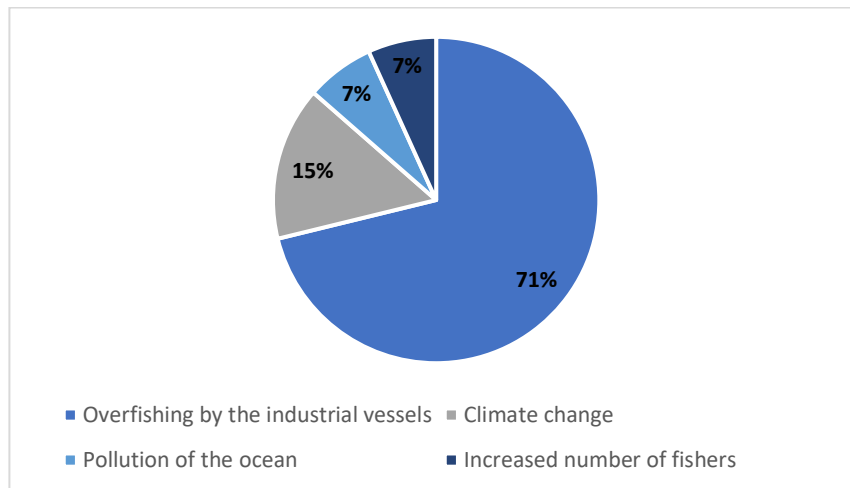
“the industrial fishing in our waters has exacerbated, in the 80s purse seiners caught 300–400 tons; now they catch so much more, it has become out of control” (SE 47).

These perspectives of local fishers that are transmitted to other fishers provide the narrative of overfishing an historical anchoring, reinforcing their views.

Regarding the state of tuna resources in the WIO, interviewees in the three countries attributed four drivers to the reduction of tuna resources. These were: industrial fishing mainly by purse seiners, climate change, pollution of the ocean and the number of local fishers accessing the resources. However, industrial fishing was the most prominent reason given. Amongst the 59 interviewees that perceived a reduction of the resources, the impact of industrial fishing on the resources was seen as a major contributor with 42 interviewees. They mentioned the role of licences to purse seiners and longliners in the overfishing of resources as well as the use of FADs and support vessels. Common phrases from small-scale and semi-industrial fishers included “they do not choose what to catch, small and big fishes” (MD 51), “they catch everything and not only tuna” (SE 19); or “they catch too much, they have very good equipment for that” (MU 25). Data from the USTA in Madagascar for example shows that some species caught by the small-scale fishery are also caught as bycatch of purse seiners or longliners (USTA 2017). Similarly, the semi-industrial segments in both Mauritius and Seychelles target the same commercial tunas and associated species. Processing companies’ representatives acknowledged the reduction in catch they found in their landing data while surveyors within the fisheries’ departments expressed that they had noticed a change in the quality notably through smaller size of fish. A smaller number of stakeholders attributed the reduction of resources to pollution of the ocean (4), increase of tuna fishers (4) or climate change (9) (**Figure 5**). The narrative of overfishing by industrial vessels was

strongly reproduced in the Seychelles and Mauritius where fishers had a more advanced knowledge on the involvement of DWFNs in their national waters. It was less present in Madagascar where the explanation of climate change was more favoured.

**Figure 5: Results of interviews regarding perceived causes of decrease in tuna resources**



These local accounts of overfishing are mainly based on knowledge of local fishers that the quantity of fish available has reduced. This has been built through their long-standing experience in fishing but also through the reproduction of the story amongst fishers. For the case of Mauritius and Seychelles in particular, the media and NGOs supporting similar views have also strengthened the story of tuna being overfished. The emphasis put on the impact of industrial fishing as depleting the tuna of the region has been incorporated as a belief amongst fishers. Industrial fishing is seen as an external intervention against local fishing practices and considered as a threat to marine resources.

As for the loss of livelihood part of the narrative, a key element of the narrative is the idea of unjust access and resources grab that local fishers feel regarding the impact of industrial tuna fishing. While they are aware of the fugitiveness of tuna and have a common knowledge that “tuna travels”, there is also a strong sense of national ownership over the fish. It is generally described as “our fish”. Associated with local livelihoods and the dependence of fishers with the sea, this perception of ownership of the fish is a strong driver behind the resource conflict around the WIO tunas. It provides a justification for local fishers to claim that the industrial sector is depriving them and their communities from their fish and related livelihoods. Fishers often complain that the reduction of tuna quantity has led to less work opportunities for fishers during tuna season (MD 51, MU 24, SE 19).

### **Cast of actors and solution suggested in the narrative**

In the narrative of overfishing done by the industrial segment of the fishery, local fishers and industrial fishers are set as in conflict with industrial fishing operators considered responsible for the decline of tunas and local fishers as the victims. The state is considered as the one that could implement the solution.

The solution to the overfishing problem promoted by fishers is restricting access to tuna to DWFNs. For fishers, this solution will replenish the sea with all kinds of fish, prevent marine resources from being taken offshore especially species that move between coastal waters and the EEZ, and will sustain their livelihoods. The request that access by DWFNs to the tuna grounds of the WIO be restricted is done by fishers themselves or fishing associations. During the fieldwork and also in the above-mentioned documentaries, fishers were asked about the solution they thought was needed to address the overfishing situation. Their responses varied between a soft “the government needs to reduce the licences it grants to industrial vessels” (MU 04, 08, 25, SE 09) to a more radical “the government needs to stop industrial fishing” (MU 20, 35, 40, SE 25, 26). Such claims have been frequent in the past ten years and have contributed to a few victories for the small-scale and artisanal fishers even if industrial fishing is still happening in the WIO. Two can be mentioned here. First, in the case of Seychelles, persistent pressure has led to the country’s delegation at IOTC having representatives from the local semi-industrial fishing, providing their opinion during debates especially regarding allocations at IOTC negotiations (pers. obs.). Second is the case of fishing access agreements between Madagascar and the EU. The negotiation of these has been put under strict scrutiny by the public. In 2019, the negotiation of a new SFPFA with the EU took three unsuccessful rounds of negotiations as both parties were not satisfied with what was offered (MD 10). Civil society organisations have also mobilised the narrative to in their advocacy work. The FPAOI in its statements position at IOTC advocates for less fishing by DWFNs. It does so by supporting the reduction of FADs and support vessels which are known to increase the fishing capacity of industrial vessels (FPAOI 2017). They also opposed the proposal of allocation of catch that considered historical catch as the main criteria – which provides catches allocation mostly to DWFNs (ibid).

#### ***5.2.4. The narrative of IOTC’s scientific committee: “the yellowfin tuna stock is determined to be overfished and subject to overfishing”***

The state of tuna resources being overfished in the WIO and more broadly in the Indian Ocean has also been established through assessments undertaken at the IOTC level. Different

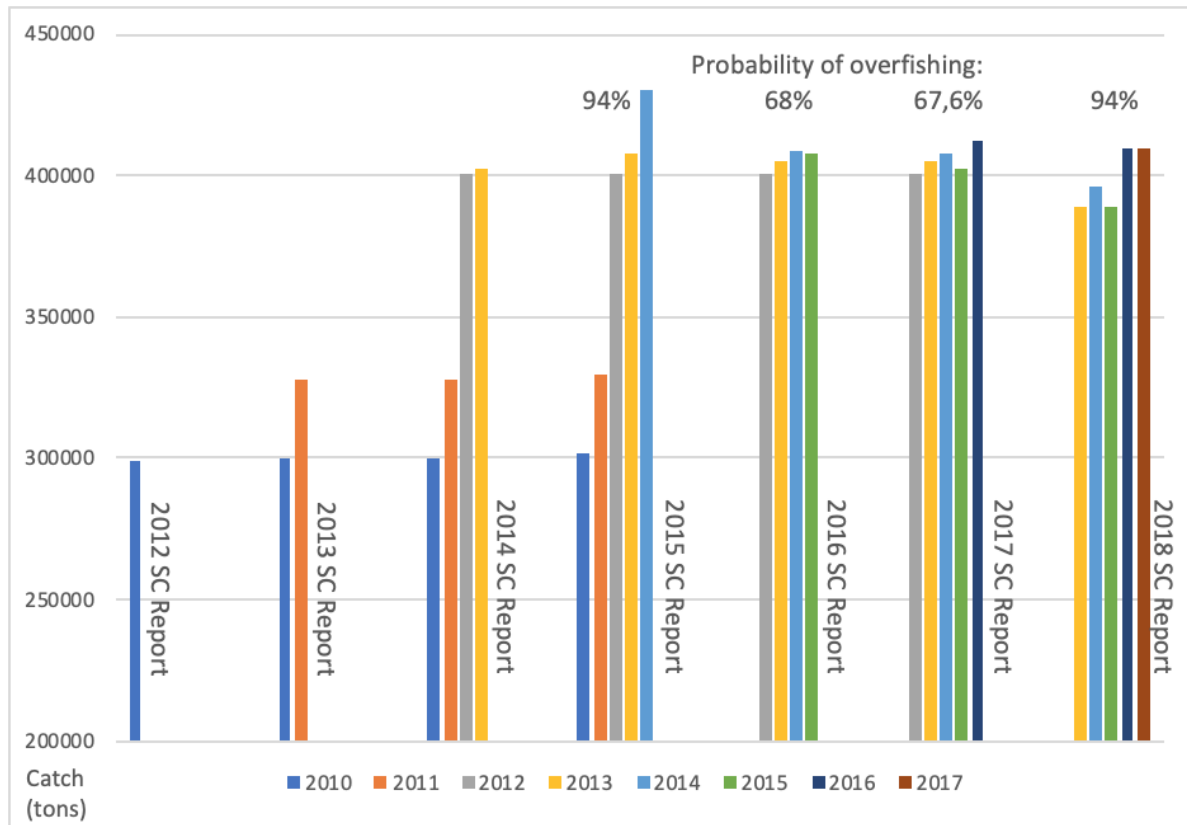
to the first two, the IOTC narrative is based on scientific assessments which have established that tunas, more specifically yellowfin tuna, are subject to overfishing since 2015. The narrative is structured in the following set of events: a fast increase of catch since 2012, scientific committee warns of unsustainable increase of effort, and stock assessments of 2015, 2017 and 2018 establish high probabilities that yellowfin tuna is overfished. The set of actors include various fleets as responsible for the situation, IOTC members not taking measures but also the same members have the ability to improve the situation.

### **Content of the narrative**

The elements of the narrative at the IOTC level about overfishing in the Indian Ocean can be found through an analysis of the scientific reports produced by the Scientific Committee that present stock assessments. Stock assessments are based on scientific models that use catch data submitted by members of the IOTC, as part of their obligations. The results of stock assessments are presented under a stock status trajectory plot (called the Kobe plot) which shows the probability of overfishing. A species is assessed as overfished when the spawning biomass is below the spawning biomass level that would provide maximum sustainable yield. It is considered as subject to overfishing when fish mortality is above the fishing mortality level at which it would provide maximum sustainable yield. The reports of the Scientific Committee picture the historical evolution of the catch since the 1980s and especially in the past 10 years. The event of the collapse of yellowfin tuna has to be put in its socio-economic context. For a start, the increase of catch in 2012 resulted from the return of fishing fleet to the WIO after piracy events that preventing fishing between 2008 and 2011. When the piracy issue was addressed, catch of different fleets increased fast. Reports of 2012, 2013 and 2014 started to warn the IOTC commission about the risk of such increase notably with clear statements that were present in SC reports since 2011 such as “the stock is unlikely to support substantively higher yields based on the estimated levels of recruitment from over the last 15 years.” (IOTC 2011: 107). Despite these, catches continued to increase and the status of yellowfin tuna being subject to overfishing was established with the stock assessment of 2015 and in the reports that followed. The 2015 report adjusted the figures of catches since 2011 (**Figure 6**) and reported 94% probability of overfishing (IOTC 2015). It also presented that the situation was “a direct result of the large and unsustainable catches of yellowfin tuna taken over the last three (3) years, and the relatively low recruitment levels estimated by the model in recent years.” (IOTC 2015: 84). Despite an improvement to a 67% probability of

overfishing in 2016, the status of the stock reverted to a 94% probability of overfishing in 2018 (IOTC 2016a, IOTC 2018b).

**Figure 6: Evolution of yellowfin catch as presented in the SC reports of 2012 to 2018**



Each cluster of bars represents the level of catch reported by the reports of successive years (vertical labels). Each report presents the data of previous years catches (coloured bars). The graph shows that the level of catch for certain years evolved from report to report.  
 Source: Analysis by the author

In this narrative, the state of tuna resources has been established through the use of scientific models that consider various criteria including fishing efforts, mortality and maximum sustainable yields. The scientific committee is in charge of undertaking the stock assessments. Representatives of member parties present at the SC work together to undertake the assessment by using modelling techniques. Representatives are usually scientists of research institutes for the case of DWFNs and more developed coastal countries and representatives of units in charge of tuna statistics for developing coastal countries. Assessments are based on common scientific methods used within all RFMOs in charge of tuna, often developed by fisheries scientists of more developed countries and appropriated by other members of the SC. Despite the diversity of its members, the SC has relied on scientific

models to produce its advice and warning about the potential collapse of the resources since 2011.

### **Cast of actors and solutions**

In the IOTC narrative of tuna being overfished, the cast of actors is less precise and points the blame towards most fleets including those using “longline, gillnet, handline and purse seine” (IOTC 2015: 84) as having contributed to the collapse of the resources. These gears account for 86,2% of the catch in the Indian Ocean and only exclude two fishing methods: pole-and-line and trolling. Therefore, the IOTC attributes the role of villains to those using specific gears rather than specific members. The attribution of the hero role is however clearer. The SC, as an advisory committee to the commission, see members of the IOTC as able to reverse the situation. The solution proposed was prescribed in the management advice of the SC. In the 2015 report, the SC’s recommendation was to reduce the catches by 20% of the 2014 level of catch to have a probability of 50% chances of recovery by 2024. For the SC, improving the state of the yellowfin stock required a reduction in catch and effort from most fleets to revert to a lower level of catch considered within MSY in 2014. This would allow the fish population to replenish and ensure that fishing could continue at MSY level in the Indian Ocean. As will be highlighted in the parallel narrative at the IOTC level, this recommendation of the SC was difficult to implement. This is mainly due to the fact that heroes and villains are related as the fleets responsible for overfishing are operated by IOTC members who have both the interests of conserving tuna under the mandate of the IOTC but also the economic interests of their fishing companies.

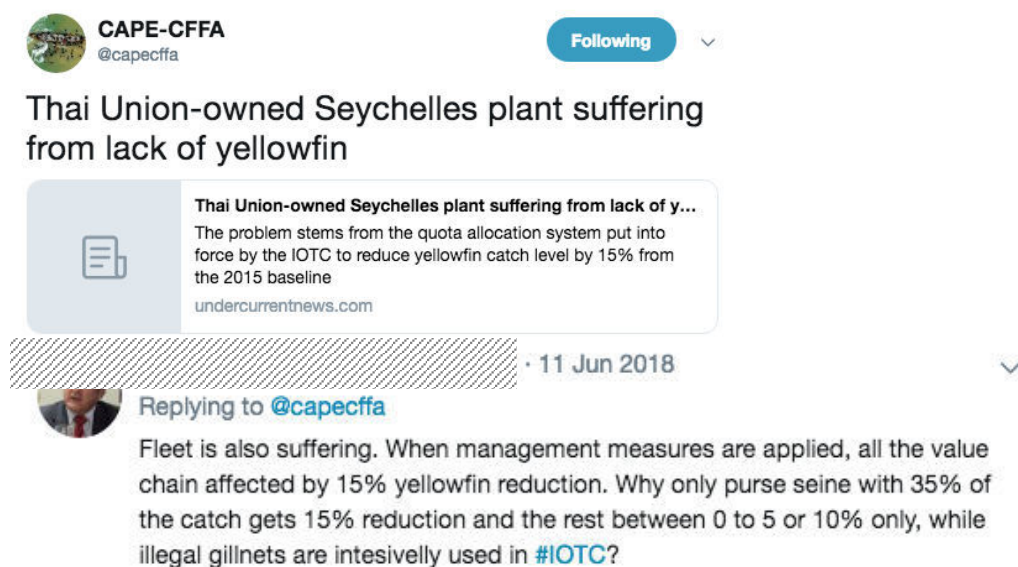
#### ***5.2.5. The narrative of European industrial operators: “we are unfairly blamed for overfishing”***

The next set of actors that also see tuna as overfished is the industrial operators. Here an analysis of European operators’ views was possible and not those of Asian operators. As they take part in discussions within the SC and in implementing resolutions taken at the commission, industrial operators acknowledge the overfished status of tuna resources based on the IOTC stock assessments presented in the previous section. Their narrative is, however, distinct and could be seen as a counter-narrative to the one of local fishers. The narrative contains two elements: inequality of blame put on their exploitation and their socio-economic contribution to coastal countries. In this narrative, actors in the industrial segment often see themselves as being victims of injustice while some NGOs and coastal countries with contradictory views are seen as at the origin of the issue.

## **Content of the narrative**

The narrative of industrial operators has been mostly present in their public discourses. The first element consists of claiming an unfair burden on industrial fleets in implementing management measure regarding yellowfin in the Indian Ocean. During my first fieldwork of 2017, the IOTC's plan for rebuilding yellowfin stock had been in place for a year, with various limitations to catches for different gear types. Some parties to the IOTC, despite the high probability of overfishing established in the region, opposed the implementation of the rebuilding plan. First, some foreign fishing fleets, especially the Spanish one, claimed injustice regarding the 15% reduction required from purse seiners, even if the original scientific advice was a 20% reduction. The industrial fishing operators protested to the EU and to their individual governments. One of the Spanish operators in the WIO, ANABAC, made a formal complaint to the Spanish government for an "unfair closing of the fishery in the Indian Ocean" (Mereghetti 2017b). As the IOT cannery started to complain about the lack of yellowfin supply in the Seychelles because the quota of yellowfin was reached in the WIO (Undercurrentnews 2018), fishing operators accentuated the gravity of the situation. They claimed that there is an unfair treatment of the purse seine fleet compared to other gears in the Indian Ocean (**Illustration 7**). Here, business actors discount the scientific evidence of overfishing and promote a narrative of unfairness and impediment of their economic interests.

### **Illustration 7: Reply form a representative of purse seiners on the yellowfin situation**



The image shows a screenshot of a Twitter thread. At the top is the profile of CAPE-CFFA (@capecffa), which is followed. The main tweet is titled "Thai Union-owned Seychelles plant suffering from lack of yellowfin" and includes a link to an article on undercurrentnews.com. The article text states: "The problem stems from the quota allocation system put into force by the IOTC to reduce yellowfin catch level by 15% from the 2015 baseline". The tweet is dated 11 Jun 2018. Below it is a reply from a user with a profile picture of a man in a suit, replying to @capecffa. The reply text reads: "Fleet is also suffering. When management measures are applied, all the value chain affected by 15% yellowfin reduction. Why only purse seine with 35% of the catch gets 15% reduction and the rest between 0 to 5 or 10% only, while illegal gillnets are intensively used in #IOTC?"

Another level of unfairness is also felt is within the European fleet itself. As the French fleet has fewer vessels and capacity than the Spanish fleet, discussions with crew members on



French vessels highlighted that Spanish operators are considered as taking more tuna by their French colleagues, seeing them as more responsible for the overfishing situation. An Ivorian crew member interviewed during landing in Seychelles commented, “we heard fishing yellowfin is now forbidden. We do not really understand the situation. We [on French boats] fish less than the Spanish and yet we get equally penalised. For us as fishers, it is very discouraging” (SE 63). In mid-2018, an interview with a representative of a Spanish fleet presented the case of implementing the catch limitations as “too difficult for the purse seiners” (SK 03). The interviewee explained that monitoring was highly difficult especially because the purse seine fishery does not only catch one species. For that reason, the Spanish fleet just fished until the limit was reached. Here, within the value chain, actors questioned the implementation of management measures as being ‘unfair’ between the different gears subject to the measure or even between the different fishing operators.

The second element of the narrative of industrial operators, especially European ones, consists of reiterating the contribution of industrial fishery to economies of coastal countries. This includes the contribution of data that industrial fleet have submitted to the IOTC to establish stock assessments. Also, as various industrial operators have invested in the development of ports and canneries in the WIO region (as will be discussed in Chapter 7), they see the adoption of management measures on yellowfin, requiring purse seiners to reduce their catch more than other gears, as affecting both purse seiners and coastal countries. Industrial operators consider that their exploitation is key to providing tuna especially to the canneries of the region. While industrial fishing, and especially purse seiners, record the highest catches in the WIO (IOTC 2018a), they also depict themselves as being at the centre of the tuna economies in the region especially for countries like the Seychelles or Mauritius, with very active ports (SK 04). As expressed by a representative of industrial fleets:

“The EU developed the canneries and also provides preferential custom tariffs for tuna products from the region, coastal countries have been benefiting from the industrial exploitation. Resolutions adopted at the IOTC might backfire at coastal countries” (SK 05).

This view is also shared by some government officials in the WIO. When asked about this difficult balance between adopting measures and aligning with the interests of DWFNs, a government official from the Seychelles acknowledged:

“The truth is, whether we like it or not and unless there is an economic study that proves otherwise, we cannot do without industrial tuna fishing, in the short and long term. We have tried pole and line and it did not work, the current increase in the semi-industrial fleet is lacking fishers, what is the point of developing a fishery if it is to recruit foreigners? The public is also not really aware of the true value of tuna fishing, including the important volume of reefers and containers going through the port. Without all that, the port would not be so important. It provides jobs for many people, but it’s not known.” (SE 40)

This second element of the narrative by industrial fishers presents the socio-economic contribution of industrial fleets as also affected by management measures addressing overfishing.

### **Cast of actors and solution suggested**

Within the narrative of industrial fishers being unjustly and unequally subject to management measures, the cast of actors is made clear especially when it comes to discussions at the IOTC. Countries like Australia, Maldives or South Africa are seen by some representatives of the industrial segment of being involved in hostilities against industrial actors (SK 03, 04, 06). Representatives from the industry interviewed during the fieldwork acknowledged that countries such as Maldives, highly dependent on tuna, were rightfully pushing for management measures (SK 05). They, however, considered other countries as tied up in measures that might not be beneficial to their national economies (SK 04). Another actor, the IPNLF is also considered by some as orchestrating the adoption of management measures with limited interests in other countries than Maldives (SK 04, SK 06). In this setting, industrial actors and by extension DWFNs see themselves as victims of machinations against their interests. This applies to the European fleet as it was not possible to discuss this issue with representatives of Asia fleets.

The solution propelled under this narrative is twofold. First is the adoption of measures requiring reduction of catch to be higher for other gears like gillnets. For industrial operators, this would improve the status of the yellowfin stock as restrictions would be increased for all. Improvement of the yellowfin stock would ensure a continued fishing of this commercial species for the industrial segment and is also necessary for some of the fleets to access MSC certification or to maintain it – for the case of the Spanish Echebstar Group. Second is

improving alliances between industrial actors and countries of the WIO region. As expressed by one representative of industrial fleets “it is necessary to find a consensus and common interests instead of focusing on debates that will bring us nowhere; more dialogues and exchanges are needed between the industrial fleets and coastal countries in order to find a common ground” (SK 04). Through suggesting dialogue, the industrial fleets aim to reinforce their ties with coastal countries and achieve more consensus about management measures at the IOTC level.

#### ***5.2.6. The narrative of NGOs at the IOTC level: “yellowfin tuna catches need cuts to prevent collapse”***

In the WIO region and more broadly at the Indian Ocean level, the narrative that NGOs are presenting is that overfishing is due to the lack of engagement of member parties at the IOTC in adopting management measures. The case of yellowfin tuna illustrates this narrative. The narrative is structured in the following set of events: the scientific committee of IOTC warned of unsustainable yields, member parties of the IOTC continued exploitation of resources leading to the current overfished status of yellowfin tuna, the tuna industry and local livelihoods are put at risk. In contrast to the narrative held by local fishers, the narrative here assigns less of a villain/victim role to actors.

#### **Content of the narrative**

In the early 1990s, the predominant discourse at the international level was one of global fishing resources being in crisis (Hubbard 2014). It was increasingly recognised that any taking from the ocean reduced the population of fish (Holmes 2014). Fish in general is also increasingly considered as a scarce commodity requiring conservation efforts (FAO 2016). The overfishing of species such as cod in New England or bluefin tuna in the Mediterranean has involved various narratives of degradation of livelihoods and local economies needing to be rebuilt (Longo and Clark 2012; McGuire 1997). Within this discourse, the narrative that NGOs promote is one that demands governments, scientists and civil society organisations to discuss and adopt measures to manage marine resources. NGOs have also supported local communities and fishers in various countries to conserve the marine resources locally and to mobilise themselves in groups to amplify their voice at the global level (CFFA-CAPE 2019; Rocliffe et al. 2014). They have also been involved in policy advocacy and lobbying at international meetings in order to push for the adoption of conservation measures.

For the case tuna in the Indian Ocean and more specifically at the IOTC, a group of NGOs have been active in pushing for the adoption of management measures, especially in light of

the overfished status of yellowfin tuna since 2015. Amongst them, two NGOs can be mentioned here: the WWF and the IPNLF. At the time of the fieldwork in 2017 and 2018, both NGOs were involved in encouraging parties to the IOTC to adopt measures. The narrative regarding the overfished tuna in the Indian Ocean is based on the findings of the Scientific Committee (SC) of the IOTC. In its 2012 report, the SC already stated that “the stock is unlikely to support substantively higher yields based on the estimated levels of recruitment from over the last 15 years” (IOTC 2012: 103). In 2013 and 2014 reports, the tuna catches saw an increase from 368,663t in 2012 to 402,084t in 2013, despite a Maximum Sustainable Yield (MSY) established at 344,000t by the IOTC (IOTC 2013, 2014).

Based on this evidence from the SC, NGOs have called members to the IOTC to take action. A press release from WWF prior to the 2016 IOTC meeting prompted in its subtitle “follow the science to save your tuna industry, WWF warns Indian Ocean Tuna Commission” (WWF 2016b: 1). Here the member parties of the IOTC are targeted by NGOs as having contributed to the overfishing of tuna resources by ignoring the warnings from the SC. The inaction of IOTC members has resulted in an increase of catch levels in the past five years (**Figure 6**) and a 67 to 94% probability of yellowfin being overfished (IOTC 2018b). Other NGOs also made statements in the same line. The ISSF argued that “it is vital for IOTC to end the overfishing of yellowfin and demonstrate that it can effectively manage the stocks under its purview” (IOTC 2016d). The IPNLF advocated in its statement that “options for reducing yellowfin catches across the range of gears should be explored taking into account the impacts on juvenile yellowfin and other vulnerable marine species of different gear types.” (IOTC 2016e). NGOs here are urging members to the IOTC to adopt concise measures based on the scientific committee’s recommendation.

Within the narrative, NGOs present the impact of this overfishing of tuna as devastating for the tuna industry and especially for local coastal communities. In the above-mentioned press release of the WWF, it is mentioned that “the seafood industry and communities that rely on a healthy yellowfin stock are highly concerned by the IOTC scientist’s predictions of a possible stock collapse in the near future, which would place their livelihoods under threat.” (WWF 2016b: 1). Similarly, the IPNLF stated in its position statement that “a large proportion of the Indian Ocean catch is taken by artisanal fisheries in developing coastal states [...] These catches are critical to local food security and livelihoods in coastal communities.” Through these assertions, we can see that NGOs see the consequences of overfishing as affecting various actors involved in the tuna industry but especially the local

communities and their livelihoods. This element of the narrative of NGOs is also seen in the narrative of local fishers.

### **Cast of actors and solution suggested in the narrative**

In the narrative of NGOs blaming the inaction of members to the IOTC for the overfishing of tuna, the cast of actors is less clear-cut as in the narrative held by local fishers. Here, governments are seen as both responsible for the situation but also the heroes that can save the tuna. While tuna is the victim of inaction, NGOs also consider coastal communities and the tuna industry in general as being the victims.

Solutions proposed by NGOs to overfishing and especially regarding yellowfin tuna have been according to the scientific advice of the IOTC's scientific committee. For NGOs, improvement of the status of the resources will benefit the various segments of the fisheries and coastal communities but also help NGOs achieve their conservation agenda in the Indian Ocean. The WWF for example has campaigned for the adoption of management measures at the IOTC since yellowfin has been assessed as overfished in 2015. Prior to the 2016 meeting, the NGO argued that "yellowfin tuna, a high-profile species that makes up a significant and valuable proportion of exports from the [Indian Ocean] region, is seriously affected by overfishing and is in need of urgent measures to recover." (WWF 2016a) and that "the lack of these control rules in this region has contributed to the current plight of yellowfin tuna" (ibid). The adoption of the yellowfin tuna rebuilding plan at the 2016 meeting was seen by the WWF as an "historic measure" (WWF 2016b). Another NGO active in proposing solutions is the IPNLF (as will be discussed in Chapter 7). On two specific occasions, the NGO has been supporting the Maldives in introducing management measures at IOTC. One was the adoption of harvest control rule of skipjack in 2016 seen as "a precautionary measure that outlines pre-agreed steps that will be taken should the skipjack fishery become unsustainable in the future" (IPNLF 2016: 1). The other one was the support of the allocation proposal led by Maldives (also discussed in Chapter 7). Regarding the adoption of measures for the yellowfin species, the IPNLF presented that "the very fact that a yellowfin management measure was adopted was a highly encouraging step in the right direction." (ibid: 2). In the making of solutions regarding the issue of overfishing, NGOs therefore play an important role in policy advocacy at the Indian Ocean level.

### ***5.2.7. Co-producing the discourse of tuna being overfished***

To conclude this section, it can be said all the main actors involved in tuna fisheries see tuna and especially yellowfin tuna as overfished. However, actors' views are based on different grounds. There is the narrative of overfishing by industrial vessels that is entrenched in the WIO region especially amongst local fishers. The narrative is co-produced through a mix of personal experiences in the fishing, the sense of loss of access over the tunas and the strength of the story being reproduced at the local level and by the public media. The narrative also relies on the importance given to local livelihoods and food security being at risk, and requiring the solution of demanding that industrial vessel have their access to tuna resources limited. The second narrative, one of overfishing being caused by inaction the IOTC members has been promoted by NGOs active in the region. This narrative is co-produced not only by the NGO's vision on how tuna fisheries should be managed, but also on their reliance on the scientific advice of the scientific committee. To this is added the strong consideration of local coastal communities as being affected by overfishing. Here, the call for action by NGOs has been strong at the IOTC and eventually led to the adoption of management measures. The third narrative is more nuanced one coming from the industrial sector especially the European fleet. While representatives of the sector recognise the fact that tuna is overfished based on the IOTC's assessment, they see this overfishing as unjustly attributed to the purse seiners especially as other gears were also considered as contributing to the situation. Within the European fleet itself, the feeling of unjust blame is present between crew members of the French fleet, considering themselves fishing less than their Spanish colleagues. Here, their narrative is co-produced by both a long experience in the fisher of crew members and reliance on the IOTC's assessments by the SC. The last narrative held by the IOTC's SC is of overfishing due to the unsustainable catch of fishing fleets in the Indian Ocean. Here the narrative is co-produced by the use of scientific models and the interpretation of results by the members of the SC. This section has shown that the discourse of tuna being overfished is present at both the local and regional level and has been co-produced by local perceptions, experience in the fishing, scientific evidence, but also perspective being unjustly burdened by management measure and the political divide between members of the IOTC.

### **5.3. TUNA STOCKS AS DIFFICULT TO ASSESS – A PARALLEL VIEW**

While there seems to be a strong discourse of tuna being overfished maintained by local fishers and NGOs, in this section I argue that there is parallel discourse that exists at the WIO and IO levels. That is a discourse of the state of tuna stocks being unknown or difficult to predict. This discourse is produced and reproduced by government officials, representatives of industrial fishing and the IOTC members within the scientific committee of the IOTC.

#### ***5.3.1. Elements of the discourse: limited national and regional data and scientific uncertainties***

In parallel to the discourse of tuna being overfished, there is a discourse within the WIO and more broadly the IO of describing tuna stocks as challenging to assess. Such discourse is mainly based on two elements: the limited knowledge of on the state of tuna resources and the challenges presented by scientific models used for stock assessments. The narrative of limited knowledge regarding tuna is evident through a look at national reports from fisheries departments. Here, the latest (up until 2018) two fisheries reports produced by the fisheries department were analysed for each country studied. I will present the structure of fisheries reports in the three countries and show how there is indeed no information regarding the decrease of tuna in the national waters. While the reports are filled with catch statistics and information regarding tuna, these do not allow fisheries departments to build a clear picture of stocks status.

For the case of Madagascar, information regarding tuna is produced by periodical bulletins of the USTA. It is divided into four parts: the catch by foreign vessels in the Malagasy EEZ, the catch by national vessels, the quantity and type of bycatch landed and the quantity of the tuna landed and transhipped at Antsiranana port. Data on catches by foreign and national vessels is retrieved through catch logbooks that vessels send to the USTA. The USTA reports make no conclusions about the state of the tuna stock in the Malagasy EEZ. Instead, they present, for example, the increase and decrease of catches in the industrial fishery, the stability of catch in the semi-industrial segment, or the results of recent data collection that they started to do on catches within small-scale fishing. In the two bulletins (2015 and 2017) analysed, the USTA estimates the catch being according to fishing effort and number of boats fishing in the EEZ. In fact, they even suggest that there are more tunas available in the EEZ that requires exploitation. The USTA states in its 2017 bulletin that:

“the analysis of catch per unit effort showed that the tuna stock in the Malagasy waters is not subject to overexploitation and that Madagascar could still increase its fishing effort (number of vessels) in order to improve the quantity of catch.” (USTA 2017: 21)

The Seychelles has a slightly different system from Madagascar as it produces both periodical statistical bulletins and annual fisheries reports that both include information on tuna. The SFA is the author of both types of documents. The statistical bulletin is structured rather similarly to the one of the USTA with catches of different segments of tuna fisheries and quantity transhipped at port or landed at the IOT cannery. The annual reports include a condensed version of the information from the statistical bulletins. Catch data from the industrial and semi-industrial segments come from logbooks as well as from the transmission of landing and transshipment forms by fishing vessels to the SFA. The SFA gets a regular submission of logbooks from purse seiners, but complains about the lack of consistency in submission from the longliners. Data is also collected via the tuna sampling programme conducted during landings in Port Victoria. The number of vessels active in the waters of the Seychelles has been considered stable in the past 10 years (SFA 2016). Statistical bulletins produced by SFA are highly detailed compared to the ones in Madagascar. The SFA presents information not only by catches of the different segments of the fishery but also by access regime, by flag, by geographical area and even by different ports of the WIO. However, the diversity of information produced revolves around catches presented in different ways including in text, tables, figures and maps.

Different to the Malagasy bulletins where conclusions are made at the end, the bulletins and reports from the Seychelles do not include such conclusions. They only present increases or decreases of catches in the different segments. The catch trends in the different segments of the fisheries are mainly described as “stable” or “more or less constant”. For the case of purse seiners for example:

“Trend analysis of the purse seine catches in the Seychelles over the last 10 years shows that following a significant drop of 37% in catches in 2007 from the previous year, the purse seine catches have since then remained more or less stable” (SFA 2016: 3)



In such setting, it is challenging to establish a decrease or increase of tunas in the waters of Seychelles. From the reports and bulletin contents, it could be implied that the tuna resources are stable if viewed from the catch trends.

The case of Mauritius is different from the two other countries. Fisheries reports are produced by the Ministry of Ocean Economy to which the Albion Fisheries Centre provides data. The latest two reports that are accessible to explore information regarding tuna in Mauritius are the 2016 performance report of the Ministry and the 2011 fisheries report. The 2016 performance report was as it is called about performance, information regarding tuna are labelled under “achievements” of the fisheries division. The report presents the tuna catch between July 2016-June 2017. The 2011 report and previous reports present data relating to tuna under a specific section called ‘licencing/tuna fishery/imports and exports’ and had information regarding tuna catches of that year. From the structure and content of national reports in Mauritius and also the gap in reports produced, it is therefore difficult to establish the state of tuna resources or even establish the history of catches in the Mauritian EEZ.

From this investigation of fisheries reports, available national reports paint a picture of more or less stable exploitation at least between 2012 and 2016 in the three countries.

The second element of the discourse is the difficulty of undertaking stock assessments at the IOTC level. At the current time, catch data that is used for stock assessments mostly come from industrial fleets, the national report regarding catches from their semi-industrial fleet and to a very limited extent from small-scale fisheries catch data. As a consequence of the limited knowledge on the national stock status presented above, coastal countries have struggled to provide data regarding the catch of their small-scale fisheries. Actors involved in stock assessments consider that the current model used for stock assessments is impaired by the above issue of insufficient data. As expressed by a researcher involved:

“There are a lot of mistakes in the calculation under the current model of stock assessments. There is a large underreporting of catches for more than 50% of the Indian Ocean fleet, mostly from gillnets and other gears. Even if the model could be good, it is not able to consider these fleets that are not reporting their data. This can lead to false and artificial assessments” (SK 08).

Such comment is at the centre of the discourse of difficult assessment of tuna. Parties to the IOTC have no other choices than relying on the model to predict the trajectory of the stock.

Actors involved in the stock assessment exercise are, however, aware of the limitations of the system which are the foundation of various uncertainties regarding the stock status.

### ***5.3.2. Actors (re)producing the unpredictability discourse***

Three sets of actors are producing this discourse of unpredictability of tuna stocks. Their individual narrative will be presented in more details in the following sections. The first actors that produce the discourse are the coastal countries' governments notably the fisheries departments. The discourse is mostly produced through their written reports as well as in their public speeches. Representatives from fisheries departments are also present at the IOTC level as members of the scientific committee that undertake stock assessments. The discourse is then produced and reproduced in a different form than in national reports, this time through conclusions of stock assessments. The last set of actors that reproduce this discourse is the industrial fleet operators. The latter are present at the IOTC and have agreed to adopt management measures for the case of yellowfin tuna in 2016. However, they argue after the 2016 meeting that the measure was not adopted based on a fair consideration of all IOTC members and that it has caused prejudice to the industry.

### ***5.3.3. The narrative of governments at national levels: “we cannot know the national stock of tuna”***

The first narrative that presents the status of tuna stock as being difficult to establish is at the governments' level. The narrative presents two elements: the migratory feature of the tuna making the knowledge on the state of the resources only available at the regional level and the argument of the importance of tuna fisheries for the economy. The narrative does not establish roles of actors as clearly as in the narrative linked to overfishing.

#### **Content of the narrative**

Discussions on the state of tuna resources during interviews of government officials often highlighted the comment that it was not possible to know the state of resources at the national level. From the reports and interviews, the main argument that sustains the narrative of limited knowledge on the national tuna stocks seems to lie within the fugitiveness of the tuna. Since the tuna travels across EEZ boundaries, fisheries departments argue that it is challenging to know how much tuna there is within a particular EEZ. The argument is supported by two facts. First, stock assessments of different species are undertaken only at the Indian Ocean level through the IOTC. These assessments are based on catch data provided by fishing fleets which include national fleets of coastal countries but also fleets of

DWNS which fish both in various EEZs and in the high seas. While fishing vessels are required to provide the coordinates of their fishing, each member party presents its national report at the IOTC with their catches across the Indian Ocean. Catches are presented by member party, fishing in their EEZ and beyond. Second, it can also be argued that the level of compliance of DWFNs in sending logbooks is mediocre and sometimes inexistent for Asian fleets (MD 10, MD 71). Catch data at the national level are therefore incomplete and currently rely mostly on catch reported by EU vessels. Another way for countries to record their catch is through the monitoring of vessels landing at ports from which statistic units can retrieve logbooks straight away from captains. While this is mostly feasible for the Seychelles and the fleet of purse seiners regularly landing in Victoria; it is challenging for the monitoring of Asian fleets which sometimes land in Mauritius, rarely in the Seychelles and never in Madagascar. For a country like Madagascar where the number of landing vessels has drastically decreased, its knowledge about the status of stocks in its EEZ is produced through statistical data that is highly reliant on the good faith of non-landing fishing vessels of sending logbooks and getting logbooks from the few landing Spanish vessels. For these reasons, governments have relied on the IOTC to produce data regarding the tuna stock.

This narrative is also contributing to sustaining industrial fishing in the region. Tuna fishery, especially industrial, is perceived at the government level as bringing economic development. Tuna fisheries have always been a strategic fishery in the WIO and especially for the three countries studied. The strong discourse of economic development stems from the contributions of tuna fisheries to the economies of the three countries. These include the revenues from fishing access agreements and tuna exports as well as jobs at the canneries and ports. Revenues are key to national budgets and tuna export is an important source of foreign currency. Furthermore, canneries are often praised as being one of the largest employers in Mauritius and the Seychelles or in Antsiranana, Madagascar. Under this economic dependence of countries on tuna fisheries, governments have a strong economic interest in sustaining tuna fisheries including industrial fishing in the WIO.

The narrative of limited knowledge is then used to justify continued access by DWFNs to the coastal waters on the ground of economic development. With an unknown stock status and catch data showing a stable exploitation, governments argue in their national reports that they are able to continue the practice of concluding fishing access agreements with DWFNs. Fishing access agreements are based on the idea of fishing the “surplus” of total allowable catch in national waters (Article 62 of UNCLOS). However, that surplus has not been

established in the countries of the WIO nor at the Indian Ocean level. For the case of tuna resources and other migratory species, its determination appears inaccessible in the current capabilities of catch monitoring in the region as it would require the availability of data regarding all catches at national levels but also in the high seas. When offshore fishing by DWFNs started in the 1980s, there was no local fleet fishing beyond territorial waters which created the assumption that there was a surplus. While that could have been a valid argument at the start of tuna fishing in the WIO region, it is not the case anymore considering the development of national fleets and local fishers having to fish further. However, fishing access agreements continue to exist and rely on existing catch data, which pictures fish as being available. Despite the existence of maximum sustainable yields for the main commercial tuna species and discussions of the allocations of fishing opportunities at the Indian Ocean level, there is currently no repartition of the total allowable catch of the different species of tuna between the countries of the region.

The difficulties that fisheries departments encounter in gathering data regarding the national state of tuna resources fuel the narrative of limited knowledge on stock status at the national level. It is not only the result of fisheries departments' limited means to collect and produce data regarding the stock. It is also co-produced by practices of stock assessments of migratory species that are only feasible at a regional level, along with fishing vessels not passing through ports and logbooks not being submitted to statistic units. These elements blend within a context where the economic development rhetoric is dominant.

### **Cast of actors and solution suggested in the narrative**

In this narrative of limited knowledge about the tuna resources, governments can be seen as the victims of the nature of tuna being migratory. The IOTC is then considered as the entity bringing the solution of producing more knowledge and data regarding the tuna stock.

In this acknowledgement of the role of the IOTC, fisheries departments also recognise that the data available either at the national level or at IOTC level is currently dependent on the industrial segment and their submission of logbooks. Data about local catches is often limited (for the case of Madagascar) or lack disaggregation (for the case of Mauritius and the Seychelles). Without the current data provided by DWFNs, there will be even less knowledge regarding the catches and the state of tuna resources in the national waters. Input from DWFNs is therefore seen as key to build the knowledge on tuna. Another solution emerging from this narrative is the need for more investment in improving the capacity of fisheries

department in gathering data. The limited knowledge narrative has then been harnessed by fisheries departments to justify requesting more financial assistance to donors to improve their research capacity. This is particularly true for Madagascar, for example, which was granted a EUR 67 million funding from the World Bank in 2017 for the SWIOFISH project under which the improvement of statistics was an important component. Over the years, tuna tagging projects have also been funded involving the different statistic units in the WIO in order to improve knowledge on the Indian Ocean tuna stocks (POSEIDON 2014).

#### ***5.3.4. The uncertainty narrative at IOTC: “it is difficult to predict the trajectory of the stock”***

A second narrative through which the discourse of unpredictability is expressed is at the regional IOTC level and more specifically within the scientific committee where stock assessments are discussed and undertaken. The narrative has two components: the uncertainty of stock assessment models and the difficulty in adopting management measure. The narrative puts the blame of the situation on the scientific model on which the stock assessment relies whereas solutions are expected from the IOTC members. While the scientific committee reached the conclusion in 2015 that yellowfin tuna was probably overfished, the process towards reaching that conclusion included a few years during which uncertainty prevented to reach the stock status earlier. That process is described in the narrative below.

#### **Content of the narrative**

To analyse the content of this narrative, I use the case of yellowfin tuna, which is illustrative of the complexity of establishing the state of resources at the regional Indian Ocean level. Here, I analysed seven reports (2012 to 2018) from the IOTC’s Scientific Committee (SC) detailing the state of yellowfin tuna stocks in the past five years. Stock assessments were undertaken periodically for the species, notably in 2012, 2014, 2015, 2016 and 2018. In the 2012 report, the catch level of 2010 (299,000t) was presented and considered to have been at a “sustainable level” (IOTC 2012). In 2013 and 2014 reports, the catches saw an increase beyond the Maximum Sustainable Yield (MSY) (IOTC 2013, 2014). While the statement that ‘the stock is unlikely to support higher yields’ was in both 2012, 2013 and 2014 reports, the reports also noted an increase in catch rates for different gears including purse seiners. Despite this, both reports still stated that “it is difficult to know whether the stock is moving towards a state of being subject to overfishing” (IOTC 2013: 108; IOTC 2014: 134).

This close look at how the state of yellowfin tuna stock has been assessed and presented in the different reports shows the continuous trend of high exploitation of yellowfin at the Indian Ocean level. Authors of scientific reports delayed the assessment of stock as being overfished due to the uncertainty of data, as well as the uncertainties on the projections and models used by the IOTC. The use of words such as ‘uncertainty’ and ‘unpredictable’ gave green light to a sustained exploitation of the resources in the Indian ocean. The second element of the narrative is the difficulty to adopt management measure at the IOTC. The 94% probability of overfishing from the 2018 stock assessment was mainly due to the lack of success in rebuilding the stock through the reduction measure adopted in 2016 (IOTC 2018b). To start with, the highest limitation adopted in 2016 was 15% for the purse seine fleet, despite the scientific advice of reducing all types of exploitation by 20% (IOTC 2016a). Furthermore, the implementation of the rebuilding plan in the end led to an increase in catch by different members. As presented in the 2018 report, “while catches for fleets subject to Resolution 18/01 decreased by 1% in 2017 compared to the baseline (2014/2015), the total catches of yellowfin in 2017 increased by around 3% from 2014/2015 levels” (IOTC 2018c: 39). According to the report, countries subject to the reduction measures exceeded their limit, notably by 7% for the Seychelles flagged purse seiners, by 33% for Iranian gillnets, and by 1% for handliners from the Maldives<sup>31</sup>. The EU only managed to reduce its catch by 5% despite its obligation of 15% reduction for the purse seiners (IOTC 2018c). Since Seychelles purse seiners are EU operated, it can be inferred that the EU did not comply at all with the reduction requirements and even exceeded their limits. Countries that reported compliance with their reduction requirements were Korea (purse seine), China (longline), Sri Lanka (longline), India (gillnets) and Maldives (bait boats). The 2018 report pictured a lack of improvement in the status of the yellowfin tuna stock. The adoption of conservation measures to rebuild the stock has not been efficient and even led to more exploitation of the resources.

As seen in other post-structural studies such as those of Jennifer Telesca, the conceptualisation of animals into technical words such as stock, biomass or population in fisheries science has consequences. It has made marine resources abstract, legible for policy-makers and commodified for capitalist accumulation (Telesca 2017). In her historical analysis of the word ‘stock’ in fisheries, she argued that the trust of fisheries scientists and policy makers in quantification is a strategy of simplification (Scott 1998). This renders

<sup>31</sup> At the 2019 IOTC meeting, the Maldives objected to the calculations by the Secretariat of the IOTC on the basis that the figure was cumulative of all its fleets while only vessels of less than 24m were subject to the management measure and these were compliant (IOTC 2019d).

problems of the ocean technical and only solvable through state regulation (Li 2007). For the case of yellowfin tuna, words such as ‘uncertainty’, ‘probabilities’ or ‘projection’ filled the scientific reports, have made the resources abstract and still available for harvesting. Scientists of the IOTC have attempted to control and manage tuna fishing with this anchoring in quantification and models, so far without success. While parties to the IOTC have agreed to reduce their catches, they have mostly failed to achieve their reduction targets by continuing to fish at high rates.

### **Cast of actors and solution proposed**

Within this narrative, there is no typical actors that could be considered as responsible for the overfished status of yellowfin tuna. Ultimately, members of the scientific committee have relied on scientific models to establish the status of the stock and the model presents levels and variables of uncertainty. It could, however, be argued that a precautionary approach could have been taken by the IOTC members as early as when reports mentioned that the tuna stock would not be able to sustain higher yields. Here, members of the IOTC can be put to blame – as seen in the narrative of NGOs – for their delayed reaction. The tuna here remains the victim of bureaucratic science and political reluctance to adopt management measures.

The solution proposed in this narrative is then twofold. First, members of the scientific committee continue to rely on the technical solution of stock assessment to provide an improved prediction of the stock. To this end, the quality of data within the IOTC is discussed as needing improvement from all segments of tuna fisheries (IOTC 2018c). Scientists involved in stock assessments reiterate that “one of the biggest challenges in the region is the lack of data: the quality is poor and the uncertainty is too high and cannot even be quantified” (SE 52). Second, parties to the IOTC are also expected to adopt conservation measures according to the advice of the scientific committee. Since this management advice of the SC was not followed from the start, there is a low prospect of member parties to the IOTC adopting more stringent measures to help the tuna populations to recover.

#### ***5.3.5. The parallel narrative of industrial operators: “there is a lack of data from other segments”***

While industrial operators recognise the status of tuna stocks being overfished, there is also a parallel narrative within which industrial fleets consider that knowledge about the tunas is still limited in the Indian Ocean. This narrative has two elements: the lack of data from other segments and the unpredictability of the fish. Here the cast actors include some local fleets

not providing data to the IOTC that shift the blame of overfishing to those providing data (here the industrial fleet). Governments here are seen as able to bring the solution by improving the reporting of its local tuna fishing. The fish here is regarded as dictating the level of exploitation possible.

### **Content of the narrative**

In this parallel narrative, the industrial sector and in particular the European fleets, also concur with the regional narrative of tuna being difficult to assess but on different grounds. The storyline of this narrative is set as follows: the industrial sector is providing data to the IOTC for the purpose of assessments of the state of the resources, while other fleets especially coastal ones such as gillnets provide less to no data to the IOTC. The only knowledge produced is from the exploitation by industrial operators which ultimately puts them as responsible for overfishing. As expressed by a representative of the Spanish fleet:

“The knowledge about the stock of tuna in the Indian Ocean is based on data and information provided by the industrial fleet. We are always blamed to be the bad guys, but we are the only ones that provide the data. We know very little to nothing about the extent of artisanal fishing in the Indian Ocean and we know for example that gillnets is very detrimental to the environment and it is widely used by some countries.” (BK 05)

This limited knowledge about artisanal fishery at the Indian Ocean level is then pointed at by industrial fishing actors as a failure of coastal states in managing access to the resources by local fishers. As seen in section 5.1.1. this disparity of data available is seen as affecting the model of stock assessments. In response to this argument, my discussion with a representative of local fishers brought up the following remark:

“Regarding the critics of gillnets at IOTC, to me it is just a diversion. Those practices have been there for thousands of years and feeding the coastal people. For coastal communities there is an issue of food security here compared to selling tuna cans to supermarkets in Europe.” (SE 47)

Here we can see that local fishers and representative of the industrial segment have strong statements against each other that are often used in public discourses or during discussions at the IOTC.

The second element in this narrative is the unpredictability of the fish, which is claimed by different actors in the industry sector including fishing crew or representatives of fishing



companies as rendering the state of tuna stocks highly difficult to know or predict. A captain on a Spanish purse seiner expressed:

“It is impossible to say if there is more or less fish. Some years there is no fish in one place (like around the Chagos, in the western part of the Indian Ocean, in the Mozambique Chanel) and some years there is fish everywhere. Sometimes you need a long time to find them. It happens that you go fishing for two weeks and there is no fish. Maybe the fish is more intelligent than we think...” (SE 66).

While such a statement seems improbable considering the amount of technology that is available to fish and locate the fish, it is also echoed by other actors in the sector who argue that tuna is productive in cycles and that history has shown that some years have been really low and some years it has been more productive (SK 09). Here, the state of tuna stocks is considered as unpredictable and fishing as depending on the variable productivity of the fish. Interestingly, such arguments find an echo in the discourses of certain local fishers (often small-scale or artisanal fishers not directly involved in tuna fishing) who consider tuna productivity and tuna catch unpredictable (MD 13, MD 24, MU 39, SE 04, 46).

### **Cast of actors and solution proposed**

Within this narrative held mainly by the European fleets, the coastal fleets and their governments are seen as contributing to the issue of limited data available and exacerbating the unjust blame put on the purse seiners regarding overfishing. The IOTC commission here is seen as able to fix the problem by being more or equally strict on other fleets in the Indian Ocean regarding data reporting. This also presents its challenge as decisions at the commission are taken by the same coastal country governments that are struggling in the reporting of their local tuna fishing. This solution therefore remains difficult to achieve but industrial actors continue to advocate for such improvement both in their public discourse and their debate at the IOTC commission.

### ***5.3.6. Co-producing the discourse of unpredictability of tuna stock***

As highlighted by the three narratives above, there is an equally powerful discourse of tuna stock being difficult to assess in different arenas of the tuna exploitation and management. While it is less seen in the media compared to the overfishing discourse maintained mainly by local fishers, it currently drives how management measures are adopted at the national and regional levels. The three narratives have also highlighted processes that co-produce the

discourse. At the government level, the narrative is co-produced by challenging socio-economic context of countries leading to inability to assess the stock, the simple assumption that regional processes will establish the state of resources, and the reliance on tuna exploitation as a provider of economic development. At the IOTC level, co-production is present as the establishment of a stock status is the result of not only the limited data supplied to the models but also the bureaucracy and technical constraints of IOTC members when establishing the stock status and adopting management measures. The narrative of the industrial sector relies on three elements of co-production: their perspective on the lack of data from other fleets and the unpredictability of the fish and its productivity. Overall, the discourse of tuna being difficult to assess is reproduced amongst government actors and industrial actors and to some extent within the scientific committee of the IOTC. While it ultimately leads to the ability of actors to sustain the exploitation of resources and delay the adoption of management measure, actors themselves have been constrained by other elements beyond their views and actions. Diverse considerations regarding the fish productivity, socio-economic contexts of tuna exploitation or the efficiency (or lack of efficiency) of scientific models have shaped the discourse and its reproduction amongst actors.

#### **5.4. INTERACTION BETWEEN NARRATIVES**

We can see that there is a diversity of narratives regarding the state of tuna resources in the WIO. While a discourse of tuna being overfished and reduction of resources is present amongst various actors involved in the fishery, their narratives are different according to their diverse interests. While local fishers and representatives of industrial fleets put the blame on each other for the decrease of resources, NGOs and the SC see IOTC members including governments and their fishing fleets as responsible for the situation and lack of management measures.

The local, industrial and NGO narratives are known but not really considered at the decision-making level regarding the fishery, may that be at the national or the regional level. This is made apparent with the continued practice of concluding fishing access agreements at the national level despite the long-term outcry of local fishers, the differentiated measures for different fleets adopted at IOTC despite demands of industrial fleets or the adoption of less stringent management measures despite the SC's advice at the regional level. Nevertheless, actors such as the FPAOI or NGOs supporting local fishers attempt to increase the reach of their narrative at the IOTC level, which is already well received in the international media

and aligns with the more global discourse of overfishing and depletion of resources. Local fishers, expressing their views from a long-standing experience in the fishery, continue to claim that the government lacks consideration of their needs and the state of the resources. On the other hand, industrial actors such as the EU can show contradictions in their narratives and practices, acknowledging the existence of reduced tuna stocks and accepting to adopt management measures but then claiming unfairness after adoption. This situation shows that, under group pressure or various lobbying from backstage actors like NGOs, members to the IOTC can adopt measures that, when put against their national and economic interests, are highly challenging to implement.

Narratives maintained by the governments in the three countries reflect the pressure from the economic development imperative present within tuna fisheries. While a narrative of limited knowledge regarding the national state of the resources is expressed, fisheries departments are aware of the level of catches in their waters. The narrative of overfishing maintained by local fishers clashes with the narrative of more or less stable exploitation sustained by the government regarding tuna exploitation. The positions of governments also change when it comes to regional discussions where government representatives of each country are also present and contribute to the production of knowledge on the state of the resources at the Indian Ocean level. The national narrative of 'we cannot know' is replaced by one of 'we cannot be sure' then a '96% probability of overfishing' at the regional level. These three positions of governments show that governments' views are strongly influenced by the different settings and socio-political environment that these perspectives are built and promoted.

The two parallel views on the resources and the seven narratives presented above show that while the state of resources seem to convene around two more or less uniform stories, narratives of actors and interests are distinct which makes decision-making on management highly challenging as storylines of actors can be different at different scales.

A common trait of the narratives of local fishers, industrial segment and governments is that they are produced ultimately to sustain access to the tuna resources. From the local fisher asking for industrial fishing to be reduced or stopped to the industrial fisher complaining about unfair management measures, and governments presenting a stable exploitation in national waters, actors with their individual interests use their version of the story of the state of tuna to be able to continue benefiting from the resources. NGOs in their endeavour of assisting countries either regarding management policy or through projects also have an

interest in sustaining the resources of the WIO and managing its access towards conservationist goals. As for the IOTC, representatives of IOTC members are bound by the science of models and its uncertainty when at the scientific committee while they are mandated to both conserve the resources and sustain access during the commission's debates.

## **5.5. CONCLUDING DISCUSSION**

In this chapter on narratives, stories and ideas around the state of tuna resources have been explored from the perspective of different actors according to the particular context of their actions (**Table 18**). I have shown that in the WIO, the state of tuna resources is not only under a discourse of depleted and overfished resources. Another discourse around uncertainty and unpredictability of the stock is also present at the national and regional levels. The existence of discourses other than the one about depleted resource can be explained by the drive of countries and members of the IOTC to continue fishing the resources. To this is added the fact that the IOTC is caught up in its own political struggles – amongst members and its bureaucracy. This makes the management of tuna stocks impeded by elements such as reference numbers, uncertain models, economic and political interests.

**Table 18: Diversity of claims and discourses regarding tuna resources in the WIO**

View	Claimed by	Narratives	Co-produced by		Political implication
Tuna resources are overfished	Local fishers, intermediaries	Tuna as overfished by industrial actors	Repetition of story of overfishing by industrial fishers, constantly made current by the media - Feeling of unjust access	- Long-standing experience in fishing	Resource conflict, local fishers demanding the reduction or the end of industrial fishing
	Industrial fleets	Overfishing cannot only be blamed on industrial operators	- Perspective of being unfairly treated - Historical contribution to economies		Political divide at the IOTC commission
	NGOs	Scientific evidence of overfishing at the IOTC level	- NGOs reports on tuna stocks	- IOTC stock assessments	Demand of conservation measures at IOTC
	IOTC scientific committee members	Unsustainable level of catch by various fleets	- Scientific models - Data available		Debated strong management advice
Tuna stock as difficult to assess	Fisheries departments	The state of national tuna stocks is unknown but levels of catches are stable	- Knowledge that stock assessments are done at the Indian ocean only - Formats of national reports only picturing catches	Limited data available	Perpetuating the practice of granting access to DWFNs
	IOTC scientific committee members	It is difficult to predict the trajectory of tuna stocks	- The way stock assessments models produce information about the stock - Scientific language of lack of certainty - Political setting at IOTC meeting negotiation		Slow adoption of stringent management measures
	Industrial fleets	There is limited data on other segments and the fish	- Long-standing experience in fishing - Consideration of being the 'good' ones by providing data		Demand of stronger attention to other fleets

Using political ecology as a lens of analysis in this chapter, by dissecting contents of narratives and the diversity of representations that various actors have (Adger 2001; Svarstad 2012), has allowed a multi-scalar view of competing discourses in environmental issues such as the case of the state of tuna resources in the WIO. The chapter has highlighted that local actors in the WIO have developed strong discursive claims that they use at different levels to contest exploitation by the industrial actors. The industrial actors, on the other hand, while

providing data that helps establish the overfished status of yellowfin tuna, have relied on scientific uncertainty to justify their continued exploitation of the resources. In the current conflict between small-scale and industrial fishing in the WIO, we have shown the presence of a ‘discursive power’ that is not only exercised by usual powerful actors, here the industrial actors. Usually considered less powerful actors, here the small-scale fishers, have built over the years a powerful narrative of tuna being overfished, with the support of actors such as NGOs and the media.

Coming back to the framing of co-production, this chapter has shown how discourses about the state of tuna resources in the WIO and overfishing of the yellowfin tuna in particular are co-produced. They are co-produced by discursive practices but also by fishing practices, technical report writing and stock assessment models. Using co-production helped to explain the broader range of elements that constructs the diversity of views regarding the state of tuna resources being overfished or not in the WIO. It showed that in the end, actors’ narratives are not only produced by what is said or the management decisions made. At each level explored, it showed that there is a broader and important context that serves as a scaffolding for the knowledge produced regarding the tuna resources.

Reflecting on the use of PE in this chapter, the focus was put on five actors involved in the use and management of tuna resources. This shed light on narratives of specific sets of actors namely local fishers, government officials, NGOs and industrial actors. What this chapter on discourses and narratives has not succeeded in doing is to analyse other narratives that are also relevant to tuna fisheries in the WIO. For instance, global narratives linked to tuna sustainability or tuna certification are currently gaining terrain in tuna fisheries, including in the Indian Ocean. For example, some of the purse seine fleets in the Indian Ocean claim to be sustainable because they have an MSC certification of some parts of their tuna catches. NGOs like IPNLF or WWF are questioning such claims. Overall, providing a picture of how the various ways discourses and narratives are produced has helped understand how actors justify their access to the resources and their aspiration regarding the management of tuna fisheries.

## **CHAPTER 6. ACCESS POLITICS AND THE WINNERS AND LOSERS IN THE WIO TUNA FISHERIES**

“If 3500 years of tuna history makes one thing clear, it is that where tuna is captured, human conflict and issues around governance are never far away... This law prevailed, independent of time and place.”

(Adolf 2019:248)

If the previous chapter has focussed on analysing the perspectives on the state of the tuna resources in the WIO at different levels and by different actors, I will now move to exploring the politics of access to tuna in the WIO. Within this next step of my political ecology analysis of the WIO tuna fishery, I aim to categorise the winners and losers in terms of how they access the resources. This follows the analysis of perspectives regarding the state of resources, as the former are also shaped by the types of access that actors have to the tuna resources. Since actors are so diverse, this chapter aims to unveil who has access to what and with what means and how different actors benefit from the tuna resources. To this end, the chapter will answer the research question: how do the politics of access to tuna resources shape the fishery and its management in the countries of the WIO? To respond to this question, I will use Ribot and Peluso's (2003) theory of access to investigate the different mechanisms that actors use to access tuna resources and will bring my own contribution to the framework.

The chapter will proceed as follows. I will start with a presentation of the theoretical framework where I discuss the theory of access and the need to integrate the concept of materiality which I consider important while studying a mobile resource such as tuna. The chapter continues by expanding the different elements of the theory of access. It first presents the different rights-based mechanisms applicable in tuna fisheries from the United Nations Convention on the Law of the Sea and permit systems, to national conservation measures and illegal means of access. It then looks at the eight relational and structural mechanisms of access that Ribot and Peluso suggest to look at. This use of the theory of access will show the diversity of means that are available to actors fishing in the WIO but also how some mechanisms have key impacts on the quantity of benefits accessed in the fisheries.

The third part of the analysis consists of unveiling the materiality infused theory of access. By exploring the different ways in which the materiality of tuna influences the access process and also becomes into-being or changes through practices, I will emphasise that an

exploration of access to marine mobile resources such as tuna, requires a great deal of attention to the spatiality of the sea and the materiality of the resources. From an exploration of materiality in other studies of natural resources, I will present how the concept will be integrated to produce an enhanced theory of access.

In concluding sections, I start with a classical political ecology analysis of patterns of winners and losers in the WIO tuna fisheries. I will show that establishing such patterns requires a special look at national contexts, the impact of specific access mechanisms and geographical scale. I continue my reflection by looking back at the use of the theory of access and materiality, presenting the contributions and limits of the chapter.

## **6.1. THE THEORY OF ACCESS AS A FRAMEWORK OF ANALYSIS**

My choice of using the theory of access of Ribot and Peluso (R+P) stems from my observation of the diversity of actors and processes behind tuna fisheries in the WIO. By using access theory as proposed by R+P, I was able to highlight the differentiated way that tuna resources are accessed as well as show how benefits are gained or not by different actors. Before expanding on these results, in this section. I will present the theoretical foundation of my use of the theory of access and the rationale for its enhancement. I will start with a presentation of ‘access’ as a concept. The section continues with my interpretation of the original framework of R+P as applied to tuna resources. Finally, I will show, based on the literature, the need to improve the original theory of access.

### ***6.1.1. The concept of access***

Studying access requires a clarification of the term. Here it is used in the context of access to natural resources in the realm of environmental management. Ribot and Peluso (2003) define access as ‘the ability to benefit from things – including material objects, persons, institutions, and symbols’ (p.153). I then see access as including physical access to the resources, their use and the ability to gain benefits from that use. Those three elements are covered within the theory of access of R+P (2003) that I will mobilise in this chapter. My definition of access also aligns with the one used by Schlager and Ostrom (1992) who see access as ‘the right to enter a defined property’ and ‘the authority to enter a resource’ (p.250), here the right and authority to access tuna resources. To that definition, I also align to the improved definition proposed by (Sikor et al. 2017) reworking the conceptual framework of property regimes. Their definition adds ‘use rights’ as a key element of access, beyond physical access. Through the use of the theory of access, I also look at the benefits generated from tuna.



Questions of access have been discussed mainly under the framework of studies of property, with different regimes of property providing various types of access to the resources (Blaikie 1989; de Janvry et al. 2001). In an open access regime, resources can be accessed without any restriction, with no specific rights assigned or claimed by holders (Fennell 2011). In other regimes, such as private, common or public property, completion of specific conditions is required to gain and maintain access, for example property rights or other forms of entitlement (Koch 2008; Ostrom 1999). In a common property regime, where common-pool resources such as communal forests, fishing resources or grazing areas are used by more than one individual or group, rules are established to control access to the resources. These rules can consist of limiting access to the ecosystem or limiting “the amount, timing, and technology used to withdraw diverse resource units from the resource system” (German and Keeler 2010; Ostrom 1999; Wade 1987).

Access has also been explored beyond discussions of property regimes. The field of political ecology has investigated the question of discourses or the interconnection between the local and the global and their consequences on people’s access to natural resources. Blaikie (1985), in his work on soil erosion in developing countries, talked of spatial marginalisation, property and the role of capital and social identity in shaping access to resources. Berry (1989), through her work on agriculture in Africa, developed the concept of access by adding the complex yet key role of institutions, political and socio-economic factors in modelling resource access in agriculture. Later on, Peluso (1992), through her work on forest resources in Java, further framed the concept by integrating the implications of historical factors and the dynamics of power between villagers, the state and corporations in access to the resources. Using the concept of social capital while looking at access to resources, Bebbington and Perreault (1999) mentioned the existence of norms, values, networks, or relationships that can facilitate certain actions of actors in one structure. Using commodity chain as a framework, Ribot (1998), developed a ‘mapping of access’ in which he examines how the various benefits are obtained by different actors at different levels of resource exploitation, through direct access to the resources or through other channels of access.

Regarding the access to marine resources, the ocean and its fish have been often been pictured as either lacking ownership or being under a problematic common property regime (Hawkshaw et al. 2012; Mansfield 2004). Campling & Havice (2014), in particular, investigated the complex question of property rights and access in industrial fisheries due to the social struggles that the ocean creates between the state and fishing operators. To address

this issue, diverse options to manage access to the ocean and its resources exist. These options include for example models that suggest regulating the sea by combining instruments like quotas or harvest seasons with the behaviour of the industry including fishing capacity, biological factors such as biomass level and other factors such as market changes (Homans 1997; Homans and Wilen 2005). Individual Transferable Quotas (ITQs) are another example of tools that are used to manage access to fisheries and are designed to provide, to their owner, exclusive and transferable rights of a given portion of the total allowable catch of fish. In these examples, access is mostly managed through various types of entitlements.

### ***6.1.2. Ribot and Peluso's 'theory of access'***

The above studies served as precursors to the work of Ribot and Peluso (2003), who propose a framework to theorise access. Going beyond the discussions of rights within property theory, they focus on the ability to benefit from resources through the social relationships between people and the webs of power that configure resource access. The theory consists in an analysis of access in three steps: (1) mapping of the flow of benefits from a resource, (2) identifying and situating the mechanisms used by actors to gain, control and maintain access and (3) analysing the political relations involved in the process. Ribot and Peluso explain the complementarity between the gain, control and maintenance of access: gaining access as “the process to establish the access”; control as “the ability to mediate others’ access and the power to direct others’ actions” and maintenance as “the use of resources and powers to keep access to the resources” (Ribot and Peluso 2003:158-159). They identified various mechanisms which include means, processes and relations and with which access to resources is gained, controlled and maintained.

Ribot and Peluso categorise two types of access mechanisms. The first category is rights-based access mechanism, mainly used to ‘gain benefits’ while the second category refers to structural and relational ones to shape and reinforce the access gained. They describe rights-based mechanisms as those derived from law, customs or conventions which can include property rights. Those mechanisms can be held by one actor such as the leader of a community with which those willing to access the resource need to build a relationship. In their telling, these mechanisms also include illegal mechanisms such as the use of coercion and stealth to gain, control and maintain access. Structural and relational mechanisms are those that derive from the specific political-economic and cultural context of resource access and shape the questions of access itself. They present 8 mechanisms that influence access (**Table 19**).

**Table 19: Access mechanisms in R+P's access theory applied to tuna fisheries**

Category	Role in access to the resources	In the charcoal commodity chain (Ribot 1998)	In tuna fisheries (my research)
<b>Rights-based mechanisms</b>			
Law, conventions, permits,	Provide rights-based access	Permits, licences and quotas to access the resources and market. Forest policies to manage the use of resources	The international Law of the sea, permits and licences, fisheries' policy
Illegal means	Provide access by mobilising non-legal processes in direct opposition to rights-based access	Threats, coercion or violence	Piracy, illegal fishing through the use of prohibited equipment or through non-compliance to regulations
<b>Structural and relational mechanisms</b>			
Technology	Equipment of all sorts that improves access or allows its control	Technical skills of woodcutters	Vessels' technology to locate and catch the fish
Capital	Finances that enable actors to gain and control access and benefits	Financial capital of wholesaler in accessing large quantities of charcoal leading to monopoly	Financial capital by fishing firms leading to more efficient vessels with more technology
Market	Access to markets influences who can benefit from the resources	Control of market access by merchants through licences, permits and social ties with distributors, retailers and state agents	Tuna both go to the international market, controlled by DWFNs through permits and rule of origin, and to local markets through fishers and intermediaries
Labour	Relations and opportunities that provide benefits to those in control and access to those without rights	Labour opportunity of woodcutters controlled by merchants	Labour opportunities to access the resources at fishing stage (controlled by industrial fishing companies and local boat owners) and at landing (controlled by handling companies)
Knowledge	Provides access through belief systems and by shaping justifications of access	Technical knowledge of woodcutters, knowledge of price and demand by vendors to control distribution	Ecological knowledge about the fish by local fishers, through technology and research. Knowledge of subsidies through social ties with the state
Authority	Allows the control of access and influences who benefits	Power of local leaders to decide forest disposition	Governments authority in deciding management measures
Social identity	Can provide access through local status or membership of a group	Ethnic identity to access labour opportunity	Coastal states nationals to access labour opportunity on foreign industrial vessels
Other social relations	Friendship, trust, reciprocity, patronage, dependence that can be used to control and maintain access to the resources, markets and labour opportunities	Social ties between wholesalers, vendors, the state and merchants to maintain access to the market and control access to distribution	Patronage and trust within small-scale fishing, patronage and dependence at the industrial fishing scale

Source: Ribot and Peluso's framework (2003), illustrated for terrestrial resources (Ribot 1998) and tuna resources (my research).

The theory of access presents three important and relevant ways for studying moving resources like tuna. First, it allows a detailed identification of actors involved, those that benefit or not from the resource, the ways they access and use those resources and in which circumstances (considering historical moment and geographical scale). As resources move and travel, an understanding of who has access to them, how and especially when and where provides clarity on the various uses of the resources by different actors. Second, through its rights-based mechanisms, the theory also questions the issues of gaining access through different types of formal or informal conventions. For moving resources this provides a venue to discuss questions of ownership and access to resources that are in a diverse socio-spatial setting or do not stay in one place. Third, through its structural mechanisms, the theory gives attention to political-economic circumstances that may affect the access rights of one group or another. In the context of managing access to moving resources, structural mechanisms unveil the differentiated ways in which this management of access is established and implemented according to national and regional contexts. They also help understand how structural settings influence the various power relations created around the benefits gained from the resources. Using the theory therefore aims to explore through one framework questions of agency, structures and power relations in the making of access politics and management of the resources use.

### ***6.1.3. Rationale for an enhanced theory***

R+P's theory of access has become widely used in studies of property, access, use of natural resources and other related topics. In early 2019, a review showed that close to 2000 publications were using the theory as a framework (Myers and Hansen 2019). Some scholars have attempted to enrich the theory with social concepts such as gender and livelihoods or other concepts such as socio-economic disadvantage (Szaboova et al. 2019). Others have expanded some components of the theory like power or authority (Hall et al. 2011; Nolan 2019; Sikor and Lund 2009). Authors have also pointed out weaknesses of the framework. For instance, Koch (2008) mentions the lack of precision in the distinction between rights-based and structural mechanisms as rights-based means could also be seen as structural or/and relational. The same author also argues that R+P's definition of power is confusing, because it does not allow a shift of the bundle of powers between individuals and does not provide enough theory regarding agency. More recently, in the reworking of the conceptual framework of property of Schlager and Ostrom (which includes access), Sikor et al. (2017) consider access as part of use rights and as "social actors' ability to benefit from resources"

(ibid: 339). While acknowledging the need to look at benefits from the use of resources, these authors emphasise the role of other types of rights such as control or authoritative rights which influence the benefits generated from the resources' use. Myers and Hansen (2019) in their review also exposed one of the flaws of the theory as not being grounded enough within other related concepts such as entitlements.

Other studies have used the framework while suggesting additions or precision to it. Neimark (2010), built on the theory of access to show how power, regulation and exclusion can influence who can benefit from resources. He looked at the different ways firms gain or control their access to resources by negotiating with institutions, such as NGOs or politicians, which are indirectly involved in the use of resources. In a further look at this actor-oriented approach, Neimark also used the eight structural mechanisms of access to assess the change in power amongst actors across environmental, social and economic dimensions during a surge of price in a valuable commodity (Neimark et al. 2019). He further analysed how such change can impact sustainability initiatives (ibid). Sikor and Lund (2009) have elaborated on the role of struggles over access. They discussed how struggles over access impact on the process of state formation and how authority and power are used to control. Langridge et al. (2006) used the theory to map the access to water and link it to the construction of resilience to water scarcity in local communities. In addition to the social and politico-economic frame that the theory provides, they take environmental circumstances, notably geographic location, climate of a region and ecological integrity of the resource as factors that can affect access. Hicks and Cinner (2014) used the various mechanisms of access to assess the ecosystem services provided by coral reefs to fishing communities. To complete the content of the theory which mentions that "people and institutions are positioned differently in relation to resources at various historical moments and geographical scales" (Ribot and Peluso 2003: 154), they emphasise that "context is a key determinant of how these mechanisms play out and whether they ultimately increase or decrease the options people have available to them" (Hicks and Cinner 2014: 17794).

The above studies show that there are improvements that can be brought to the framework and that it can be developed and adapted according to the resources studied. Langridge et al. (2006), in particular, discussed the need to consider ecological factors. The access framework could be further strengthened by establishing a better link between the political and the ecological aspects. In line with these scholars that have attempted to expand the theory of access, the contribution of this chapter is to apply the theory to resources that move. This

requires giving attention to two specificities of mobile resources, in addition to the framework of access they are in: their materiality and spatiality.

## **6.2. MECHANISMS OF ACCESS TO TUNA RESOURCES IN THE WIO**

By mobilising the classic theory of access described above, I will present how various actors access the resources through a mix of access mechanisms. Through the analysis of these mechanisms, I will be able to highlight how and why some actors benefit more from the resources than others.

My use of the access mapping process differs slightly from the original three stages proposed by R+P. While they start by mapping the benefit(s) from the resources, my analysis will start by identifying the access mechanisms to the resources and analyse from there the diverse types of benefits and power relations generated. I chose this approach because the benefits from tuna fisheries go beyond just tuna resources or the revenues. I wanted to present this diversity in the analysis, differently from the original framework of R+P which focuses on a specific benefit.

The section is structured as follows. It first analyses the rights-based access mechanisms under which tuna resources are accessed. From international frameworks to national regulations and illegal means, I will show that while the management of access has various legal foundations, implementation is challenging and makes the tuna available in a differentiated way, to the advantage – or not – of various actors. The section continues with a focus on six of the eight structural mechanisms of access suggested by Ribot and Peluso (2003). While exploring how through each mechanism various benefits are generated, I will also show how some mechanisms are key in creating conflicts over the resources and in shaping power relations.

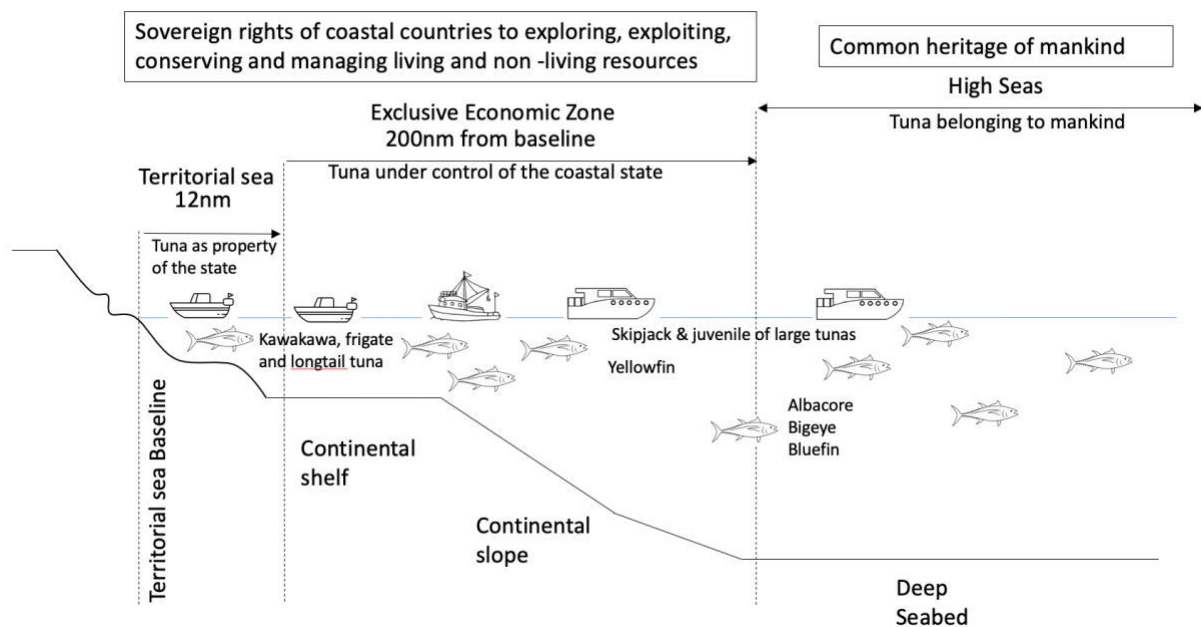
### ***6.2.1. Rights-based access to tuna resources***

I will start the analysis of access mechanisms by looking at those that are based on rights. In R+P's theory of access, rights-based mechanisms include the various legal frameworks and entitlements that establish the legal right to access the resources. Access to tuna resources in the WIO is determined by six types of mechanisms that intervene at the global and at the national scale.

### **The law of the sea: legal access established from the global level**

The United Nations Convention on the Law of the Sea (UNCLOS), adopted by 168 countries in 1982, set up a system of access rights to marine resources. The UNCLOS established geographical boundaries for national waters which include countries' territorial waters and an economic exclusive zone (EEZ). Coastal states were given full control over natural resources within the EEZ: the rights to access, use and manage the resources within those limits, determine who can have access and use rights and finally lease or sell the previously mentioned rights<sup>32</sup>. The convention, therefore, puts tuna resources under the control of coastal states when they are in the countries' territorial waters and EEZs (**Figure 7**).

**Figure 7: Spatialisation of the ocean and tuna fishing by the Law of the Sea**



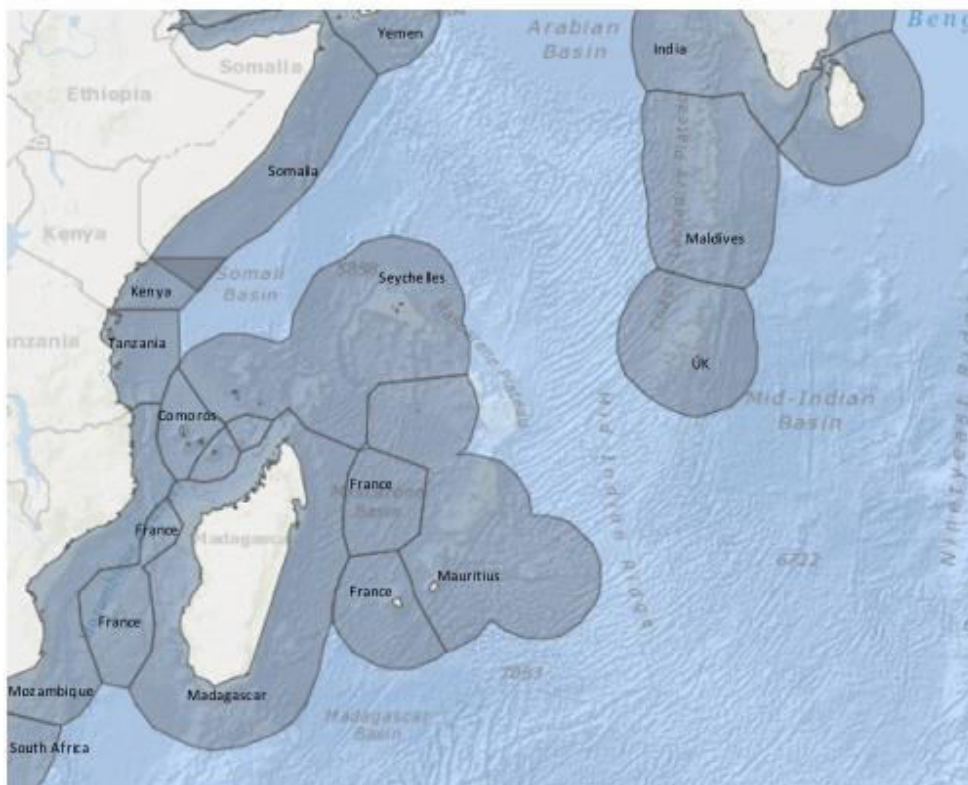
Source: Adapted from FAO 2000

In the WIO region, the countries' EEZs are contiguous between the islands and in the Mozambique Channel, but open to the high seas towards the rest of the Indian Ocean (**Figure 8**). This makes the tuna subject to regulation that varies from national property (in territorial water) to full control of access (within the EEZs). Control from one country is lost when the tuna moves to the EEZ of neighbouring countries and to the high seas. The management of migratory resources in general is also mentioned by the UNCLOS as requiring the

<sup>32</sup> Art 56 of UNCLOS: "In the exclusive economic zone, the coastal state has: (a) sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living, of the waters superjacent to the seabed and of the seabed and its subsoil, and with regard to other activities for the economic exploitation and exploration of the zone, such as the production of energy from the water, currents and winds [...]"

cooperation of coastal states and others in order to conserve and use the resources within and beyond the EEZs (Article 64<sup>33</sup>). The UNCLOS has also played a key role in introducing external actors in the tuna fisheries of the WIO. It has allowed the access to the resources to DWFNs and it was also the foundation to establish the IOTC as the RFMO to manage tuna through cooperation, as recommended by the text.

**Figure 8: EEZs of the countries of the WIO region**



Source: adapted from EEZ maps within [sea around us project](http://www.seararoundus.org/data/#/eez)<sup>34</sup>

**Fishing access agreements with DWENS: access through bilateral negotiations**

The same convention also mentions in its article 62 that countries with a limited capacity to harvest their resources to the allowable catch, shall provide access to the resources in surplus

<sup>33</sup> Art 64 of UNCLOS: “The coastal state and other states whose nationals fish in the region for the highly migratory species listed in Annex I shall cooperate directly or through appropriate international organizations with a view to ensuring conservation and promoting the objective of optimum utilization of such species throughout the region, both within and beyond the exclusive economic zone. In regions for which no appropriate international organization exists, the coastal state and other states whose nationals harvest these species in the region shall cooperate to establish such an organization and participate in its work.”

<sup>34</sup> Available at: <http://www.seararoundus.org/data/#/eez>



within their EEZs to other states (UNCLOS 1982)<sup>35</sup>. This provision created the possibility for the second type of rights-based access mechanism: bilateral fishing access agreements between host countries and Distant Water Fleets Nations (DWFNs). In the Western Indian Ocean, those are mainly Spain, France, Japan, South Korea and Taiwan. Spain and France are often treated together under a European Union agreement called Sustainable Fisheries Partnership Agreement – SFPA. These agreements determine the modalities of access to the fishing grounds of tuna within the EEZ. They include for example the number of vessels that can be licenced to access the EEZ of the country, the area that is accessible, the tuna species that can be fished and other fishing conditions such as the obligation to have satellite devices on-board. They also set fees to be paid in exchange for access. In the case of SFPAs, a part of this contribution is to be dedicated to the improvement of fisheries policies in the host countries. A summary of agreements between the EU and the three countries studied that were active in 2018 is provided in Table 20. The EU agreements are publicly available whereas the Asian agreements are confidential and cannot be publicly accessed.

**Table 20: Summary of SFPAs between the EU and the three countries as of 2018**

Country	Start date Expiry date	Total EU contribution (p.a)	Sectorial support per year	Reference tonnage	Vessels licenced	
					Seiners	Longliners
<a href="#">Madagascar</a>	01.01.2015 31.12.2018	1 566 250 € in 2015/2016 to 1 487 500 € in 2017/2018	700 000 €	15 750 t./year	40	54
<a href="#">Mauritius</a>	08.12.2017 07.12.2021	575 000 €	220 000 €	4 000 t./year	40	45
<a href="#">Seychelles</a>	18.01.2014 17.1.2020	5 350 000 € in 2014 To 5 000 000 in 2019	2 600 000 €	50.000 t./year	40	6

Source: European Union website of bilateral agreements <sup>36</sup>

Three elements are worth clarifying from the above table. First, regarding the financial contribution, around half of the annual financial contribution of the agreements are dedicated to sectorial support. This part of the access fee provides funding for diverse fisheries development activities in the host countries (as developed in Chapter 7). The rest of the

<sup>35</sup> Article 62 of UNCLOS: “Where the coastal state does not have the capacity to harvest the entire allowable catch, it shall, through agreements or other arrangements and pursuant to the terms, conditions, laws and regulations referred to in paragraph 4, give other states access to the surplus of the allowable catch”

<sup>36</sup> EU database of fishing access agreements: [https://ec.europa.eu/fisheries/cfp/international/agreements\\_en](https://ec.europa.eu/fisheries/cfp/international/agreements_en)  
Accessed February 20th, 2018

access fee enters directly into the countries' national budgets. Second, the reference tonnage does not represent a quota but a rather an approximation of annual catch by the fleets (MD 02). Every ship owner is required to pay from 60 to 70 Euros per tonne effectively caught. Third, the number of vessels authorised to fish in the EEZs of countries is not always the number of the vessels effectively fishing. In the year of 2015 for example, despite there being around 150 EU vessels licensed to fish in the WIO, the number of EU vessels effectively fishing was 26 in the waters of Madagascar and 31 in the Seychelles (USTA 2017, SFA 2016). There were around 25 EU boats in the waters of Mauritius between July 2016 and June 2017 (GoMU 2017).

Fishing access agreements have often been criticised for their lack of sustainability, equity and transparency (Gagern and van den Bergh 2013; Le Manach et al. 2013). They also constitute a conundrum from a coastal state perspective for two reasons. First, negotiations of such agreements are highly geopolitical. Coastal states often have lower capacity of negotiation and are beholden to DWFNs as providers of development aid (as developed in Chapter 7). Second, states often struggle regarding the setting of the appropriate rent as they are put in the challenging position of managing influences from DWFNs and the global production dynamics along with handling the national pressure to distribute the benefits of the tuna fishery (Barclay and Cartright 2007; Campling and Havice 2014). Access to tuna in countries' EEZs via fishing agreements is therefore an arena shaped by competing powerful political and economic interests (Barclay & Catwright 2007; Schurman 1998). Negotiations of fishing access agreements can be linked to economic national necessities that can influence government officials when providing access to the resources. In terms of management of tuna fisheries, the establishment of fishing access agreements also set challenges for coastal states especially developing ones with limited means of monitoring, control and surveillance. As discussed in Chapter 4, government often rely on good faith of foreign fishing fleet to submit data regarding the monitoring of catch. Furthermore, surveillance of fishing activities within the entire EEZs cannot always be ensured and risk of illegal fishing activities remain high. While there is an economic rationale behind the conclusion of these agreements, their implementation in terms of management can be problematic especially for developing coastal countries like Madagascar.

#### **Intra-regional fishing access agreements: access through flagging and reciprocity**

A second, less known type of fishing agreement takes place between countries of the region. Mauritius and the Seychelles for example have established fishing agreements since the

1990s. These agreements allow reciprocity in terms of fishing grounds, in that specifically licenced boats from each country may access both EEZs. For the agreement signed in 2017 for two years, 25 fishing boats (including purse seiners and longliners) from both countries were to operate in the EEZs of both countries at a fee of \$110,000/\$30,000 per purse seiner/longliner per year to be paid by Mauritius and \$30,000/\$24,000 per purse seiner/longliner per year to be paid by Seychelles (Seychelles Nation 2017). Considering that neither of the two countries have national industrial purse seiners and they both have a limited number of national longliners (SFA 2016, GoMU 2017), it can be concluded that the agreements cover boats that are foreign-owned but flagged to one or the other country. Some foreign operators in the WIO region, mainly Spanish, French and Taiwanese, flag their boats in Mauritius or Seychelles against a flagging fee. This bilateral yet multi-faceted agreement brings another type of legal access: the flagging of vessels. Such flagging transactions allow foreign owned vessels to be counted as part of the national fleet and thus eligible under bilateral agreements outside the main EU agreements as presented above. While considered beneficial by coastal states, the process of flagging actually extends the sovereignty of DWFNs over the tuna resources of the WIO while being a strategy to operate within opaque taxation structures and lower labour standards (Campling and Colás 2017). Access by foreign nations can therefore be gained through inter-coastal states negotiations and not only through a bilateral agreement between the foreign nations and the coastal country. Bilateral agreements and flagging are two faceted when it comes to the management of tuna fisheries. In cases where fleets are flagged to the coastal countries, monitoring of catch and reporting including to the IOTC are under the responsibility of the flag state. This can contribute to the building of knowledge regarding the tuna resources in the region. On the other hand, these operations can also blur the actual fishing effort by various members of the IOTC. Flag states like Mauritius and Seychelles are in reality contributing to the fishing effort of European and Asian fleets. As it will be discussed in Chapter 7, this has an impact on the implementation of IOTC management measures.

### **Licensing system: control of access within territorial waters and the EEZ**

In the three countries studied, access to the resources by national operators in national waters – including the territorial waters and the EEZ, relies on a licencing system. Licences to be obtained depend on the types of fishing that is undertaken and the final market of the catch, either for the local market or export (**Table 21**). It can range from fisher's card to various permits and agreements (GoMA 2015; GoMU 2007; GoS 2014).

**Table 21: Different types of permits to access the fishery and sell the catch**

	Madagascar	Mauritius	Seychelles	Geographical coverage
Artisanal/ subsistence	Fisher's card	Fisher's card		Territorial waters
		Boat licence		
Local semi- industrial	Fishing access agreement	Fishing permit		Territorial waters and the EEZ
	Boat licence	Boat licence		
Selling to local market	Selling permit for fishers			Within the country
	Collection and selling permit for intermediaries			
Exporting	Exporting permit for fishers or processing companies			Various countries abroad

This licencing system has diverse consequences. In Madagascar for example, considering the important number of coastal communities and limited means of the fisheries department, this licencing system often does not cover the entire fishing activity of local fishers. This situation prevents the fisheries department from evaluating the extent of artisanal fisheries' catch including tuna. It, therefore, makes it difficult for the government to assess the status of the coastal stock of tuna, with the perverse result that tuna fishing by local fishers is considered negligible. This is also due to the low quantity of catch attributed to the small-scale fishery that is officially recorded. When interviewing government officials, common phrases by government officials were "artisanal fishers do not really catch tuna here" (MD 50) or "it is a very small catch" (MD 04). When asked about this situation, local fishers often respond that they do not trust or rely on the state. Licencing is perceived as a way to control local fishers and penalise them when possible. One fisher said "The small-scale fisherman is independent. He comes and goes whenever he wants. The state only sees and considers the fishermen when it is the period of fisheries closure and they want to prosecute us. The small-scale fisherman cannot depend on the state." (MD 59). Another fisher said "There are problems with the state but there is no real solution, we are not consulted for the measures they take." (MD 25).

In more developed countries like Seychelles and Mauritius, registered fishers receive subsidies for their activities and have an interest in registering as a fisher (**Table 22**). When asked about the licences that they need to have for fishing, fishers of the Seychelles proudly say "of course" (MU 04; SE 60). Fishers have therefore a high interest in being registered as a fisher to be able to access support from the state.

**Table 22: Types of subsidies available to fishers in Mauritius and the Seychelles**

Mauritius	Seychelles
Allowances (Bad weather, closed season, sick leave)	Fuel Incentive Scheme
Buy-back scheme for nets	Sickness Benefit Scheme
Loan and grant schemes on boats	Loan and concession on equipment

The licensing systems in place within the WIO are currently the policy tools that help coastal countries manage their tuna fisheries in the territorial waters and in the EEZ. In more developed islands like Mauritius and Seychelles, they have allowed a monitoring of catch and effort in the different segments of the fishery. They have also helped the process of marine spatial planning for the case of Seychelles. In a developing country like Madagascar, the government is still in the process of establishing the extent of fishing activities in the national waters. Knowledge about small-scale and artisanal tuna fisheries in particular is still at its infancy.

### **Conservation measures as regulating access to fishing grounds**

Rights-based access mechanisms also include formal restrictions to access for conservation and other purposes, including no-take zones from marine protected areas, fisheries closures, prohibition of some types of gear, or local conventions between community members. Various studies have explored the question of restriction of access through such mechanisms (Barley Kincaid et al. 2014; Bennett and Dearden 2014; Walker and Robinson 2009) that will not be developed here; however, what will be discussed is how tuna fits within these forms of regulation.

In the three countries studied, tuna is not subject to any period of closures nor considered as a species for priority conservation, the reasons being that most tuna is caught further from the coast and their movement combined with seasonality make it difficult to establish a closure. Setting up closures, marine protected areas or locally-managed marine areas (LMMAs) are also often initiatives that emanate either from the state or from NGOs promoting local management or the conservation of specific species. In the WIO, tuna has not received conservation interest yet at national levels. Considering the movement of tuna, enforcement of conservation measures also entails monitoring the entire EEZs, which requires substantial investment for coastal states in control and surveillance.

The case of sedentary tunas (such as bonitos) can, however, be mentioned as they are present close to the coast and could be present in marine protected areas and LMMAs, hence having

their access limited. In Madagascar and Mauritius, marine protected areas were not mentioned by fishers I interviewed as a major obstacle to their fishing because their fishing grounds were not close to MPAs (MD 51, MU 18). Marine protected areas in Madagascar for example focus on restricting access to species such as sharks, sea cucumber, lobster and cetaceans (Cripps and Gardner 2016; Francis et al. 2002). They do not mention tunas even though MPA restrictions apply to them too. Madagascar has also developed many local conventions in managing its marine resources within LMMAs. However, while it has restrictions on species such as octopus, crabs and sea cucumbers, these restrictions do not address big pelagic species like tuna (MD 80, 81). In the Seychelles, however, news about an upcoming large new MPA raised concern amongst fishers as a threat to access to tuna grounds (SE 29, 47, 48).

Beyond national waters, IOTC members including the three countries studied have also adopted measures that aim at improving the management of tuna fisheries including by managing access to the tunas. As an example, since 2016, the commission adopted and updates yearly the rebuilding plan for the overfished yellowfin tuna, assigning catch limits for different gears and setting measures in case of over catch (IOTC 2017b, 2019). The different levels of reduction of catches, as seen in Chapter 5, included 15% reduction from 2014 levels for purse seiners, 10% reduction for longliners, 10% for gillnets and 5% for other gears (IOTC 2016c). As seen in Chapter 5, managing access to the resources by limiting catches has proven challenging especially as it requires a robust monitoring of catches that IOTC member parties have not yet managed to establish.

### **IUU fishing as granting access to the resources through contravening rights-based structures**

Ribot and Peluso also discuss illegal access through coercion as a mechanism. In the field of fisheries, IUU fishing includes illegal fishing – as activities contravening existing laws and regulations, Underreported – fishing that has not been reported, or has been misreported, and Under-regulated – fishing undertaken in contravention of management measures and procedures or in areas with no management measures (FAO 2001). In the WIO for example, it has been estimated that 400 million USD in revenue is lost by countries due to IUU fishing (IOC 2017). With tuna being one of the key species affected by this issue. During my interviews questioning access, I have gathered actors' views by questioning only about illegal fishing as fishing “without the permission of the state, or in contravention of its laws and

regulations” (ibid). This illegal fishing is, however, perceived differently depending on the positionality of the actors and often includes the other components of IUU fishing.

From a governmental perspective, what is considered illegal tuna fishing falls between illegal and unregulated fishing. It takes the form of unlicensed boats that are fishing in the EEZ or licenced boats that are not fulfilling the conditions of fishing in their access agreements for example by turning off their mandatory satellite apparatus. According to regional inspectors (MD 37, SE 31), in the WIO region, those practices have largely decreased mainly due to a regional monitoring system led by the countries of the region, managed by the IOC (IOC 2015d). I discuss this further in Chapter 7.

NGOs working on the subject have also documented transshipment of tuna at sea, a practice that is illegal. Greenpeace for example has campaigned in the Indian Ocean for many years to stop this practice. For NGOs, illegal fishing is considered to be an important mechanism of access to the resources that impedes on the access to resources by small-scale fishers and affect sustainability. This is illustrated for example in various documentaries that have uncovered illegal fishing practices in the Indian Ocean (see for example ‘Tuna War’ in 2013 or ‘Cash Investigation’ in 2018 – described in footnotes 29 and 31).

For artisanal fishers, illegal tuna fishing is mainly big boats that they see at the horizon that they think are illegally fishing as they are fishing too close to the coastline. When asked about the details, not all of them were sure about the illegality of the fishing as some of them could be licenced foreign vessels. Fishers make statements such as “there is illegal fishing. We do not know who they are but they come too close to the coast to be legal boats” (MD 06) or “there are big boats that do illegal fishing in our waters, they come close to the coasts at night” (MU 06, 11, 25). This perception of illegal fishing by artisanal fishers exacerbates the issue of fishing access agreements raised above as it is seen by fishing communities as an illegitimate access to the resources.

Illegal fishing is certainly a way to access tuna resources in the WIO at the margins of official regulated access. While opinions differ as to its scale, at least two sets of actors, NGOs and artisanal fishers accuse industrial vessels of being involved in this practice.

To conclude this section, rights-based access mechanisms in tuna fisheries of the WIO region cover a broad range of mechanisms from international laws to national regulations to illegal practices at the margins of those regulations. Tuna resources are governed by multiple frameworks of access established at multiple levels of governance. These frameworks also

influence the power and negotiation leverage of fishery actors, with a strong historical place given to the DWFNs who legally gained access to tuna resources in coastal countries waters through UNCLOS and subsequently fishing access agreements. They also set the multiple uses and intrinsic values of tuna in the different national contexts. Tuna is an instrument of fishing reciprocity between countries, a species with limited conservation priority while also being a widely regulated and high value commodity. This diversity of what tuna represents mainly shapes the way how access and benefits from the resources are gained. The extent to which this access is maintained and these benefits sustained is influenced by relational and structural mechanisms of access.

### ***6.2.2. Relational and structural means of access to tuna resources***

I now move to structural mechanisms, which reinforce access and shape “how benefits are gained, controlled, and maintained” (Ribot and Peluso 2003: 162). While R+P explore eight structural mechanisms in their framework, I will focus here on six of them that play an important role in shaping access in the case of tuna and also generate a diversity of benefits. I will start with three mechanisms that directly improve access to the tuna resources – knowledge, technology and capital; then continue with three others that help maintain and control access to the resources as well as influence the types of benefits generated from the resources – market, labour opportunities and state authority. These six structural mechanisms are key as they highlight the differences within the segments of the fishery and they also shed light on indirect actors and socio-economic factors influencing access and benefits from the resources. Two mechanisms in R+P framework, social identity and other social relations, were not directly addressed in this thesis as they required a deeper investigation of actors’ relationships at a specific level, especially locally. This was not feasible due to time constraints and as my focus on covering relevant sites.

#### **Knowledge: knowing the tuna and the fishery to gain benefits**

The category of “knowledge” as a structural and relation means of access include components such as beliefs, ideological control, discursive practices or systems of meaning (Ribot and Peluso 2003). In this section, I will discuss two types of knowledge that are based mainly on experience but also on local beliefs and technology. This knowledge has an impact on the quantity of fish gained but also on perceptions regarding the tuna resources and access.

The first type of knowledge is about the tuna itself and about tuna fishing practices. This knowledge is held by fishers and produced through long-standing experience in the fishing



activity. This knowledge is generated differently between the small-scale and industrial fishers and is key in determining where the tuna is but also what species is there to be fished at which period of the year. The mobilisation of this knowledge also shapes narratives and discourses of access to tuna grounds in the WIO.

At the local level, such knowledge is key for fishers to access tuna and is transmitted through oral history and storytelling among fishers and through generations of fishers. In the recent years, academic scholars and fisheries managers have increasingly recognised the importance of local knowledge of fishers. While originally undermined in fisheries management (Gordon 1954), fishers' knowledge is now seen as contributing to a better management of fisheries through local rules and institutions in place as well as providing key information regarding the socio-ecological state of marine resources and ecosystems (Robinson et al. 2014; St. Martin et al. 2007).

For artisanal and semi-industrial fishers, interviews with those involved in the fishing between five and twenty years highlighted a rich knowledge, often transferred between generations regarding the biophysical characteristics of the resources or the optimal conditions for fishing tuna, including the seasons, the warmth of water preferred by tuna, the area and distance where the tuna can be found (**Table 23**).

**Table 23: Types of knowledge, context of knowledge production and sample of quotes**

Type	Context of production	Sample of quotes
Location of tuna fishing grounds	<ul style="list-style-type: none"> <li>• Long-standing experience in fishing in the same place</li> <li>• Place-based knowledge of the geography of the coast and the sea</li> <li>• Relying on technology available</li> <li>• Interpersonal and intergenerational transfer</li> </ul>	<p>“the tuna is located at a place called Ampasinjoby, just outside the Bay” Fisher in Ramena (MD 13)</p> <p>“we go 30 to 50km from the coast, we go East in the canal” Fisher in Ramena (MD 22, with similar comments by 57,64)</p> <p>“to fish tuna we go 200km around the St André Cap.” Fisher in Majunga (MD 51, 68)</p> <p>“we have to go between 5 and 12 NM to find tuna” Fishers in Mauritius (MU 06, with similar comments by 15, 24, 25, 31)</p> <p>“during the day tuna like cooler waters in the deep” Fisher in Mauritius (MU 04)</p> <p>“we can find tuna around the Mahe plateau, as close as 25NM to 70-100 NM around Bird Islands” (SE 04, with similar comments by SE 07, 09, 10, 25, 26, 28, 34, 43)</p>
Seasonality of the fish	<ul style="list-style-type: none"> <li>• Prediction of presence of different tunas associated with seasons</li> <li>• Empirical and historical knowledge of climate patterns</li> <li>• Oral transmission of tuna seasons amongst fishers and through generations</li> </ul>	<p>“the dry season is when the tuna is most abundant” Tuna fisher in Antsiranana (MD 12, with similar comments by MD 13, 20, 22)</p> <p>“if the summer has a lot of rain, then the dry season would be full of tuna” Fishers in Antsiranana (MD 27, with similar comments by MD 28, 35)</p> <p>“tuna is around in the Spring from April until around October” Fishers in Mauritius (MD 51, with similar comments by MD 56, 58, 64, 67)</p> <p>“yellowfin and skipjack can be caught between March and April and Albacore during November and December” Fishers in Mauritius (MU 05, with similar comments by MU 10, 11, 15, 18, 20)</p> <p>“all year long there is tuna of about 5 to 10 kg, in the winter you have big tuna of 15 to 25 kg and in the summer you can get tuna of 40 to 100 kg” (MU 31)</p> <p>“you can catch yellowfin and skipjack in the winter and Albacore in the Summer” Fishers of Mauritius (MU 13, with similar comments by MU 24, 25, 40)</p> <p>“There is yellowfin tuna when there is the Southeast monsoon, between April and October” Fishers in the Seychelles (SE 03, with similar comments 04, 09, 24, 46)</p> <p>“bonitos and small tunas are found all year round” Fishers in the Seychelles (SE 03)</p>

Catchability of tuna	<ul style="list-style-type: none"> <li>• Experience in fishing the whole year</li> <li>• Local belief of tuna as an unpredictable gift from nature</li> <li>• Empirical knowledge on the evolution of catch</li> </ul>	<p>“you do not systematically catch tuna, it travels to the East and we follow them” Fisher in Antsiranana (MD 14)</p> <p>“you cannot catch it every day, the creator ‘Zanahary’ gives or not” Fisher in Antsiranana (MD 20)</p> <p>“tuna is a traveller, it travels a lot from here to the East” Fishers in Antsiranana (MD 25, with similar comments by MD 29, 31)</p> <p>“most of the tuna is fished in the South West because the fish like the lagoon, the heat of the sunset of this zone.” Former fisher in Mauritius (MU 02)</p> <p>“big tuna is only caught by chance, you need to go far to find it” Fisher in the Seychelles (SE 07)</p>
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Source: Quotes of artisanal fishers in Madagascar, Mauritius and the Seychelles about tuna (translated from Malagasy, Creole and French for the case of Madagascar and Mauritius)

Through this local knowledge anchored in experience, beliefs, oral history of fishing and to some extent technology, local fishers have accessed tuna through the years and generations in different places and at specific seasons. However, this richness has been contained within national or even local borders. In Madagascar for example, there are very little exchanges on tuna fishing practices between fishers from different areas, due mainly to the distances between fishing sites. At country levels and the regional Indian Ocean level, there is little visibility of this wealth of local knowledge about the tuna resources. This is illustrated by the industrial segment often claiming that there is very little known about local tuna fishing especially the extent and impacts of the fishing.

In the special case of the Seychelles semi-industrial fishing where the crew is mainly composed of Sri Lankans, knowledge regarding tuna fishing is mainly produced by the Sri Lankan crew. Considered as better seafarers for tuna, boat owners talk of their Sri Lankan crew members as knowing where and how to fish tuna better than Seychellois. Boat owners (often former artisanal Seychellois fishers) make statements such as “they look at the moon and know where the fish is going” (SE 42) or “they – the Sri Lankans – have fished tuna for many years in their country, their fishing technique is better, the catch is better with them fishing” (SE 13, with similar comments by SE 35, SE 60). This integration of other WIO nationals within the Seychelles’ tuna fishing is seen by boat owners as improving their access to the resources and the amount of tuna that is caught, leading to more financial revenue.

In the industrial sector, there is an extensive knowledge regarding the tuna as well as the most recent and efficient ways of fishing. Regarding tuna’s localisation and their biological characteristics, knowledge is produced through numerous channels. There is first the experience of fishers. Some Spanish captains of European purse seiners have been fishing in

the region between five and ten years (MD 44, 45), accumulating knowledge about the migration pattern of tuna in the WIO. Considering that foreign fleets have been present in the WIO since the 1980s, knowledge about fishing in the region has also been transmitted within fleets over the years mainly through accumulation of data on board. Second, technology also plays a key role in the production of knowledge regarding tuna. Vessels are equipped with various radars and screens that indicate where the fish is located from buoys and Fish Aggregating Devices (FADs) that have been placed during previous fishing trips. This equipment provides key information that hugely facilitates access to the resource. Finally, knowledge is also generated through research that specifically aims to understand patterns of fisheries in the region. This is mainly undertaken by research institute of DWFNs fishing in the WIO region. The European fleets for example have access to their home countries' research institutes, observers on board and specific research activities that are dedicated to produce knowledge based on catch data, tuna behaviours and fishing practices of fleets. The knowledge produced is then shared with fleets and managers of the fisheries, via the shipowner associations or the country representatives negotiating at the regional management meetings of the IOTC. Those research institutes are often based in the host countries: the French *Institut de recherche pour le développement* (IRD) and the Spanish *Instituto Español de Oceanografía* (IEO). This large array of means that DWFNs maintain to produce knowledge implies a much-improved access to the resources.

The high availability of knowledge production raises the issue of equity between artisanal and industrial fishery as well as the power of knowledge that is held by foreign fleets compared to national and especially local ones. Fishing associations of artisanal fishers claim that industrial boats would know exactly where the fish is and the quantity available before they even leave the port. A member of the FBOA vigorously argued that “there is a substantive problem regarding access to the tuna as the purse seiners, before leaving the port, already appropriate the fish” (SE 29) or that “research on tuna is mostly funded by the industry, means that are not available to local fishers” (SE 47). Artisanal fishers in the region strongly perceive this access to knowledge (produced through experience, technology and via scientific research agencies) as unbalanced, giving the industrial segment an unfair advantage by gaining an improved access to the tuna resources. The industrial segment, on the other hand, argues that this production of knowledge also benefits the region notably through the various reports that fleets have to submit either to the fisheries department or to the IOTC (as seen in Section 5.3.3.).

The second type of knowledge is contextual to the fishery including the state of resources and fishing activities in the region. This knowledge is produced by indirect actors in the fisheries, such as associations or NGOs, through knowledge sharing activities or communication materials. In Mauritius and the Seychelles, fishers' associations represent a forum that allows fishers to share their knowledge on fishing techniques and state of the resources or obtain knowledge from others about the tuna. In the Seychelles for example, the Fishing Boat Owners Association (FBOA) serves as an interface to inform fishers about the state of the resources in the Indian Ocean that is produced by the IOTC assessments. Similarly, it also tries to enhance the capacity of its members on tuna fishing through workshops and training that are organised in the region. For instance, in February 2018, tuna fishers took part in a workshop on improving the value of small-scale tuna fisheries in the WIO (IOC 2018b).

In the WIO region, NGOs and the media also play a non-negligible role in producing knowledge regarding tuna fisheries. WWF for example produced various reports presenting the value of tuna fisheries for the WIO region, its economic contribution to coastal countries or the state of various species in the region (Barnes and Mfodwo 2012; Obura et al. 2017; WWF 2015). While such knowledge is not used to access tunas directly, they are used by fisheries managers such as fisheries departments as background information for their decision-making regarding management of access. Another NGO that is active in the region is Greenpeace. The NGO has long campaigned in the Indian Ocean regarding illegal fishing or the reduction of marine resources including tuna (see, for example the documentary tuna war, mentioned above). In Mauritius and the Seychelles, the state of tuna resources has been documented by the NGO and shared with artisanal fishers, often also interviewed in their campaigns (this was the case for example for MU 25). In the Seychelles, where the tuna fishery is central to the economy, the media and especially the written press plays an important role in sharing knowledge regarding tuna fisheries mainly regarding the decrease of tunas, new actors in the fishery and legislation affecting the tuna fishery sector (Marivel 2017a; Nation 1990). This knowledge influences local perspectives regarding the fishery and is also mobilised by the state to disseminate policies and management measures including regarding access. During my daily encounters with locals in the Seychelles, they were, through the media, aware of the tuna situation or knew about the existence of negotiation of access by foreign fleets.

This second type of knowledge, while produced by indirect actors in the fishery, plays a significant role in shaping discursive practices regarding tuna fisheries in the WIO. The

perception of local fishers about the reduction of tuna available or the perceived unequal benefits that the different segments of the fishery gain are based not only by experiential knowledge but also by this contextual knowledge that is produced on the fishery. This reinforces local views regarding how access is currently managed in the region and how actors benefit or not from the fish.

This diversity of knowledge produced surrounding the WIO tuna fisheries has fuelled the strong discourses from both segments of the fishery. There is also a multiplicity of views on how each segment uses this knowledge to access tuna and influences the quantity of fish available. The two segments of the fishery would claim either a lack of knowledge (claimed by the industrial actors, about local fishing activities) which prevents an adequate management or an excess of knowledge (claimed by local fishers, about industrial fishing) which leads to an excessive access to the resources. These discourses shape access to tuna in the WIO region through the management needs they convey at the national and regional levels. The artisanal segment carries a discourse of unbalanced access to the resources. This is supported by indirect actors such as NGOs which often put pressure on national governments to improve the management of access by DWFNs in national waters and at negotiations at the IOTC levels. The industrial segment, on the other hand, hides behind the discourse of insufficient knowledge about local fishing activities and the opacity of artisanal catch data to divert attention from their own activities at management discussions at the regional level. In discussions of total allowable catches and stock assessments, reports have each time requested that more attention is given to the catch from the artisanal fishery (IOTC 2017a). Management of access to the resources are then significantly shaped by how the knowledge about tuna fisheries is mobilised at different levels.

### **Technology: a key determinant to the amount of tuna accessed**

The discussion above of knowledge has already indicated that technology plays a crucial role in access to the resource in the WIO. The evolution of technology after World War II has been well documented as the main factor behind a drastic increase in fish catch and an improvement of efficiency in fishing techniques (Pauly & Le Manach 2012; Sumaila, Bellmann, et al. 2016). For tuna fisheries, technology has brought more powerful vessels, a diversification of fishing strategies and especially highly efficient fish detection devices (Torres-Irineo et al. 2014). Similar to the availability of knowledge, the amount of technology available in the two segments of the fishery varies considerably and impacts the quantity of fish that can be accessed.

In the artisanal fishery, tuna is fished with wooden boats of 2m to 8m in Madagascar (**Illustration 8**) and motorised fibreglass boats of 5m to 8m in Mauritius and the Seychelles. Fishing techniques consist mainly in hand line and trolling (Described in Appendix 4). GPS devices are also used by fishers to locate the fish in Mauritius where the fisheries department has installed fish aggregating devices around the lagoon to attract offshore species. The tuna catch of this sector is not entirely known, as most fishers in the three countries studied other species of fish as well and reporting is not systematic.

**Illustration 8: Artisanal boat used for tuna fishing in Ramena, north of Madagascar**



Photo by the author

In the semi-industrial fishery, vessels are around 24m long (**Illustration 9**) and the technique used is longline: a couple of lines with around a thousand hooks on each. GPS devices are also used as well as long view binoculars. In the three countries studied, the semi-industrial fleet provides a limited catch not exceeding 500 tons a year, with the exception of the Seychelles in recent years where catches in this segment have been reaching 1000 tons in 2017 (GoMU 2017; SFA 2016; USTA 2017).

### Illustration 9: Semi-industrial tuna boat in Victoria, Seychelles



Photo by the author

In the industrial fishery, which has the largest catch in the WIO, operators have large vessels up to 70m in length and with two distinct fishing techniques: longline or purse seine (a large net that encircles the tuna schools) (**Illustration 10**). Two technologies have highly increased the catch of industrial fishing in the past ten years in the WIO region: one is Fish Aggregating Devices (FADs). FADs are man-made floating objects used to attract fish. They can be anchored (consisting of a float, mooring line, anchor and some type of underwater structure/attractant) or drifting (that can be made of a floating structure such as bamboo raft or using naturally occurring floating objects such as logs). They are accompanied by locating buoys and sometimes an echo sounder that can predict biomass (Dagorn et al. 2013; PEW 2011) (**Illustration 11**). The numbers of FADs deployed in the IO had no limitation until 2016 (IOTC 2017a). The second technological advance in the IO is the use of support vessels, or vessels that help to locate the tuna and supply fuel to the tuna vessel.



**Illustration 10: Head of a Spanish purse seiner landing in the Seychelles**



Photo by the author

**Illustration 11: Sample of tracking device for FADs on a Spanish purse seiner**



Photo by the author

The role of technology in shaping access to tunas lies in the fact that the amount of fish extracted depends on the technology that is used. Artisanal fishers with limited assistance from the state like in Madagascar can fish a very limited amount of tuna. In Mauritius and the Seychelles, artisanal fishers receive assistance in the form of loans to buy boats, or can access more productive waters due to FADs installed by the fisheries departments. In the small-scale fishery, being registered as a fisher through licences is the key condition to access financial support such as interest-free loans to buy gear and boats.

For the semi-industrial segment, Mauritius has for example launched a campaign in 2017 led by the fisheries department to help fishers buy semi-industrial boats in the form of half-loan by the Mauritian Bank and a grant by the state (up to 4 million rupees). The conditions were that fishers would need to be part of an officially registered fishing cooperative. Five

cooperatives out of 11 applications received this financial support in 2017 (GoMU 2017). In the Seychelles, loans to purchase semi-industrial boats have been encouraged in the past 5 years. The number of semi-industrial boats has increased from 4 in 2006 to 21 in 2016 (SFA 2016). Financial solvency of the investors was the main criteria for accessing loans (SE 60).

Similarly, in the industrial fishery and especially for foreign fleets, investment in technology is high and state subsidies are available to ship owners. A global study of subsidies estimates that around 20 billion USD was invested solely in 2009 by developed countries in capacity-enhancing subsidies, with around 5 billion USD by the EU and 3.5 billion USD by Japan (Sumaila, Lam, et al. 2016). Those include subsidies for boat construction, renewal and modernisation programs or tax exemption through fuel subsidies.

As an illustration, the EU has a fund that helps its member states fund projects linked to fisheries. The types of projects funded evolve with the change of the European Common Fishery Policy but include adjustment of the fleet, aquaculture, processing and marketing, inland fishing, and development of fisheries areas or technical assistance to fund administration (**Table 24**). Subsidies from these funds are managed by individual countries, which agree to an operational programme with the central EU administration, according to some basic principles and procedures by Council regulation, and then set up their criteria and requirements to access the funds.

**Table 24: History of EU funds available for EU fleets covering technology**

EU fisheries funds	Projects line – linked to technology
Financial instrument for fisheries guidance (FIFG) 1994-2006 EUR 3.7 billion	<ul style="list-style-type: none"> <li>• Renewal of the fleet (such as the building of new boats)</li> <li>• Modernisation of the existing boats (through fishing gear, safety, new radar)</li> </ul> <p>A total of EUR 829.16 million (Ex-post evaluation of the 1994-2006 FIFG)</p>
European fisheries fund (EFF) 2007-2013 EUR 4.3 billion	<ul style="list-style-type: none"> <li>• adjustment of the fleet (e.g. to support scrapping of fishing vessels, selective gears replacement of engines for energy efficiency) (European Fisheries Fund factsheet 2006)</li> </ul> <p>A total of EUR 91.5 million used under the fund [and individual countries contributed to an additional total amount of 408.5 million for fleet investments] (Ex-post evaluation of the 2016 EFF)</p>
European Maritime and Fisheries Fund (EMFF) 2014-2020 EUR 6.4 billion	<ul style="list-style-type: none"> <li>• promoting environmentally sustainable, resource-efficient, innovative, competitive and knowledge-based fisheries</li> </ul> <p>A budget of EUR 150 941 071 for France and 352 491 260 for Spain under the fund (France and Spain EMFF Factsheets)</p>

Source: EU website, Funding of the policy section<sup>37</sup>

<sup>37</sup> The Common Fishery Policy page. Available at <https://ec.europa.eu/fisheries/cfp/>. Accessed June 10th, 2019

The divide between the different segments of the fishery is clear when viewed through the lens of technology. The domination of the industrial sector in the fishery is apparent: not only does it have the technology to find and harvest more fish, it also receives the most financial assistance to access that technology. To this is added that vessels such as purse seiners do not only catch tuna and have high rates of bycatch often including coastal tunas and other species caught by local fishers (**Illustration 12**). Here, access to the tuna resources is structurally facilitated by the financial power held by the industrial segment through their investment capacity and state subsidies. This domination through technology, as discussed in Chapter 5, is sometimes perceived by host countries through their local fishers especially, as a key contributor to the overfishing of tuna resources in the region.

**Illustration 12: Sample of bycatch caught on purse seiners.**



Photo by the author

**Capital: differentiated investments shaping access to technology**

In Ribot and Peluso's framework, capital refers to different forms of wealth including finance, equipment or credit that enables actors to control and maintain access to tunas and related benefits. This section will focus on the role of financial capital, closely linked to technology but also social capital, as having a substantial impact on the access to tuna resources in the WIO. Looking at capital in the WIO and especially the three islands involves a consideration of the political and socio-economic context of the three islands. While the

case of Mauritius and the Seychelles can, to some extent, be put in the same category of capital being accessible to fishers through the state for example, it is not the case for Madagascar. The case of the foreign industrial fishery is also entirely different.

#### Building individual financial capital within local tuna fishing

For the case of local fishers, the three island nations need to be looked at individually. For Madagascar, fishers in general have limited access to capital to invest in vessels and equipment (MD 01,09,61,65; Pers. Obs.). As tuna fishing involves long-distance fishing with more powerful boats, actors that have financial capital for local tuna fishing in Madagascar are boat owners and intermediaries that own vessels and equipment (**Illustration 13**).

In the north of Madagascar, financial capital is then held by a handful of boat owners that have accumulated wealth through two to three generations of family members involved in fishing and selling fish. This family wealth has been accumulated through an organised sale of catch in the village and neighbouring towns including the city centre of Antsiranana. The boat owners have also built strong social capital through the connections and social relations they have created within the community. Villagers are aware that boat owners are providing labour opportunities for those willing to go fishing.

#### **Illustration 13: One boat owner's nets and a boat under construction in the background**



Photo by the author.

In the west (Mahajanga) and southeast (Sainte Luce village) of Madagascar, for tuna fishing especially, financial capital lies in the hands of intermediaries who provide the boats and the



equipment to fish tuna. Fishers are then entitled to sell their catch to the same intermediaries at an agreed price. In Mahajanga, intermediaries provide 8 metre boats to fishers who in turn are in charge of hiring other crew members. They are often neighbours, family members or friends that they are used to fishing with. In Sainte Luce, intermediaries provide the funds for fishers to build or buy and repair pirogues that fishers can consider as theirs. In this latter case, the fishers see themselves less as workers and more as partners of the intermediaries. Amongst the 10 fishers interviewed in Sainte Luce, 6 mentioned they were 'working with' such intermediaries rather than 'working for'.

In these three villages investigated in Madagascar, the reliance on a boat owner or an intermediary for capital is not uncommon and widely accepted by fishers. More capital is needed in tuna fishing than in other types of fisheries. Fishers in the three areas commonly mentioned that tuna fishing required a lot more investment with stronger boats, more equipment and more time at sea (MD 09, 18, 61, 65). They also recognise that due to the limited means for fishing, income from the fishery does not allow them to invest in their own tuna fishing (MD 09, 18). Some fishers expressed that there was maybe more tuna available but not enough equipment to catch them (MD 61, 65). The low access to capital is the strongest obstacle to the development of local tuna fisheries in Madagascar and engenders a limited access to the tuna resources and the benefits their sale provides.

In Mauritius and the Seychelles, local fishers have higher individual financial capital in hand and many own their own boats. Amongst the 50 fishers interviewed, 12 fishers out of 24 in Mauritius and 9 out of 26 in the Seychelles owned their own boats. However, tuna fishing, involving fishing beyond the reefs, requires more fuel and more powerful engines. Only a limited number of fishers have a direct access to the capital needed for such input. For that reason, fishers specialised in tuna fishing are fewer in Mauritius and are well known in their village. Four of those fishers were interviewed in different villages of the west coast of Mauritius. Their financial capital was built from a long experience in the fishing and sale of their products either directly or through intermediaries. For the case of Seychelles, local fishers targeting tuna have larger boats and are categorised as semi-industrial. Access to capital for local fishers in the Seychelles has evolved in regards to funding tuna fishing. Local semi-industrial boats are either solely owned by Seychellois, partly funded through loans from the state or through investments by Sri Lankan partners (SE 60). This has strongly increased the number of vessels in the Seychelles semi-industrial fleet within the past 10 years (SE 59). Despite the favourable socio-economic context in Mauritius and the

Seychelles, access to capital is still limited to a few fishers who have been in the fishery for several years or assisted financially by the state or private investments.

#### Subsidies and firms' investments as fuelling tuna fishing by DWFNs

As for technology, the importance of financial capital in tuna fisheries is starkly apparent in the industrial tuna fishing sector. As seen in a previous section, capital is needed to access technology in this segment of the fishery. This capital used by the foreign industrial fleets has two main sources: governments and the fishing firms. The different DWFNs fishing in the WIO all have subsidy programs that allow their fleet to access capital either for acquiring or repairing vessels or equipment as well as for fuel (Sumaila 2016b et al.). In the case of the EU, these subsidies have been criticised as contributing to overfishing through the improvement of fishing capacity while subsidies are also funded by the European taxpayers (Sumaila 2016b et al., Le Manach et al. 2013). Fishing firms also mobilise capital in order to access advanced technology and different types of tuna vessels. Profits gained through fishing in the WIO represents an important input to this capital and also constitutes a key element to gain other sources of finance, such as loans or external investments (Carvalho et al. 2020; Dentes de Carvalho Gaspar et al. 2017). The cost of access to the tuna resources in the WIO is considered marginal compared to the profits fishing vessels make from the fishing. This access cost is estimated as representing around 5% of the profits that firms gain from the fishery for the case of access to the waters of Madagascar and the Seychelles (Caillart et al. 2018; Macfadyen et al. 2015). As we saw in Chapter 4, large fishing firms as well as important DWFNs are involved in the WIO tuna fisheries. Their contribution to increased access to capital for their fleet is a key determinant in the access to tuna resources in the WIO. Considered the “last frontier” (Campling 2012b), the WIO has been the stage for the most sophisticated and modern capitalist exploitation. For instance, in the WIO, the Spanish fleet, both through the EU subsidies but also through the investment of their fishing firms, have a large amount of capital available allowing them to access cutting-edge technology. As expressed by a French industrial vessel's captain,

“The Spanish have very sophisticated means it is quite another story. However, they also invest a lot. If there is a new technology of 300,000 Euros, they will pay. But that's also why they need to make their fishing profitable” (SE 51).

This quote is highly illustrative of the role and impact of access to capital in the industrial tuna fishing. As it is key to technology access, it is also leading to a more extractive type of exploitation of the resources.

#### The role of the state in access to financial capital

The state plays a key role in various aspects of the tuna fishery, including by providing access to capital. The states of the three island countries studied have distinctive interventions. In Madagascar, financial support does not go directly to fishers, but is channelled instead through general support to the sector and via specific projects. For instance, fishing access agreements with the EU or development aid from the Japanese development agency have funded distributions of fishing nets or donated small-scale fishing vessels. Therefore, fishers may be provided equipment under various projects rather than the financial capital to buy that equipment.

In Mauritius and the Seychelles, the state is more involved in directly providing financial capital. As seen in **Table 22**, the two countries have various government schemes available to local fishers, including loan systems or subsidies for engines, nets, fuel or ice (SE 12, 46, 59, 60, MU 34, MU 27). As the tuna fishery requires specific investments for small-scale fishers, the return from the fishery does not always allow for fishers to build strong solvency which is a key condition to access the loans. Access to this type of financial capital becomes restricted to a handful of fishers. For the Seychelles, it is accessible to those who have accumulated the initial capital or joined other investors to be solvent. As of 2018, the majority of semi-industrial boat owners in the Seychelles were investors rather than fishers (BK 03). For Mauritius, it required fishers to be organised in cooperatives. While Mauritius has various associations of fishers, it does not have any that are solely dedicated to tuna fishing. Tuna fishers are scattered all over the island and need to join existing and more general fishing associations in order to meet the state's condition of being part of an association.

In the three countries, and to a larger extent the WIO region, the development of the fishery and hence the access to tuna resources, relies strongly on the state's ability to provide schemes that help fishers to invest in vessels and various equipment. The Seychelles have in recent years promoted the development of the fishery and have facilitated access to financial capital to fishers. In Mauritius, this interest has also increased and the willingness of local fishers to upgrade their vessels and fish more offshore for species like tuna is welcomed by the government. Investments in ports infrastructure, ice facilities and equipment are intended

to help local fishers increase the quality and quantity of their production and improve the importance of local tuna fishing in the countries. As will be seen in Chapter 7, developing tuna fisheries also present challenges including in finding local fishers willing to undertake semi-industrial fishing, for example. Similarly, the development of the fishery might require sustained funding that coastal states will need to ensure in the longer term. As seen in the foreign industrial segment, subsidies play a key part in the viability of tuna fishing activities. For the case of Madagascar, the lack of financial capital is rooted in a challenging socio-economic context with limited individual capital. To this is added the fact that the government focuses more on the industrial segment run by DWFNs rather than the national artisanal and semi-industrial fleet.

The role of access to capital in the WIO tuna fishery is undeniable. While capital is still highly limited in the small-scale fishery, especially in Madagascar, countries like Mauritius and the Seychelles have started to provide more schemes to allow the development of semi-industrial fishing. The high availability of capital in the industrial segment is ultimately a determinant of why DWFNs have a facilitated access to the tunas and to the financial benefits they provide. This improved access is, however, considered by some actors as the main driver of a continued decrease in the marine resources, as seen in Chapter 5. Considering the existing declining trends and particularly for the case of yellowfin tuna, the continued availability of capital, especially in the industrial sector can be questioned in terms of long-term sustainability of the tunas. I return to this observation in the conclusion of this thesis.

#### *The market: a key driver for the political economy of tuna*

In their analysis of access, Ribot and Peluso see the market as a significant determinant of how actors can benefit from resources. They discuss the role of both market access – “the ability of individuals or groups to gain, control, or maintain entry into exchange relations” (Ribot and Peluso 2003: 166) and market forces of supply and demand as elements that influence benefits from the resources and their distribution. In this section, I will focus on access to market in the different segments of the fishery and analyse how they generate benefits for the actors involved.

#### The importance of local markets for the artisanal fishery in Madagascar and Mauritius

In Madagascar and Mauritius, tuna catches are mainly consumed by the fishers themselves or sold at local markets for local clients. In Madagascar, the latter mainly involves the local population of coastal towns. In the north of Madagascar, the tuna is sold either in the village



or further in the local market of the regional capital city of Antsiranana. In the latter case, as soon as the fish is landed, boat owners call their usual sellers at the market to negotiate price of the catch before it is sent straight to the market (MD 25). Access to market is here established through long-term personal relationships between fishers and sellers based at the market. The two boat owners interviewed mentioned that there is always a taker for the fish. It is also a practice that spouses or other family members linked to the fishers or their crew take the fish and sell it themselves at the market (pers. obs.). The price of tuna (all species mixed together) is around 2 USD/kg. The only time that the price varies is when tuna is also landed by industrial boats at the port of Antsiranana and sold by stevedores in town and surrounding villages including in Ramena. When asked if this situation created a competition between the two types of landings, boat owners acknowledged the reduction of price of their catches. However, they did not consider that as a major issue for two reasons. First, they saw the quality of their catch as different and better than what is sold by stevedores. Indeed, tuna from the industrial boats are much saltier than tuna caught in Ramena (pers. obs.). Second, as tuna is more and more considered a luxury product in Antsiranana in general (MD 39, 41), fishers are still able to sell their catch despite the competition (MD 26). Here, the access to local markets of locally caught tuna generates sustained benefits for fishers, boat owners and the communities they support. It is also interesting to see that the competition between locally and industrially caught tuna is not perceived locally as an important source of conflicts over the resources.

In Mauritius, clients include the local population as well as hotels that serve local and foreign clients. The tuna can take a longer route compared to Madagascar, as it tends to go through intermediaries. Those intermediaries are contacted by fishers when the fish is about to be landed, and the fish is sold directly on the beach (**Illustration 14**). The price of the tuna here is between 2 USD to 5 USD /kg. This price varies according to the abundance of different tuna species during the year. An economic relation is then in place between the fisher and intermediaries. While this relation presents the advantage of the catch being taken and sold without much effort needed from the fisher to access the local market, the seasonality of tuna makes it that in a peak season, the price is set low by intermediaries and renders the fishers' effort less profitable (MU 11). The amount of financial benefits that fishers get from the tuna is mediated by intermediaries who, through their facilitated access to the local market, are able to fix the price of tuna. When asked about this economic factor, tuna fishers both expressed discontent about this price fixing, and yet also acknowledged the advantage of

having buyers for their fish (MU 10, 15). The overall benefit they gain from having buyers is usually considered more important than the reduced price of tuna at peak seasons.

**Illustration 14: Sale of yellowfin between a fisher and an intermediary in Rivière Noire**



Photo by the author

The reliance of the semi-industrial fishery on local processing companies in the Seychelles

In the semi-industrial segment in the Seychelles, the market for tuna is both local and international. Semi-industrial fishers do not have a direct access to these markets as the fish is handled by processing companies. The majority of the catch (composed of yellowfin, bigeye and swordfish) are handled by three processing companies: Fresh Tuna, Oceana and Sea Harvester (**Illustration 15**). These three companies buy the tuna at the price of around 7 USD/kg depending on the quality of the fish and send it by airfreight to USA, Japan, or EU countries such as Italy or the UK (SE 16, 44). Here the catch is aimed for high-grade sashimi tuna markets at the international level and for retailers for fresh products – usually another branch of the processing company – at the local level. The economic relation here is between the processing companies – which buy the fish and also can provide ice and bait – and the boat owners – who are ensured their catch is taken at an agreed price from which costs of inputs are deducted from the final payment.

### Illustration 15: Control of tuna landing at the local processing company in Victoria



Photo by the author

Here tuna fishery generates benefits on three fronts: tuna for the processing companies to send abroad, catch revenue for the boat owners and salary for the crew members. A small portion of the catch stays at the local level, mainly for hotels. This route of the tuna is set through individuals that have a close contact with the boat owner and have an arrangement to take some fish from the boat when it is landed (SE 19, 21). In the semi-industrial segment of tuna fishing in the Seychelles, access to market is a key element in shaping the supply chain and it also determines in a structured way the types of benefits generated for each actor involved.

#### The rise of the ‘European tuna’ fished by purse seiners in the WIO

The purse seine fishery in the WIO catches tuna, mostly skipjack and yellowfin, for the canneries of the WIO region, including those based in the three case studies. The fish is then re-exported, mainly to the EU. As presented in Chapter 4, the supply chain of tuna caught by the purse seine industry has been widely explored in other studies. Authors have for example analysed the role of international demand of tuna in the future of its exploitation or the importance of trade rules and market fluctuations in firms’ strategies to access tuna resources (Campling 2012a, 2016; Mullon et al. 2017).

A topic that is relevant to reiterate is the analysis of the ‘economical nationality’ of the tuna of the WIO, especially the tuna caught by the EU fleet. In addition to these discussions in

Campling 2016; Campling and Colás 2017; Campling and Havice 2013, looking at this the topic can contribute to the argument of differentiated access to market. According to the EU regulations, tuna is assigned a country of origin depending on where it is caught and by whom and more specifically: “caught from the national waters or if it is caught by a vessel flying the country’s flag, registered in the country and owned by either a national of the country or a company that has its base in the country and is owned at least 50% by nationals of the country” (EU 2013). When caught in the high seas, the nationality of the fish is determined by the fishing vessels. In WIO, as purse seiners are fishing both in the EEZs and in the high seas, the tuna can be officially either from the EEZ’s country or European. When they are fishing, vessels have to record the geographical area of their catch, distinguishing the high seas with national waters. When tuna is landed in a cannery, the tuna with “European origin” is then considered imported to the WIO countries, as it has acquired the nationality of its fishing fleet. This tuna is then re-exported to the EU with an exemption of tax if it fulfils the conditions of origins under the EU East-South African economic partnership agreement (ESA-EPA) to be “wholly obtained” and “sufficiently worked or processed” products in the country members to the agreement. In this setting, tuna caught by EU vessels are the most likely able to fulfil the requirements of the EU rules of origin (Havice and Campling 2013). Processing companies that wish to access the EU market are then under the economic pressure to source tuna from the EU fleet to comply with trade regulations.

As the canneries of the WIO mainly have the EU as a market target, the three countries studied have benefited from a derogation to the rule of origin regulation under the ESA-EPA. Under the derogation, the three countries are allowed to export tuna, with European or non-European origin, tax-free to the extent of 8000 tons in cans and 2000 tons in loins (EU 2017). Here, the access to the EU market for tuna caught by purse seiners in the WIO is then dependent on broader economic agreements between countries. In line with Campling (2016), I argue here that tuna processing activities are influenced by broader policies such as trade preferences and tariff liberation. Hence, the benefits from the tunas, here revenues for canneries, are principally shaped by broader geopolitical and economic policy negotiations that determine access to the EU market. The trade policy established by the EU dictates the way the resources are accessed and marketed in the WIO. The canneries and by extension their local staff are highly dependent on this access to the European market. While it appears that the derogation is a boon for WIO countries, the EU also largely benefits from it via a cheap supply of tuna products from the WIO (Mereghetti 2017a). With such market access

restrictions, DWFNs such as the EU manifest their strong position in shaping the rules of how benefits from tuna can be accessed by WIO countries, here mainly the canneries.

Based on the above exploration of the role of access to markets in gaining benefits from tuna, we can see that tuna from the WIO is equally important to local and international markets. Access to these markets is controlled not by fishers themselves but other actors such as boat owners, intermediaries, processing companies or by international trade policies and regulations. These actors maintain economic power over the rules of access to the market while also gaining economic benefits from the resources. They also play a key role in supplying tuna to locals and consumers at the global level. Ultimately, with the increasing demand for tuna both at the local and global level, the ability to access these markets will continue to shape how economic benefits from the tuna are maintained by actors at various stages of the value chain.

### **Labour opportunity: expanding local livelihoods and providing indirect access to tuna**

Access to labour and labour opportunities is seen by Ribot and Peluso as a key construct of who can benefit from resources. Actors who control labour can allocate it where it is needed to access the resources. Conversely, those who have physical access can influence who gets to work to extract or produce the resources or provide access to others through working relationships (Ribot and Peluso 2003). Within the commodity chain of tuna, labour plays a key role from production to retail. While technology is present at all stages of the supply chain, human labour plays an equally important role. From the fishers that pull the net or line to the cannery workers and retailers, tuna is dependent on human labour (Campling 2012a; Dentes de Carvalho Gaspar et al. 2017; Lecomte et al. 2017). In this section, I will focus my analysis on labour opportunities that tuna fisheries provide to different actors in the WIO and particularly to those that are involved in the production of tuna during fishing or at landing. I wanted to focus on these labour opportunities, particularly to show the contribution of the fisheries to local livelihoods and to shed light on actors that are less visible in the process of tuna production, and yet play valuable roles.

### **Local labour opportunities and local livelihoods**

Access to tunas and their benefits through fishing at the local level is strongly linked to building and maintaining relations of trust and reciprocity within the community (Berry 1989, 1998). In Madagascar and Mauritius, not all fishers have a fishing card/permit, either because the system has not reached all fishers yet (case of Madagascar) or that the process to receive

the permit is too long (case of Mauritius). Those that do not have such a permit, while not able to access subsidies from the state for example, can still access the resources through working relations with boat owners or other fishers that are permit holders. Local tuna fishing usually involves a group that would include individuals from the same family or village without a formalised right. In this instance, the participant receives a part of the catch that would have been divided between the crew members. This social relation is embedded within a reciprocity principle of offering to help a relative, friend or neighbour in the same fishing community. Access to labour opportunities here is not formalised and is rather horizontal, based on trust and reputation building. Each fisher can ask for work by approaching the boat owner. In Ramena village, boat owners are well known to accept members of the village that are looking for and willing to work, including women. One boat owner declared “In Ramena, fishing is a matter of survival, I accept anyone who is in need of work, there is always something to do in the fishing, whichever your skill” (MD 24). Here, the labour opportunities are not limited to the job of fishing only, but also include a large array of tasks from net making/repair, boat maintenance, fish handling and preparation for sale or transport. Local tuna fishing, therefore, generates benefits through labour opportunities to various members of the community. In Mauritius, the crew members are either family members or friends from the same village who appreciate fishing with their relatives or neighbours. The same crew composition applies in the Seychelles, where catching tuna is opportunistic as fishers target other species such as jackfish or groupers. The artisanal tuna fishery is therefore a segment where labour opportunities are offered on the basis of personal relationships within a community. These social relations allow non-registered fishers to gain access to the resources and get either economic benefit or/and tuna to consume or sell.

**Illustration 16: Landing of catch from an artisanal boat in the north of Madagascar**



Photo by the author

Relations of trust are also apparent at the time of sharing catch and benefits from the fishing. In the Seychelles, the system of revenue share is that 1/3 is given to the boat owner and the rest is equally divided between the crew members. When asked about this distribution, members of the crew expressed their appreciation or satisfaction they had from the relationship they had with the boat owner they were working with. Madagascar and Mauritius share the same system of revenue allocation where the revenue is divided equally between the fishers after deduction of the boat owner's share and the cost of fuel. In the north of Madagascar, fishers make statements such as "bosses are not greedy here, they take care of you" (MD 27, MD 22) while in Mauritius and the Seychelles, fishers do not refer to boat owners as "bosses" but more as their equals. The mention of "comrades" between fishers in Mauritius and the Seychelles were common (MU05, MU06, MU17, SE 06, SE 24). In the three countries, the economic benefits received by each fisher is therefore variable, dependant on the catch and the season. They are not provided a fixed salary. Despite the difficulty of the fishing activity, fishers still find reward in working with their peers at sea.

As I have shown, there is therefore a broad network of actors which benefits from access to tuna resources in the small-scale tuna fishery, through labour opportunities and other local livelihoods. To maintain the benefits of the fishery to the local economy implies hoping for continued access to a healthy tuna fishery, by both fishers and other indirect actors. This is presently achieved through the low-intensity way that tuna is exploited: use of smaller boats and limited fishing effort. While it could be argued that the situation shows a lack of development in the fishery, the social interactions and impacts of the fishery demonstrate that this way of fishing does benefit local actors, even if just from a labour perspective.

#### The less well-known labourers of the semi-industrial and industrial fishing

The case of the semi-industrial sector in the Seychelles is worth mentioning here in terms of the labour opportunities it brings. In the past five years, the Government of the Seychelles has strongly invested in developing its semi-industrial tuna fishery. With a national fleet of around 30 boats in 2017, demand for crew was not satisfied. As a result, fishers from Sri Lanka have come to work on Seychellois vessels. The few Sri Lankan fishers interviewed expressed satisfaction regarding their working conditions, including being able to send money back to Sri Lanka and fishing more tuna than in the Sri Lankan waters (SE 22, 50). Local views on this influx of Sri Lankan fishers have, however, been mixed. Some consider them as taking the jobs of local fishers at a lower cost, views carried by small-scale fishers and some government officials (SE 19, 31); while others, mainly boat owners, see them as

contributing to the development of the fishery and filling the labour shortage, with young Seychellois willing less and less to take part in fishing (SE 21, 35). Because of the social context in the Seychelles, the fishery has provided access to foreign labourers who otherwise would have not ventured to the EEZ of the Seychelles.

Another set of actors that I wanted to shed light on emerge from my encounter with purse seiners' fishing crew members, and stevedores during landings in Antsiranana and Victoria. Labour opportunities on board purse seiners are controlled by EU fishing firms. A typical purse seiner fishing in the WIO region has crew composition of around 20 people. Around half of the crew is European - the captain, officers and technicians - and the other half is Senegalese, Ghanaian, Ivorian, Seychellois or Malagasy, with non-specialised roles. The Fishing Access Agreements require a percentage of the crew to come from African, Caribbean and Pacific (ACP) countries, including from host countries where the fishing takes place (Goulding 2016b; Macfadyen 2015). In the Indian Ocean, an average of 700 ACP nationals are annually employed by EU tuna fleets (Campling 2012a; Macfadyen 2015). Nationals of the three countries studied have, however, only benefited from this labour opportunity to a limited extent, with an average of 10 to 15 seamen from each country involved every year (Caillart et al. 2018; COFREPECHE et al. 2015; POSEIDON 2019). Those non-EU crew members directly access the resources through employment with the fishing company and gain a financial benefit through wages rather than fish. When asked about the amount of benefits they receive from the fishery, many of them responded that they were satisfied by the wage and work conditions they had compared to what they can make in their home countries. However, the same crew members mentioned they did not feel they were getting as much benefit compared to what the fishing companies are making (MD 42, 46, 87). These observations were made by non-EU crew members that were involved on EU vessels for more than five years. Sentences like "I make a good living compared to what I can earn at home" (MD 46) were stated amongst the non-EU crew along with, "In the end it's the big bosses sitting in Madrid that make the money, we are only fishers, we do not gain much" (MD 87). Non-EU crew members were often performing non-specialised roles on tuna vessels. Therefore, despite the labour opportunity, their wages are much lower than EU nationals on board, estimated at around 7 times less (Campling 2012a). Similarly, while the wages are usually considered a substantial operational cost for EU vessels (amounting around 30%), the EU fleet in the Indian Ocean, including in the WIO has been evaluated as highly profitable, generating more than 100,000,000 USD in gross profit for 2016 (Dentes de



Carvalho Gaspar et al. 2017). Considering the important number of non-EU crew members, they play an important role in the access to tunas as they generate high profits for EU fleets. Here, these non-EU crew members both benefit and lose from this access to the resources: while they gain more revenue than other home-based fishers, they gain much less than their EU peers on-board.

In host countries, another labour opportunity provided by foreign fleets is stevedoring at the port. In Madagascar, landing boats employ local stevedores to unload the fish to the cannery. In this process, non-tuna species, damaged or undersized tuna are provided or sold to them at USD 0.1/kg, on top of their wages (USTA 2017). With an average landing of 480t/year, these fishes are then sold at the port by stevedores on the evening of landings at USD 1 to USD 1.5/kg (USTA 2017). The socio-economic context in Madagascar implicates that wages for these positions are not very high (less than 2 USD/hour according to MD 04). Stevedores are therefore making the most of their ‘real wage’ through the sale of fish they are offered. The importance of these local market events has made access to these jobs a very competitive business where relations of patronage are established, requiring stevedores to build personal and economic ties with those with authority at the handling companies, including through financial gifts (MD 04, 36). The supply of bycatch fish in Antsiranana by industrial vessels is seen by some as unwanted competition to local tuna fishers (SK 07), and by others as a welcomed source of cheap fish in a city with a high cost of living (MD 05, 39). One resident emphasised that “the coming of tuna from the big boats periodically regulates the price of all goods in Antsiranana. Without this tuna, everything remains at high price the whole year” (MD 05). As seen in the previous section, local fishers consider the competition brought by these landings as manageable. They did not have issue in selling their fish and the competition was only a couple of months a year (MD 24, 26). In sum, in far northern Madagascar, the stevedores are an important but easily neglected part of the tuna supply chain. They access the resources without fishing while supplying the local market. They also turn industrial ‘unwanted’ tuna to an economically local ‘needed’ fish.

In the three segments of the fishery, labour opportunities are a means by which various local stakeholders gain access to the tuna resource. These labour opportunities often generate access for those not having their own rights-based access to the resources. In coastal communities where tuna fishing takes place, diverse livelihoods are created around the fisheries and the supply chain of tuna. Livelihoods are also created for foreign fishers who have access to the resources through the semi-industrial sector in the Seychelles. Finally, the

contribution of the industrial segment and especially the EU fleet through labour opportunities is not all benefits as often advertised by DWFNs. While landings of industrial vessels generate labour opportunities and benefits for stevedores, fishing crew members who are not from the fishing nations often gain fewer benefits from fishing activities.

### **State authority: a strategic mechanism to maintain access to tuna**

A sixth structural mechanism that is explored by Ribot and Peluso is authority. Individuals or institutions with authority can dictate the implementation of rights-based mechanisms of access and shape the ability to benefit from resources (Ribot and Peluso 2003). Having access to actors with authority can influence the way resources are accessed including legitimisation (Sikor and Lund 2009). In this section, I will show how actors with a privileged link to state authority maintain and sustain their access to the resources compared to those with limited links.

The first illustration is of DWFNs' access to the authority of coastal states. For foreign industrial fishing fleets, this is key to establishing fishing access agreements with the WIO countries. In the three countries studied, this connection to state authority has been established through a long-term relationship built between host countries and DWFNs, mainly through bilateral cooperation and development aid (as will be developed in Chapter 7). Through this involvement in host countries, DWFNs have created strong leverage to negotiate rights to tuna resources within EEZs. During discussions with officials from fisheries departments, one interviewee mentioned that DWFNs such as the EU use development aid and partnership as an element to be considered during negotiation of fishing access agreements (MD 78). In Madagascar, anecdotes during negotiations of fishing access agreements include those of prime ministers being pressured by foreign embassies during the negotiations to grant access to fishing grounds based on the long-term partnership of both parties (pers. obs). Such intervention of state institutions into fisheries negotiations shows how access to state authority has helped DWFNs maintain their entry to tuna fishing grounds.

The second example is how industrial fishing firms access their own governments as well as coastal state authorities to ensure their sustained access to the resources and the fishery. For European fishing firms, producer associations play a key role in building a strong relationship with state authorities that provide subsidies. For example, for the case of the EU, fishing associations such as ORTHONGEL, OPAGAC or ANABAC are prime contacts of the state for subsidies or fishery policy. To illustrate, the EU delegation to the 2018 IOTC meeting

included a representative of each association in addition to representatives from fishing firms. Similarly, the Malagasy delegation included representatives from the Korean fishing fleet (pers. obs.). This close link of foreign fleets to their state or even coastal states (as seen for the case of Madagascar) shows a privileged access to state authority. Through connection to their home state, fishing firms make sure that they benefit from state support in the fishery including by gaining capital and technology. Through access to coastal states, foreign fishing firms ensure that management decisions at IOTC do not impede on their rights to fishing grounds.

In the small-scale fishery, the state has the authority to issue permits and licences which are needed by small-scale fishers, especially if they want to sell or transport their products. Fishers who have an existing relationship with state officials will be more aware of schemes that the state might put in place to develop the fishery or support fishers. During the fieldwork, discussions with fishers, however, show a considerable distrust of the state, especially in Madagascar. Fishers especially made statements such as “the government is only there to punish small fishers” (MD 19, 59). In Mauritius and the Seychelles, fishers expressed that the state was “not doing enough for the local fishers” (SE 19, 26) or that it was “protecting the big boats” (MU 25, 35). In contrary to DWFNs and their fishing firms, small-scale fishers have fewer interactions with the state, creating fewer opportunities for leverage as compared to the industrial segment. In Madagascar, it is through the intervention of NGOs working in fisheries, collaboration with fisheries departments and local fishers that small-scale fishers have improved their access to state authority. In Mauritius and the Seychelles, fishing associations facilitate access to state authority in order help fishers benefit from various subsidies but also voice their demands, the latter not always welcomed by the state (MU 25, SE 47). To mirror the example of delegation composition, it has only been since 2016 that local fishers have joined the state delegation of the Seychelles to the IOTC (IOTC 2015, 2016). From what was observed in the meeting of 2018, there was no such integration of local fishers in the delegations of Madagascar and Mauritius. Thus, only fishers in the Seychelles have succeeded in taking part in regional negotiations at the IOTC.

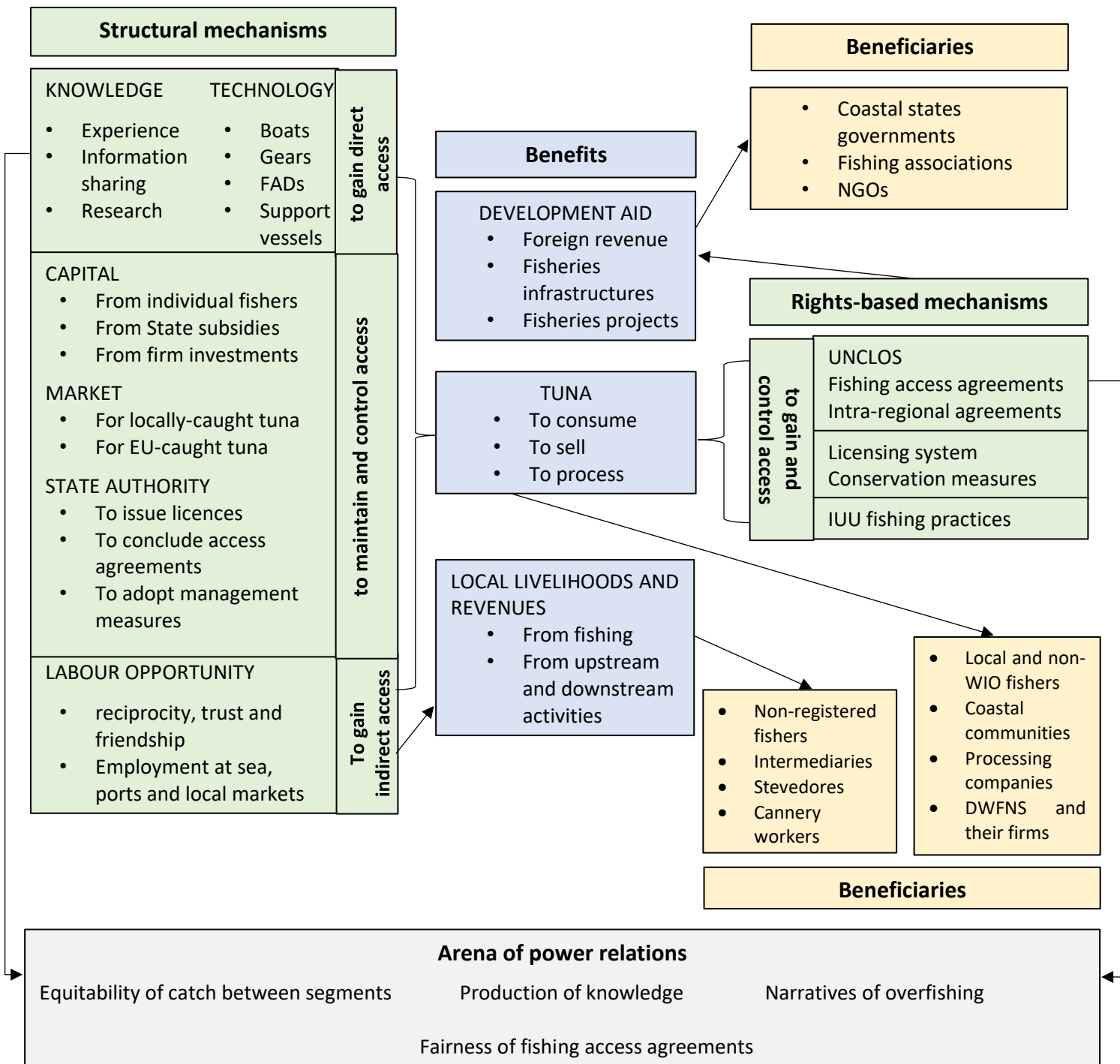
The leverage that the industrial sector has through DWFNs’ privileged access to state authorities, either in host countries or in their own states, shows the limits that small-scale fishing actors have in accessing tunas and the fishery, compared to the industrial actors. While rights-based mechanisms determine the legal arrangements available for fishing, access to state authority in tuna fisheries facilitate the mobilisation of these arrangements. It

is also a key strategy by DWFNs to maintain access to tunas and ensure that their economic interests are considered in management measures.

To conclude this section on relational and structural mechanisms, I showed how benefits from tuna fisheries and access to tunas are strongly influenced by these mechanisms. While knowledge, technology and capital have a direct impact on the quantity of tuna fished and the economic benefit from the fisheries, market, labour opportunities and state authority shape the context of how benefits are distributed across the different segments of the fishery, and also contribute to maintaining access to the resources.

The use of the theory of access framework highlighted that while rights-based mechanisms set the foundations for the possibility of access to the tunas to a variety of actors through various legal arrangements, structural mechanisms present a clear picture of unbalanced and unequal access between the involved (**Figure 9**). As I will develop in the next section, these power relations and conflict are aggravated by the materiality of the tuna resources and the western Indian Ocean.

**Figure 9: Mapping of access to tuna using R+P's classic theory of access**



Source: Author's drawing

### **6.3. CONSIDERING MATERIALITY AND THE ROLE OF NON-HUMANS IN ACCESS POLITICS**

If the previous section described how the classic theory of access can be applied to tuna resources, I will now move to the enhanced theory of access that considers both the spatiality of the ocean and tuna as contributing to shaping access but also how fishing practices influence the materiality of the fish and the sea. Considerations of materiality are essential in discussions about mobile resources as their biophysical and ecological characteristics determine their movements. This is one of the key arguments of this chapter on access as the materiality of WIO tunas, including their ecologically and socially produced biophysical characteristics which are exacerbated by their high mobility, play an important role in the: who, when, and how the tuna is fished and managed.

In the following sections, I will start with a presentation of the concepts of materiality and mobile resources as I use them in this thesis. I will continue with explaining how I integrate materiality to the framework of R+P. I will finally show two examples of how materiality in tuna fisheries shapes access to the tunas and how this can also influence materiality. From this enhancement of the classic theory, I then offer a new mapping of access to tuna resources infused with materiality.

#### ***6.3.1. The concept of materiality and its influence in resource management***

The concept of ‘materiality’ refers not just to the tangible biophysical and spatial characteristics of a resource, but also the ways in which those aspects are constructed through social processes (Bakker and Bridge 2006). This reflects a ‘material turn’ in political ecology and other fields in social sciences (Bennett 2010; Walker 2005), which explores the active dynamics of non-humans and highlights the importance of biophysical ecology in socio-environmental research. As Robbins puts it, “non-human actors play an important political role in explanation” (Robbins 2003: 643). This leads to a kind of hybrid socio-natural materiality that has an impact on access to the resources while it is also influenced by this same access.

The need to study materiality has been widely explored in geographical studies especially those on construction of nature or society-nature (Castree 1995; Robbins 2012). Beyond simple attention to the matter and biophysical features, various authors have attempted to present how materiality intervenes in social practices or how it can be produced or co-produced. Bakker & Bridge (2006) promoted a new research agenda in resource geographies where exploring materiality entailed looking beyond the binary of materiality and production

of nature. They encouraged the study of various contributions that materiality can bring to resource studies, including the different meanings attached to the tangible, the impacts of the biophysical in social practices or how the material creates or disrupts social practices of resources management (Bakker & Bridge 2006). Bakker (2012) discussed materiality as “shaping human perception, discursive constructions and responses to one resource” (p. 617) but also how the material can be produced through social, representational and symbolic practices (Bakker 2012; Bakker & Bridge 2006). Anderson and Wylie (2009) suggested looking at materiality beyond the elements (earth, water, fire, air) of the earth or the state (solid, liquid gas) of the object but also through the processes that can enact the properties and capacities of these elements. Bennet (2010) in her account of the role of things in our daily lives exposed the vitality and political force of things through their encounters with other bodies. By looking at the agency of non-human materials, she showed the ways in which things as they move, compose and combine, create affect and shape different capacities of action between humans and non-humans. The materiality of tuna I use here then includes both the biophysical features of the fish such as their mobility, their feeding and social behaviour but also their produced features through fishing practices. As for the materiality of the WIO, this includes the productivity and ecological characteristic of this western part of the Indian Ocean as well as the imagined geographical delimitations produced through social practices. I will argue that there are crucial factors to consider in a theory of access of tuna resources.

In parallel to the concept of materiality, the thesis also engages with the agency of non-humans in social practices as advocated by different authors. Whatmore (2002) for example, in her discussion of hybridity in geography drew attention to the role of space and relationships between human and non-humans in shaping various processes in society. She advocated for broadening our way of thinking of the social world by better including the non-humans and the relations that constitute the world. Haraway through her various works explored our entanglement with non-humans including companion animals and various non-living technologies. Regarding animals in particular, she described the way in which non-humans can be active partners and engaged in processes that co-shape all the parties involved through historically and culturally situated encounters (Haraway 2008). Her manifesto called for a better way of engaging with non-humans as “a question of cosmopolitics, of learning to be ‘polite’ in responsible relation to always asymmetrical living and dying and nurturing and killing” (ibid: 42). In this thesis, I present the tuna and the WIO as actants in shaping access

to tuna fisheries including through their materiality. I will argue that their agency requires better attention in the management of access but also in ensuring their sustainability.

Before expanding on this more theoretical argument, below I review concrete examples from the scientific literature of materiality in both terrestrial and marine resources.

### **Mobile resources on land**

In this section I will explore the various implications of materiality of mobile animals notably linked to their movement. Animals such as elks, bison, deer, elephants, zebra or antelope all migrate in their lifespan. This movement takes different forms and patterns during which the population size or distribution can change (Lulka 2004; Tisdell 2015). Some species undertake migration in response to seasonal changes while others can undertake movements according to their lifecycle (Tisdell 2004). In the case of the bison for example, Lulka (2004) emphasised the need to consider their movement in conservation policy. He described that existing measures such as establishing boundaries are only reinforcing human and non-human hierarchies, and can undermine the conservation of the species itself. Sundberg (2011) explored the role of wild cats in disrupting enforcement of border control in the United states. As the conservation of the species was argued by environmental agencies, its protection across borders generated challenges to border control agents trying to enforce strict delimitation of borders.

Highly mobile animals through large geographic areas can be qualified as fugitive resources (Giordano 2003). Resources are defined as fugitive when their movement is unidirectional and where the initial user gains all the benefits from the resources but does not necessarily bear the cost of the exploitation since such costs can move with the resources (ibid). This fugitiveness has been discussed by various authors regarding the challenges it presents, in managing property rights, for example. Luek (1995) recognised the complexity of setting and managing property rights of fugitive resources or resources situated in a vast geographic area due to the variation of classification of species, land ownership patterns, and wildlife values. Tisdell (2004) emphasised the economic value of fugitive resources passing through private property compared to those in an open access setting. He argued that in a US legal setting, the movement of wildlife through private lands can incentivise landowners to implement stewardship and conservation of the species for future economic opportunities. The fugitiveness of wildlife has also been studied in savanna ecosystems in Africa. Child (1996) showed that the movement of wildlife through a large area where various local communities



and tourists are present required access to be shared. This sharing involved tourists paying for access, to the benefit of the local communities. Meguro (2011), however, indicated that fugitive resources in savannas can also have negative effect on local populations such as creating human-wildlife conflicts and making management unattractive to communities (Meguro 2011).

Access to migratory species in Africa has also been discussed in relation to Transfrontier Conservation Areas (TFCAs). Intended to conserve migratory species such as elephants, these areas are subject to management by actors across the countries where the TFCA is established which can be challenging. While rules of access can be established in collaboration by various countries, the effectiveness of their implementation varies due to often differing governance capacity, leading to management efforts being more or less successful in the different parts of the TFCA (Muchpondwa and Ngaru 2010). The materiality of migration is also discussed by these authors as a potential factor of uneven distribution of benefits.

The cases presented above emphasise the role of the mobility of animals in shaping their management and access. It also shows how the movement of animals as part of their materiality can disrupt environmental policies or engender conflicts amongst actors.

### **Mobile resources at sea**

Researchers from various fields have studied how people access marine resources that are mobile such as tuna, salmon, marine turtles or other shared fish stocks.

Fisheries management and marine conservation studies have shown that migratory species present challenges for their management, including regarding access. Management of salmon for example implies the conservation of both freshwater and marine habitats as well as regulating inland activities affecting both habitats (Semmens et al. 2011). The movement of fish can also bring complexity to management processes. Bear (2012), for example, discussed the role of bottlenose dolphin movements in the management of scallop fisheries as the dolphins are a protected species that feeds on the seabed where dredging for scallops is taking place. Management measures for a sedentary resource, here the scallops, required the consideration of mobile animals, here the bottlenose dolphins. He argues that the materiality of non-humans shapes management measures and also calls for a deeper study of the sea as well as its materiality, its multiple elements and actants. Bear and Eden (2008) also explored the complexity brought by movement of marine species in management processes such as

certification. They presented how the boundaries required for fisheries certification can become fluid as the fish moves and can naturally evade the established limits of the particular place to be certified. With fish moving freely, moving in and out the certifiable space can make their labelling difficult and requires therefore a better consideration of spatiality of the sea but also ecological knowledge of the fish.

Another case is marine turtles, a species that appears on all lists of protected species. The question of access to the resources by local populations has been overridden by the global need for their conservation (Campbell 2007). Their migration across various oceans has required the intervention of international measures such as prohibition or restrictive use. Such policies can contradict local settings where consumption and use of the resources are culturally acceptable or part of socially established norms (Campbell 2004; Humber et al. 2015). For Campbell, the problem with this migratory species is of “space and scale” as the resources move across national and international spaces while management measures are taken without consideration of the local scale of access. Marine turtles illustrate the key role of materiality and spatiality in the management and access to moving resources. Local access to the moving resource is controlled by international measures due to their global ecological importance.

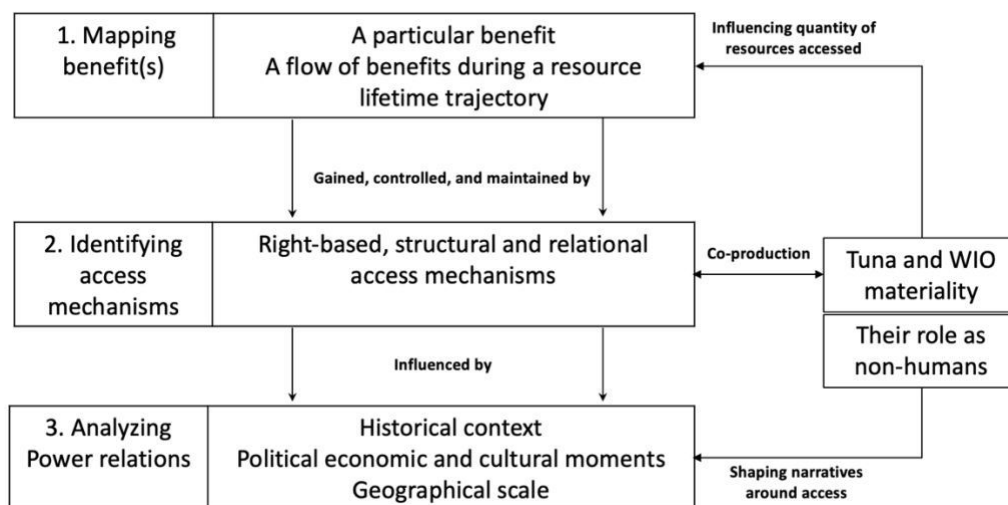
A last example comes from the implementation of Individual Transferable Quotas (ITQs). Despite their attributed economic efficiency (Birkenbach et al. 2017; Newell et al. 2002), implementation of ITQs has been subject to various critiques. Those include the lack of consideration of ecosystems and the nature of fishing resources especially marine fugitive ones or a disregard of social equity as ITQs could be in the hands of a few large fishing companies (Copes 1999; Sumaila 2010). These debates on ITQ emphasise the complexity that the movement of the fish brings to questions of access. As they are designed to establish rights of a given portion of the total allowable catch of fish, they can be challenging to implement in multispecies fisheries such as tuna where in addition to being migratory, the fish also congregates with many other species.

This exploration of the role of movement in natural resources showed the specificities of questions of access, property and management when resources are mobile. The above studies have shown that when the materiality of species, notably their movement, is not taken into consideration, policies and management measures are less likely to be effective and can have negative impacts on the resources and their users.

### 6.3.2. Integrating materiality and the role of non-humans into Ribot & Peluso's framework

The following sections argue that the materiality of tunas and the WIO have an impact on the theory of access to tunas in two ways (**Figure 10**). First, benefits from tuna fisheries are highly dependent on the materiality of tuna including its productivity and presence within a country's EEZ or in the high seas. Second, the biophysical attributes of tuna shape and influence structural access mechanisms such as knowledge and technology, which in turn have an impact on the quantity of tuna that can be accessed. The materiality of the sea and tuna is also shaped by various rights-based mechanisms of access that generate spatialisation of the sea. This section also presents the role of tuna and the WIO as actants in the politics of access to tuna. The established yet imaginary boundaries of the WIO, the current availability of tuna and the perceptions around their current ecological state shape various narratives of overfishing and equitability around the benefits from the resources. This in turn has an impact on the power relations that intervene between actors involved in the fishery and its management.

**Figure 10: R+P's mapping of access enhanced by materiality and the role of non-humans**



To explore this integration of materiality and the role of tunas and the WIO in the theory of access, I will first illustrate, through two important aspects of materiality of marine mobile resources – spatiality of the sea and movement of tuna, and how access to tunas and related benefits are influenced by the role of the WIO and tuna. I will then explore how the materiality of tuna can be co-produced through practices in the fishery. Finally, I will present the materiality-infused theory of access.

### **The role of the WIO and tuna in access control**

The sea has often been seen as an undeveloped space of trade, lawlessness and placelessness (Steinberg 2001). At the same time, it is also considered a specific space of enquiry ‘out of sight’ and yet rich in socio-cultural and political formations and perspectives (Peters 2010). The latter is specifically true for the WIO and its tuna fisheries. Tuna fishing takes place in waters that are ecologically distinct (from near coastal reefs to deep water), carved into particular geopolitical and economic territories, through which the different species move and circulate. Tuna moves within high seas, with an open access regime, and also within the legally defined space of EEZs between countries of the WIO region.

The UNCLOS, through its supposed delimitation of the marine space, has territorialised the sea around the Indian Ocean. The establishment of EEZs, which put tuna under the property regime of coastal countries when they pass through their waters, turn it into fugitive resources (Giordano 2003) as soon as they move to another EEZ. This fugitiveness of tuna beyond national jurisdictions can create perverse incentives for host countries akin to those of open-access property regimes, where profits accrue to the takers but all share the costs. These incentives may influence host countries in their approach to fishing access agreements. One government official commented “the fish moves beyond our waters, if they are not fished in our waters, they will be fished elsewhere, it will be a loss for us” (MD 02). Here the territorialisation of the sea gives power to host countries to lease its resources, but at the same time, the mobility of the tuna creates incentives to accelerate exploitation while possible. The WIO and tuna here become actants in the creation of economic power that coastal states can have in tuna fisheries.

This situation is different when the fish reaches the high seas. There are no access rules or property regime applicable yet, fishing vessels are then free to catch tuna without any specific regulation as UNCLOS requires countries to collaborate in order to establish conservation and management measures<sup>38</sup>. However, fishing vessels are constrained, when full, by their need to land and tranship at the closest ports which in the WIO are in the Seychelles, Madagascar, Mauritius and Kenya (MD 42, MU 30, SE 66). The strategic positions of ports make these countries necessary in the operation of tuna fishing. Foreign fleets, in their strategy of optimising their time at sea, land to ports to be able to return to fishing grounds as

<sup>38</sup> Article 117 of UNCLOS - Duty of States to adopt with respect to their national measures for the conservation of the living resources of the high seas: “All States have the duty to take, or to cooperate with other States in taking, such measures for their respective nationals as may be necessary for the conservation of the living resources of the high seas.”

soon as they can. The sea, as open as it may be, cannot always fulfil the needs of tuna exploitation, requiring fishing vessels, especially purse seiners, to come back at land.

The mobility of tuna and the spatiality of the vast ocean are therefore a key element to the fishery. The imagined political boundaries of the sea are not respected by mobile tuna. As migratory species, some tunas travel in the WIO region at different periods of the year while other species can be found all year long in different countries' waters or undertaking a circular journey. Yellowfin and bigeye tuna for example are found in the coastal waters of Madagascar, Mauritius and the Seychelles between April and December and further offshore between November and March. Coastal tunas are present all year in the coastal waters of the countries (Fonteneau 2010, 2014; Kaplan et al. 2014). The question of spatiality of natural resources and its implication in terms of access has been particularly looked at by Giordano (2003). He presented four types of spatial frameworks: open access, private property, fugitive resources [where the resources move from one space to another] and migratory resources [where the resources can travel between two spaces]; and emphasised the need to differentiate management under these frameworks and consider their influence on the exploitation (ibid).

Placing tuna under Giordano's categorisation of spatial frameworks (open access, private property, fugitive resources and migratory resources), tuna fits a particular framework depending on the time and place: from the property of the state to an open access regime and qualifying as a fugitive resource when leaving one EEZ but also migratory if not caught and pursuing its movement in the region.

The characteristics of tuna movement mean that it has no fixed spatiality, making access mechanisms to it highly diverse in terms of actors and content. Foreign vessels need to have fishing access agreements with different countries of the WIO region to catch sometimes the same school of tuna. Here tuna is an agent that deterritorialises established legal access boundaries. It forces fishing vessels to negotiate access to different host countries and gives power of access control to the coastal states in the EEZs, but only until the tuna moves to the high seas where that national power is lost. Tuna and the sea are therefore important actants as they mitigate tuna fishing activities and power relations in the WIO.

### **A new materiality of tuna co-produced through technology and social practices**

Tuna could be qualified as an undisciplined resource moving around different seas and one that can be productive one year and not the other. Yet, its materiality can also be produced by the practices that are associated with its fishing. To illustrate, I explore two examples: first, the use of Fish Aggregating Devices (FADs), and second, piracy.

In the Indian Ocean, 30% to 50% of purse seine catches are from FADs (Dagorn et al. 2013; Kaplan et al. 2014). The use of FADs has been adopted as a fishing practice because fish are naturally attracted to floating objects. The reasons are manifold, including for protection against predation, for food, association or protection of eggs and larvae (Castro et al. 2002; Dagorn et al. 2013). FADs are used both in the industrial and in the artisanal sectors. In tuna fisheries they are mainly used by the purse seine industry. The use of FADs by purse seiners in the Indian Ocean has drastically increased. It is estimated that around 7,000 units were deployed in 2010 and 14,000 in 2013 (PEW 2015).

While they increase productivity and facilitate the localization of fish, their impact on the ecological behaviour of the fish is debated. Some of the issues raised include the higher risks for some species such as skipjack to be overfished, the aggregation of more juvenile fishes under FADs, or the reliance of the fish on FADs for feeding and disrupting their natural search for food, hence their migration patterns (Davies et al. 2014, PEW 2015). Those can lead tuna to be attracted to poor condition areas where the FADs are located. It can also change their natural movement as well as impact their growth (Dagorn et al. 2013; Davies et al. 2014). The use of FADs as a fishing practice has therefore produced another type of materiality of the fish, changing its migratory behaviour but also its biophysical traits. Here, interactions between fishers and tuna through FADs co-produce materiality that increases the quantity of tuna accessed by fishers, reduces the extent of tuna agency in fishing and also modifies the nature of the resource.

Another practice that had an impact on the materiality of tuna in the WIO is Somalian piracy. Between 2005 and 2009, piracy was rife in the northwest Indian Ocean, preventing many industrial vessels from undertaking fishing due to security reasons (Chassot et al. 2010). The IOTC reported that the tuna catch in the region during the piracy period was reduced and that Somalian piracy could have been one of the causes of decrease in catch and reduction of active vessels (e.g. IOTC 2012a: 38 and IOTC 2014: 39). Fishing effort remained reduced until 2011, when the security situation had improved.

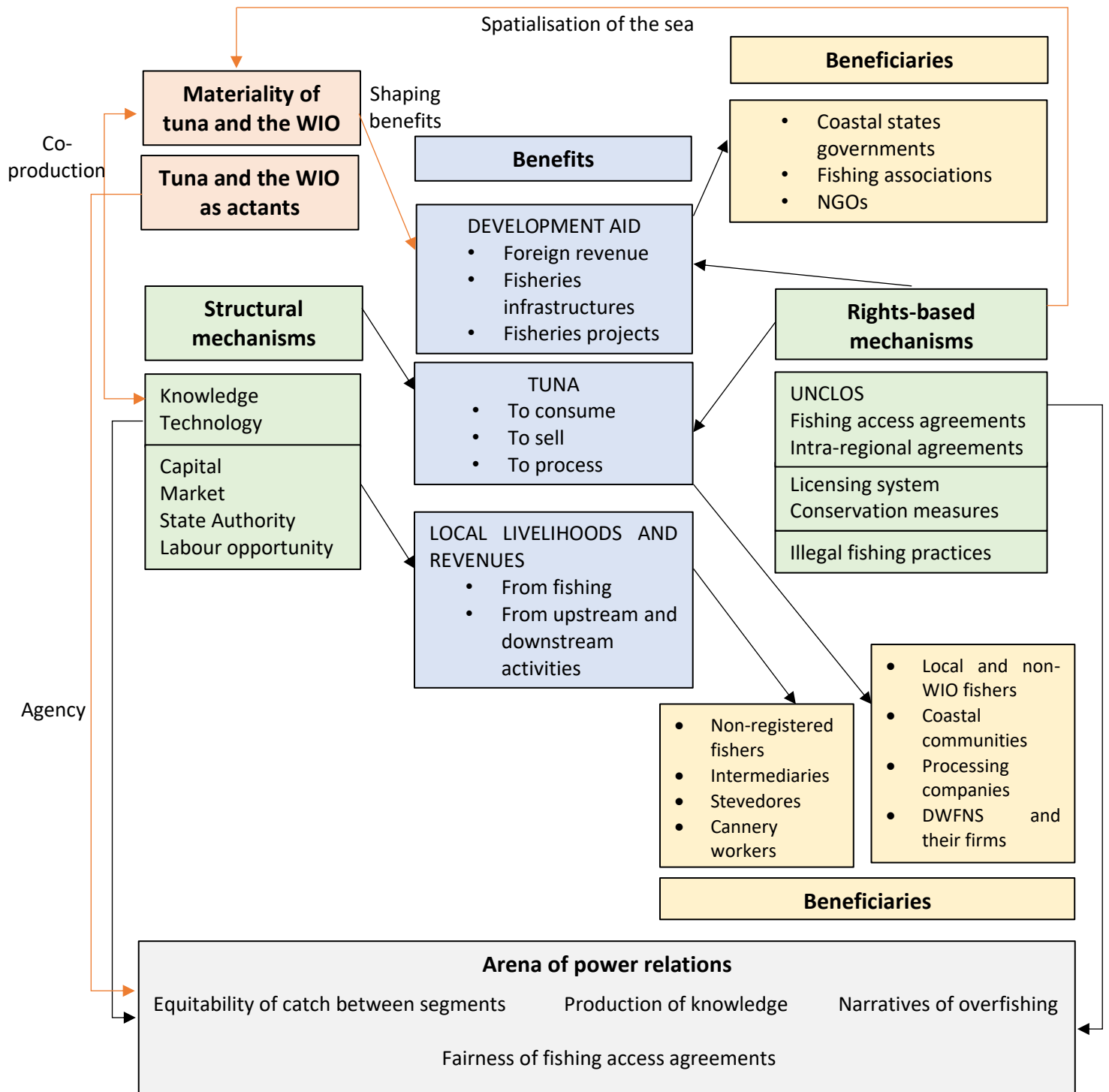
Since 2011, as tuna vessels returned to the WIO, the production of tuna steadily increased in the region (IOTC 2016a). The effort also increased for all foreign industrial fleets. Between 2010 and 2016, the number of purse seiners in the WIO region has increased by 53%, and the number of supply vessel that help locate the tuna increased from 7 in 2010 to 26 in 2016 (MU 33). Anecdotal stories from the field said that the event of piracy allowed the tuna to re-flourish in the region. This increased its availability for the years after and with that the number of vessels fishing in the region. Stories by different actors included statements such as “there is a lot of fish in the canal this year, because of the pirates, the resources could rest and rebound” (MD 42) or “the piracy had a major impact in reducing the numbers of boats coming in the WIO region” (SE 31) and “the piracy events between 2008 and 2012 almost closed the fishing which relieved the pressure on resources” (SK 02). This is an illustration of how the health of the tuna stock can then be influenced by socio-political practices such as piracy that took place far from national waters but had direct consequences to the tuna accessed in those waters. The frantic race to fish since the stop of piracy is also seen by some as one of the reasons why the yellowfin tuna stock collapsed in 2015 (SK 02).

Those two examples show how fishing and other practices happening in the large Indian Ocean can affect the fish, its stock but also its intrinsic nature. The undisciplined tuna is conquered by technology through FADs and the health of its stock impacted by a socio-political event. They illustrate how the materiality of tuna and tuna as benefits can be shaped by technology and social practices in the fishery.

### **A mapping of access infused by materiality and the role of non-humans**

Looking back at the theory of access and the inputs of materiality as well as the role of the fish and the WIO, I argue that these two elements require more attention in the study of access to natural resources, particularly for mobile ones, migratory species, and the marine space. To do so, I suggest to enhance the theory of access of Ribot and Peluso by integrating the impacts of materiality and the role of non-humans, and highlighting their implication when mapping access to the resources. This can be done at all three stages: introducing the implications of the biophysical aspects as well as socially constructed materiality of the resources to the benefits they produce, exploring co-production by considering the role of access mechanisms in producing materiality, and finally examining the role of fish and the WIO in shaping benefits and power relations (**Figure 11**)

**Figure 11: A theory of access to tuna infused with materiality and the role of non-humans**





## 6.4. CONCLUDING DISCUSSION

This chapter on access politics started by mobilising the classic theory of access of Ribot and Peluso. It then built on the framework to add materiality and the role of non-humans as components that influence different parts of the theory. In this conclusion section, I will highlight the winners and losers in the politics of access to tuna resources including by exploring structural settings that produce potential patterns. I will end this section with my reflection on the use of the theory of access and materiality to study tuna fisheries.

### *6.4.1. Patterns of situated winners and losers*

After mapping access to tuna resources, I will now develop a bit further the power relations elements and discuss the impact of those relations on who benefits or not in the tuna fisheries. To do so, I will undertake a common task in political ecology, which is exploring potential patterns of winning and losing. Robbins (2012) mentions that political ecology stories “track winners and losers” (p. 87) and in this process “it is essential to understand the degree to which such outcomes are non-incidental, persistent, and repetitive: a structure of outcomes that produces losers at the expense of winners” (p. 87). In tuna fisheries, tracking patterns of winning and losing requires paying attention to access mechanisms that produce uneven benefits as well as the elements such as geographical scale that produce more situated outcomes (**Figure 12**).

### **Structural winners and losers**

From the mapping of access above, we can highlight that three mechanisms produce structural losers and winners: knowledge, technology and capital. These three ultimately lead to a substantial difference in tuna catch between the foreign industrial segment and the national tuna fisheries.

In terms of knowledge, while local fishers – from small-scale to semi-industrial – have many years of experience to locate the fish and various means to access the fishery, those are limited compared to the knowledge produced by the industrial sector where research institutes and advanced technology are available. Local fishers are then losing catches due to this structural differentiation. In terms of technology, the same persistent pattern of lack of availability to technology in the segment makes small-scale, and especially artisanal and semi-industrial fishers – as they fish further offshore – lose in the game of gaining tuna. While it can be argued that the distinction between the segments naturally produces different catches, what can be noticed is that coastal states have been engaged in the development of

their fisheries at the same time as allowing DWFNs into their waters. However, national technology investment, as well as national research institutes, lag far behind. The case of the Seychelles needs to be mentioned where some artisanal fishers have managed to move towards a semi-industrial exploitation and where the Seychelles Fishing Authority produces more detailed knowledge through reports and statistical bulletin on tuna fishing compared to its two neighbours. While DWFNs argue to have provided fisheries development to the coastal countries, it has not entirely produced an improved tuna fishery. The development of a national fishery in the three islands has been limited to non-existent. Despite some advancements in the fisheries in Mauritius and the Seychelles, weaker countries like Madagascar have failed to improve their national fisheries through fisheries development aid. This questions the discourse of DWFNs of bringing support to developing countries through access agreements. As for capital, the industrial sector has sustained access to capital through their own funds or through access to government funding. Local actors have much less access to capital, despite recent efforts of governments of the WIO like in the Seychelles and Mauritius.

#### **Situated and contextualised winners and losers**

The geographical space of the tuna exploitation in the WIO also produces injustices. These are, however, situated and contextualised. They therefore need to be understood with a consideration of the socio-political context. They also need to be placed in the context of the benefits that are generated through the fishery.

In the EEZ, relations of powers between foreign boats, local fishers and coastal state governments and the tuna are variable and localised. As foreign boats are required to have fishing access agreements to access the resources, they have to negotiate this access with coastal state governments, giving coastal states power over the management of tuna fishing and provides them the ability to determine conditions under which fishing by foreign boats takes place. The countries' capacity to negotiate and the outcome of such negotiation are, however, different depending on the socio-economic context of the country. The Seychelles, for example, as a more developed nation with the most productive fishing ground and a key port for purse seiners can, to some extent, has a substantial leverage and higher capacity to negotiate conditions of access with DWFNs. Madagascar on the contrary relies rather heavily on DWFNs for aid and national budget (MD 78; pers. obs.) which can give the country less leverage in negotiations for access. The country can still be considered to be winning if one takes into account the value added of industrial tuna fishing combined with development aid.

For the case of the EU in Madagascar for example, the value-added from the EU tuna fishery in the country is estimated at about 4 million Euros a year (Caillart et al. 2018) and the amount of EU development aid that is provided annually is around 500 million Euros (SEAE 2016). However, these socio-economic gains need to be weighed against the large amount of profit made by fishing firms and especially the sustainability of the tuna exploitation. The tunas, subject of the negotiations for access, are not winning, especially in the fact that they are widely traded resources despite the limited knowledge on their productivity and availability in national waters. For the case of the EU reference tonnage of catch for example, it cannot really reflect a 'surplus' of the existing stock as prescribed by Article 62 of the Law of the Sea, as such surplus has not been determined and as tunas are migratory and transnational. As such, the determination of the surplus at the national level appears unrealistic.

In the territorial waters and the EEZ, the debate around competition over the resources also brings different arguments. While local fishers argue that industrial fleets strongly contribute to the reduction of fish available, industrial operators claim that industrial tuna vessels fish outside the 200 NM of territorial water which should not impede on local fishing activities. Here again, winners and losers are situated. DWFNs are not entitled to fish within territorial waters while local fishers are, which makes DWFNs not entitled to tuna in that marine space. However, for the three case studies, the competition exists between the semi-industrial fleets and the industrial fleet within the EEZ as they often fish in the same productive areas. Similarly, bycatch caught by purse seiners are often species that are caught by artisanal and small-scale fishers. Photos of landings of purse seiners in Madagascar and data from the USTA show that species such as skipjack, bigeye, kawakawa, and frigate tuna and non-tuna species such as barracudas and sharks are caught as bycatch by purse seiners and are also caught by small-scale and artisanal fisheries in Madagascar (USTA 2017, IOTC 2018d). Here then, local fishers can lose fish that are present in both the EEZ and the territorial waters.

The situation in the high seas is different in terms of power relations. The distance of the high seas from the coastal states makes it difficult, if not impossible for local fishers of the WIO to fish in the high seas. The DWFNs with industrial boats are able to reach the high seas and catch tuna. The influence of technology and knowledge therefore put industrial vessels in a continuous winning position compared to coastal vessels with limited capacity. The high seas here engender some financial power to industrial fishing firms from the catch revenue they

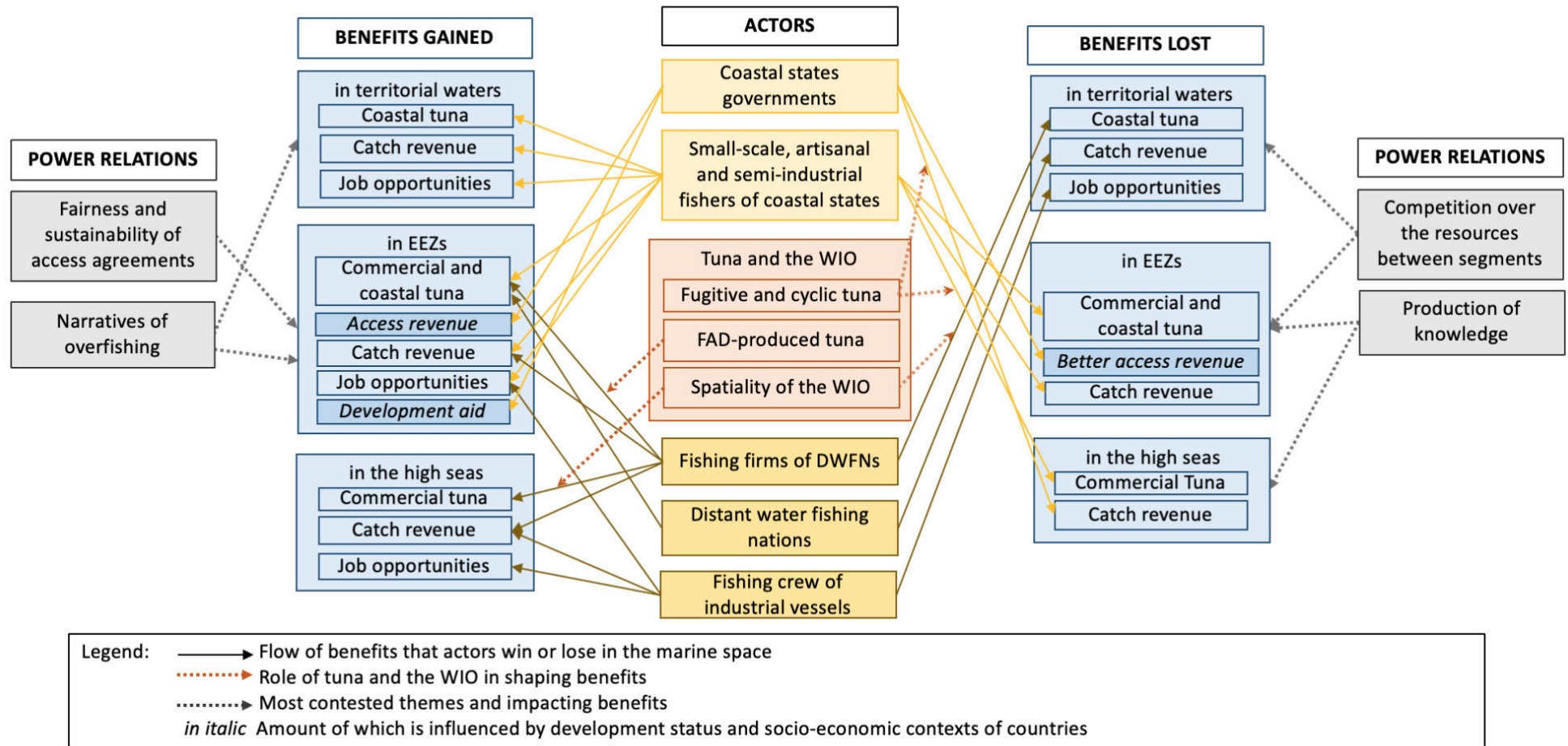
obtain. The coastal states are currently unable to benefit from catches of the high seas nor revenues from the fish.

As for overfishing, the different segments of the fishery make different arguments as to who is responsible for overfishing in the WIO region and more broadly the Indian Ocean. Small-scale, artisanal and semi-industrial fishers argue that overfishing by the industrial fishing sector has affected local resources. On the other hand, DWFNs, especially at the Indian Ocean level, often argue that the catch of the small-scale and artisanal segments is not accurately portrayed as there is a lot of underreported catch from gears such as gillnets (BK 05). Such claims by the industrial segment are valid to some extent. In some countries of the Indian Ocean that have substantial small-scale/artisanal tuna fisheries using methods such as gillnets, there is a limited knowledge on the catch and similarly for the small-scale fisheries' catch in the three countries. However, in the case studies, small-scale fishers and artisanal fishers do not specifically target tuna. The Seychelles and Mauritius's semi-industrial fleet composed of longliners has only recently grown in size. Madagascar has a limited number of longliners in its semi-industrial fleet and its artisanal fleet use hand line or trolling which lead to a low catch of tuna in the WIO and wider IO region. The argument of using overfishing to shift blame between the segments of the fishery is ultimately making tuna the main loser, as its stock may continue to reduce while debate continues on overfishing.

The role of tuna here is worth mentioning. Through its movement across territorial waters, EEZs and the high seas, tuna (or, more precisely, the migrations of schools of different species) drives actors to gain or lose catches. While in the EEZs, coastal states only have a time-limited right to the tuna, whereas DWFN fleets can follow the fish across EEZs and to the high seas. In the high seas, while industrial boats have full right to exploit the resources, the tuna itself does not necessarily cooperate by making itself available to fish, either due to its migration or due to its productivity which can be high or low at different years. Here, the tuna and its materiality dictate where the vessels could go to follow it. The use of FAD technologies, however, suppresses this power by allowing vessels to increase their chances of catching tuna. In terms of fisheries management, adapting to this specificity of tuna is essential to ensure that benefits from the fisheries are maintained but also that the tuna is fished to a level that allows its long-term sustainability. At the country level, gathering knowledge about the presence of different tuna species can help fishers and fisheries' departments to mobilise resources for fishing at certain periods of the year or to discuss the need to reduce access to the fishing during reproduction stages. At the regional Indian Ocean

level, fishing activities in the high seas where the fish travels could benefit from further surveillance to prevent illegal fishing. Another important aspect is a continued monitoring of the biological impacts of FADs on tuna species which could have unexpected impacts in the longer term.

Figure 12: Contextualised winners and losers within the arena of power relations



#### ***6.4.2. The contributions and limits of using the theory of access in tuna fisheries***

Using the theory of access of Ribot and Peluso (2003) to explore tuna fisheries in the WIO gave us a deeper understanding of the array of actors behind the fishery, their interactions, and the different power relations that form through the different mechanisms of access to the resources. Exposing rights-based access mechanisms showed that beyond direct revenues from the fishery, a range of indirect actors from intermediaries to port workers or coastal community members also benefit from it. Rights-based mechanisms are also a source of geopolitical interactions between countries that can influence development aid and development trajectories. My analysis of structural and relational mechanisms showed that beyond rights-based access mechanisms, tuna fishing is engineered by rooted knowledge, advanced technology and a multiplicity of social relations. These means of access generate power relations that are not fixed or permanent. Actors, through various mechanisms, depending on the socio-political contexts and interactions, have power over the tunas at specific temporal and spatial scales.

The chapter also argues that materiality and the role of non-humans require more attention in the study of access to fluid resources such as the sea or highly mobile species, such as migratory species. The theory of access of Ribot and Peluso can be enhanced by making the role of non-humans and the influence of their materiality clearer when mapping access to the resources. This could be done at all three stages:

1. Introducing the implications of the materiality of the resources to the benefits produced. Here it is suggested that in the study of the benefits produced, the resource itself is looked at by exploring how its characteristics influence the quality and quantity of benefits that actors obtain. This is particularly relevant for mobile species to which the amount of benefits can vary according to the movement of the species. As seen in tuna with its migration and species diversity, those can influence the quantity of fish accessed and the potential financial gains.

2. Exploring co-production by considering the role of access mechanisms in producing materiality. This process of co-production has been evident in the case of tuna fisheries where the characteristic of the fish has influenced access, but also how the fishing has changed the 'features' of the fish. The resources and the mechanisms of its use do influence each other and co-produce both mechanisms and 'new tuna'. This was also explored in other studies such as the one of American borders and the impact of the characteristics of the desert and wild animals on establishing and controlling borders (Sundberg 2011).

3. Examining the role of non-humans through the way their biophysical aspects as well as their socially constructed materiality shape power relations. As seen in tuna fisheries, power relations between DWFNs and host countries as well as between fishers in the different segments of the fishery have been engendered by the spatiality of the sea and how the resources move around the WIO. For mobile species especially, power relations can shift and evolve with the species' mobility giving some actors power over other actors in a specific time or place.

The use of the theory of access also presented some limits in this thesis. I observed that using the theory of access can be difficult for a multiple-scaled study. One of the challenges lay in introducing the role of geopolitics in shaping access and influencing mechanisms of access. The theory, as originally proposed by R+P, was built on case studies where the geopolitical scale was less relevant, and less explicitly theorised. To use the theory requires a careful attention to the question of scale. While geopolitics will be addressed by the next chapter, it also plays an important role in access that could not be directly addressed by the theory of access. This was also due to the fact that tuna fisheries are a highly multi-stakeholder activity that strongly involve foreign firms and countries.

Another remark considering my use of access theory is warranted. While R+P's list of structural mechanisms was not exhaustive or to be taken as exhaustive, the chapter attempted to explore most of them. This proved difficult at times, considering that the chapter covers the various segments of the fishery, three countries and a diversity of fishing actors. Addressing each mechanism for each country, segment and actor was not feasible. The chapter had to focus on the distinction between the segments of the fishery and using examples from the three countries when possible. This demonstrates the limit of the theory as more designed for a precise resource at a specific geographical location and also a resource from which benefits can be clearer to establish. It could have then been more beneficial to use the theory of access for a specific segment of the fishery in one country.

Nevertheless, what the theory did allow me to do was to bring to light several often overlooked aspects of tuna fisheries, such as the people behind the fishery or the difficult balance of benefits. It can also help in enlarging discussions of access for similar types of mobile resources, being more mindful of the entanglement between human and non-human actors and the heterogeneity of means of access involved.



#### ***6.4.3. The contributions and limits of using materiality and the role of non-humans in studying tuna fisheries***

One of the main contributions of this Chapter on access is its consideration of materiality and the role of non-humans in the analysis of resource access. The enhanced theory showed that tuna as highly mobile and also co-produced can disrupt users' efforts of management and requires concerted actions in a large geographical scale to be effective. The materiality of the sea and tuna influence the management of access in the different EEZs and bring countries to compete for foreign revenues to get most of the benefits from these mobile tunas. On the other hand, it was also shown that tunas can be impacted by fishing practices that make the fish easier to find and catch in the current type of highly extractive type of exploitation of the resources in the industrial segment. By congregating under FADs, the fish makes industrial exploitation more effective. At the same time, these practices can have a destructive impact on the state of the resources. Here the material fish is both an actant in how the fisheries are managed and the way it is accessed but is also heavily impacted by other actants' fishing practices and management decisions. In the study of fisheries, having this double consideration allows a more diverse view on the role of the fish and users' actions on the fish. Tuna fisheries, explored with the lens of materiality and the role of non-humans, are then co-produced with the fish playing a non-negligible role in establishing access and management. The spatiality of the sea is also a key component to consider in the WIO region. As opposed to the South Pacific, in the WIO it is largely open to the high seas, making it more open to uncontrolled uses especially by the industrial sector. As explained in section 6.1., the application of materiality to industrial fisheries including for tuna has been explored before under other terms such as 'environmental conditions of production' (Campling and Havice 2014). What the present chapter brings to light is that it is not merely environmental conditions, but access, management and materiality shaping each other. In an attempt to bring an improvement in policy as the 'seed' in political ecology, the use of materiality and the role of non-humans informs users that the fish and the ocean are important actants that shape their use. As it will be seen in Chapter 7, a strong collaboration of coastal states is needed to be able to face more powerful users of the tunas in the industrial segment. Similarly, the role of fishing practices on the state of the tunas resurfaces throughout the chapter. As seen in Chapter 5, the resources are declining, and as such the impacts of practices like FADs on the materiality of the fish require continuous advocacy in order to advance fisheries management and policy regarding tuna.

This attention and role I attribute the tuna including via materiality is not without its criticisms. For instance, Malm (2018) argues that attributing an active role to the non-humans distracts from the role of humans in the current state of affairs, at least in climate change. A point that could be made is that the use of materiality and non-humans here can be a distraction from the role of capitalist exploitation in access to resources. As argued by Campling (2012b), firms' strategies and tariffs strongly determine access and management of the WIO tunas fisheries. The industrial exploitation of tuna in the WIO, currently the most substantial segment in the region in terms of catch, is the most impactful on the fish. One limitation of the theory of access enhanced by materiality and the role of non-humans could be the loss of focus on the role of drivers that are rooted in political economics such as capital and market in the state of resources. While those components are addressed in the classic theory of access, my argument was that they should be equally investigated along with materiality and the role of non-humans.

A similar limit to this approach that can be raised is that the role of human actants and their decisions could be obscured. The focus on attributing agency to non-humans in the thesis could have prevented from a deeper analysis of decision-making on management at different levels. The thesis could have benefited from a detailed analysis of some actors' involvement and decision-making at the different stages of the fisheries from fishing to management of access.

In defence of this chapter, it can, however, be argued that the aim of the chapter is to produce this diversity of lenses to analyse the fishery as other aspects such as the political economic part and governance of the fishery have been largely addressed elsewhere, for example in Campling (2012a), Campling and Havice (2014) or in Lecomte et al. (2017).

In conclusion to this chapter on access, I argue that using the theory of access and putting an emphasis on materiality and the role of non-humans has provided a view of the WIO tuna fisheries with a fuller spectrum. With the PE lens, the chapter shows that local and national stakeholders are at different times and spaces both winners and losers; the foreign industrial actors, steady winners; and the fish – or its sustainability in the future – a consistent loser. A deeper look at the role of the fish and the sea can bring more awareness of the susceptibility of tuna and the WIO as actants. It also helps to keep raising awareness on the impact of destructive practices towards natural resources.

## CHAPTER 7. POTENTIALITIES AND CHALLENGES TO REGIONALISM THROUGH TUNA FISHERIES

“Au moment de conclure ce message sur une note d’espoir et de satisfaction, je tiens à remercier aussi, au nom de notre organisation régionale, l’engagement constant de l’Union Européenne à nos côtés depuis 2007; un engagement d’importance, à la hauteur des intérêts européens dans ce secteur et dans cette partie du monde.”

Discours de Monsieur Jean Claude de L’Estrac, Secrétaire Général de la Commission de l’Océan Indien. 6 Juin 2016.

As tuna resources move between the EEZs of the countries of the WIO, fishing boats operate across territorial boundaries, and the management of the tuna fishery is guided at a supranational level, ‘regionalism’ would seem to be an important entry point. From the activity of fishing the highly mobile tuna to the regional management of the tuna resources, countries of the region have had long-term economic and socio-politic interactions. In addition to that, the WIO region and especially the sub-region of the three countries studied – the Southwest WIO – have for a while been engrained in a regional rhetoric of belonging to the ‘Indianoceanica’, a sub-region that shares the Southwest Indian ocean, as well as common values and cultures. The Indianoceanica identity, conveyed since 1985 by the intergovernmental Indian Ocean Commission, is promoted as bringing countries together to collaborate on various fronts. In this regional context, this chapter aims to investigate if tuna fisheries in the WIO have contributed to this regional cooperation and identity. To this end, this chapter will answer the research question: how does the tuna fishery bring countries to cooperate or compete and does the fishery contribute to the building of a regional identity? To respond to this question, I will highlight the existing initiatives of regionalism in tuna fisheries, which have had successes and failures over the years. To understand the challenges to enacting regionalism in tuna fisheries, I use geopolitical political ecology as a lens of analysis. The chapter will proceed as follows.

I start with a presentation of the theoretical foundations of the chapter. I first discuss my use of the concept of regionalism. I then expand on the framework of geopolitical ecology, a theoretical lens combining regional political ecology and geopolitical economy (Bigger and Neimark 2017; Galt 2016; Glassman 2017). In the study of tuna fisheries of the WIO, where an important part of the catch is caught by DWFNs, geopolitics between coastal countries and DWFNs constitute a key element in the discussion of regional interactions.

The chapter continues with a section that illustrates how regionalism is manifested within tuna fisheries. It first presents the existing regional identity, which does not necessarily feature tuna fisheries at its centre. The section continues by dissecting the existing regional cooperation initiatives within which countries of the region have collaborated in tuna fisheries as well as the various attempts at building a regional tuna fleet. I will show that such regional initiatives often fail or have had relative successes.

The third part of the chapter consists of explaining the challenges that countries of the WIO face to achieve regionalism through tuna fisheries. Through the lens of geopolitical ecology, I unveil the role of geopolitics in impeding current initiatives of regional cooperation in the WIO and its impact on the management of tuna fisheries. The analysis will also show that economic interests, lack of involvement of countries and lack of local integration of a regional identity are factors that hinder regionalism.

To conclude, from the empirical data and interactions with stakeholders, I propose some pathways through which regional cooperation and identity could be reinforced within tuna fisheries. This requires interventions at different levels and especially within each segment of the fishery. I end the chapter by providing my reflection on the use of political ecology – extended to geopolitical ecology – to explore regionalism and present the contributions and limits of the framework.

### **7.1. USING GEOPOLITICAL ECOLOGY TO EXPLORE REGIONALISM**

Political ecology is generally known as a framework that analyses natural resources access and management from the perspective of resource managers, often rooted at the local level (Robbins 2012). However, it has also evolved to explore more the impact of broader factors and processes beyond local scale (Simon 2016). Since the tuna fisheries of the WIO take place within and beyond local borders, studying regionalism and regional dynamics requires moving beyond locally centred analysis. To this end, I will use here a recently developed part of political ecology that focusses on the role of global processes and geopolitical institutions in environmental change and management. This geopolitical lens will help understand the challenges facing countries of the WIO to implement regionalism. After a description of how I use regionalism, the section will develop more the theoretical framework of geopolitical ecology.

### ***7.1.2. The concepts of region, regionalism and the making of regional identity in political ecology***

Before delving into the discussion of the theoretical framework used here, it is useful to define the concepts of region and regionalism as used in this chapter. Geographers often define the region as a delimitation of space within which a dominant criterion is present (Baud et al. 2013; Levy and Lussauld 2013). Other definitions include administrative delimitation within a country or places that are linked by homogeneous characteristics such as natural features, history and culture or by common interests and needs (Baud et al. 2013; Bufon 2010; Rangan and Kull 2009). Furthermore, as Simon puts it, “regions are performative and capable of doing work analytically, discursively and materially” (Simon 2016: 199). Here my use of the Western Indian Ocean region refers to the space where countries are linked by the western part of the Indian Ocean. As discussed at the start of Chapter 4, the delimitation of the WIO of the region is not fixed and neither is the delimitation of the Indianoceania or the Southwest Indian Ocean. The former seems to cover the countries of the IOC and the latter, while also covering the countries of the IOC, goes further to East African countries until the horn of Africa and to the East until the Maldives. I will use both terms in the chapter as the three countries are considered in both delimitations. Through examples drawn from tuna fisheries, I particularly focus on this sub-region where geographical conditions along with cultures and especially tuna resources are shared.

Regarding regionalism, a common definition of the term involves the idea of mutual dependency of countries in the same region (Hurrell 2009; Ronni 1997). This regional interdependency of countries is then manifested through various regional phenomena such as regional identity, interstate cooperation, economic regionalisation or regional cohesion (Hurrell 2009). To answer the research question of this chapter regarding the role of tuna fisheries in the WIO regionalism, my use of regionalism as a concept refers here to two different, though related, dynamics. I particularly focus on regional cooperation between countries, while also looking at the social construction of a regional identity through contextualised practices and narratives (Paasi 2003; Tarte 2014). The choice of these two components stems from my observation during the time of the research of the way tuna fisheries are embedded within regional discourses and practices. For a start, tuna resources are depicted as the ‘shared wealth’ of the Indianoceania and the WIO (De l'Estrac 2016; Obura et al. 2017). More importantly, the management of the tuna resources is decided at the supranational level of the Indian Ocean within regional platforms such as the Indian Ocean

Tuna Commission (IOTC) or the Southwest Indian Ocean Fisheries Commission (SWIOFC). Within those platforms, countries are prompted to cooperate for the conservation of the resources and the management of fishing activities. It therefore appears relevant to analyse regionalism through these two components and show the dynamics that tuna fisheries generate in these regional processes.

In the studies of tuna fisheries, regionalism has been widely discussed in the Western and Central Pacific Ocean (WCPO) region but has received less interest in the WIO region. Most tuna studies that address the regional question in the WIO are embedded within studies of regional dynamics and processes at the IOTC (Abolhassani 2017; Kaplan et al. 2014; Sinan and Bailey 2019). In contrast to the WCPO, where tuna is interlocked within EEZs, the Western Indian Ocean and especially its southern part is adjacent to a large high sea area. The tuna resources largely migrate between EEZs and the high seas. In this geographical setting, regionalism in the WIO through tuna fisheries can be difficult to establish and might have been the reason for the fewer number of studies looking at this regional phenomenon. The regional experience of the WCPO is, however, still worth mentioning. Countries of the Pacific region have succeeded to create regional management platforms to manage their fishery or to cooperate together in access negotiations (Tarte 2014). Countries of the Pacific region have also gathered together by environmental interest - the sustainability of tuna resources and currently the issue of sea-level rise and climate change, as well as political concerns - regaining sovereign rights over the resources and managing outsiders with an anti-colonialism vision (Cicin-Sain and Knecht 1989; Schurman 1998). A regional identity has emerged from the need of countries to reappropriate and control their resources after the decolonisation process (Cicin-Sain 1989; Tarte 2014). Finally, studies have also investigated the role of local populations in this regionalism and presented the differentiated involvement of local populations (Alexander 1997). In the West and Central Pacific Ocean, Pacific Island Countries (PICs) have also managed to effectively cooperate as a group in their Vessel Day Scheme (VDS) negotiations with DWFNs (Fry and Tarte 2015; Havice 2013). This has allowed PICs to negotiate fishing access agreements with DWFNs as a group of countries. As the tuna targeted by purse seiners – skipjack and juvenile yellowfin – are present with EEZs of these countries, DWFNs have to cooperate with at least one PIC and comply with the VDS to be economically profitable. This diversity of the manifestations of regionalism in the WCPO shows that tuna fisheries can be a catalyst for regionalism in the right geographic and

socio-political setting. It is therefore of interest to investigate how the tuna fisheries in the WIO can foster or impede regionalism.

### ***7.2.3. Contributing to a geopolitical ecology of tuna fisheries***

As discussions of regionalism are transnational and also involve foreign fishers, governments operating in an international geopolitical sphere, and regional institutions, it appears relevant to use a theoretical framework that addresses the question of regions and also brings in broader geopolitical and economical elements of analysis. In this section I will look at regionalism and more precisely regional cooperation and identity by building a framework of geopolitical ecology, which takes insights from regional political ecology and geopolitical economy.

Regional Political Ecology (RPE) has been interested in the idea of the region through a range of conceptual lenses. Originally established to integrate the local use of resources with broader structural processes and environmental conditions (Blaikie and Brookfield 1987), it has evolved to include discussions of how scalar dynamics politicise environmental problems at the regional level (Rangan and Kull 2009) and investigations of the discursive construction of regions and regional classifications (Galt 2016; Simon 2016). Recent debates in regional political ecology have highlighted the relevance of considering regional approaches either within a country or at a meso-scale level (McKinnon and Hiner 2016). Some interesting questions raised in these discussions include “the possibilities and constraints created by the regional biophysical environment” for agriculture and food systems and the role of stakeholders such as households, communities and the state in shaping productive conditions (Galt 2016). RPE therefore allows researchers to explore how the characteristics of the region shape processes, here regional cooperation and identity building through tuna fisheries.

To address questions of geopolitics, developing a “geopolitical ecology” of tuna fisheries appears important. Various definitions could be made based on its two parts components – geopolitics and political ecology. Bigger and Neimark (2017) use geopolitical ecology as a conceptual framework to combine strengths from both fields and “gain a deeper understanding of the role of large geopolitical institutions [...] in environmental change.” (ibid:14). In line with the regional political ecology definition of considering broader political economy processes, they put geopolitics alongside with political economy and aim to “find synergies between political ecologists' careful attention to multi-scale environmental politics and the discursive-material co-constitution of global institutional geopolitics” (ibid:14). The understanding of geopolitics here is one of “struggles for political dominance” as well as

“attempts to make, organise, dominate and control particular spaces, most notably now the spaces of the global neoliberal economy” (Dalby 2013: 38). This framework appears especially pertinent in examining the role of entities like the EU or countries like Japan that are central geopolitical actors in the Indianoceanica while also having their fleets fishing in the region. It also allows an investigation of the potentialities of regionalism through tuna fisheries, in the current socio-political context of the region.

Another component I integrated to the geopolitical ecology of tuna fisheries is ‘geopolitical economy’, a concept that focusses on “the intertwining of the geopolitical and the socio-spatial” and calls attention to “the socio-spatial variegation and complexity of political economic processes, not simply emphasis on the importance of the global scale” (Glassman 2017: 408). Within this framework, Glassman suggests giving more attention to three aspects: the flexibility of socio-spatial relations through the “deep intertwining of geographical political economy and geopolitics”, the recognition of states as “institutional ensembles rather than allegedly unified actors ruling over unified blocks of territory”, and the flexibility of “concrete state practices” (ibid: 412). For the case of tuna fisheries, Havice and Campling have highlighted the role of power relations at the nexus of state and market. They also showed how the current fisheries crisis has been driven by the continued central role of the state in harnessing continued expansionary and volume-driven extractivist logics (Havice and Campling 2017). Therefore, this added component to the theoretical framework for this chapter allows a better consideration to the States’ practices in the SWIO tuna fisheries and their role in the current management of the resources. It also considers the role of spatial configuration in shaping the geopolitics and political economy of tuna fisheries.

## **7.2. PAST AND CURRENT REGIONALISM THROUGH TUNA FISHERIES IN THE SWIO**

To analyse the extent to which there is regionalism in tuna fisheries, I will start by describing the current regional identity of ‘Indianoceanica’ that is promoted within the region. I will then continue by highlighting examples of past and present regional cooperation that have involved tuna fisheries. These examples will illustrate how countries have collaborated – or not – through tuna fisheries, namely in two attempts to set up a regional fleet and recently a regional association of local fishers. I will also discuss two cases that, despite being seen as regional cooperation successes, are strongly tainted by external influences.

### ***7.2.1. The ‘Indianoceanica’ identity and the Indian Ocean Commission***

For the three islands studied, discussions of regional identity go in hand with looking at the



Indian Ocean Commission, which is the main vehicle of such identity. The sociocultural foundation for an ‘indianoceanic’ regional identity is often depicted by the IOC as leading to regional cooperation on different fronts. When it comes to tuna fisheries, however, existing regional initiatives have mainly involved technical collaborations.

The Indian Ocean is typified as “a space of trade” (Steinberg, 2001). It has experienced exchanges of goods, people, animals and plants over thousands of years (Beaujard 2005; Boivin et al. 2013; Fuma 2013). The Southwest part of the Indian Ocean is a discrete – and somewhat more marginal – region in these historical networks of exchange around the rim of the ocean (Beaujard 2005, Moorthy and Jamal 2010). The Seychelles and the Mascarene islands are thought to be uninhabited before European colonialism. Commonalities between the countries of the region include their insular characteristic, their strong colonial history and the different waves of settlements from Africa, south and southeast Asia (Hoarau 2013; IOC 2013b). They have been called the ‘Latin Quarter’ of the Indian Ocean, due to the French presence, at one time or another, in all of the territories concerned. There are also sub-regional commonalities within some of the islands. Mauritius, Reunion, Rodrigues and the Seychelles have an established creole culture that links its people through some roots of languages, cuisine, music and dance, that is not seen in Comoros or Madagascar (IOC 2013). Similarly, the region has different levels of settlements. While all the islands have seen the arrivals of Afro-Malagasy slaves then Indian workers, a much higher proportion of Indians are present in Mauritius, Reunion and the Seychelles compared to Madagascar and Comoros (Sellström 2015).

As a result of these commonalities, it might be expected that an “indianoceanic” space be cultivated amongst people in the region. This is based on shared history, identity, cultural heritage, and development aspirations amongst the islands of Comoros, Madagascar, Mauritius, Mayotte, Reunion, Rodrigues, and the Seychelles. The “indianoceanic” identity is promoted by the Indian Ocean Commission (IOC) in various forms. They include events such as regional the “Prix Indianoceanie”, an annual call for literary works in the region (IOC website<sup>39</sup>), through reports that promote a shared heritage in the Indianoceania (IOC 2013b; Jauze 2016), or through the branding of the IOC in its website and various publications gathering the islands of the region under the Indianoceania (see for example **illustration 17**).

<sup>39</sup> <https://www.commissionoceanindien.org/portfolio-items/prix-indianoceanie-2019/>. Accessed January 08th, 2020.

### Illustration 17: Promotion of the ‘Indianoceaania’ by the IOC on its facebook page



In addition to this regional identity promotion, the IOC has also been a catalyst of regional cooperation. Regarding tuna fisheries in particular, the IOC has been the source of several technical collaborations under its promotion of a regional “smart economic growth”. Three of them can be presented here: SMARTFISH, “des thons et des hommes” and the Regional Fisheries Monitoring Program (PRSP, or Programme Régional De Surveillance Des Pêches).

The SMARTFISH program, while led by the IOC and its members, covered 20 countries throughout Eastern and Southern Africa – Indian Ocean region (ESA-IO) and aimed at improving capacities for the sustainable exploitation of fisheries resources. It included two phases 2011-2014 then 2015-2018. While the program had a variety of projects relating to fisheries in general, it also included projects that were specifically linked to tuna fisheries (**Table 25**).

**Table 25: Sample of tuna-related projects under the SMARTFISH program of the IOC**

Project	Objective
Collaboration with the IOTC	Providing IOC member countries training to comply with the Port State Measure Agreement and IOTC conservation measures
Regional action plan on SWIO coastal tuna fisheries	Increase entrepreneurship amongst coastal tuna fishers through modernisation of technics, marketing strategies, management of governance and innovative funding
Regional Plan for Fisheries Surveillance in SouthWest Indian Ocean	Establish a common regional strategy for surveillance operations, pooling of means, information, and know hows
Regional scientific observer program	Training scientific observers from the SWIO region to collect scientific and catch data on tuna and tuna-like species on tuna vessels
Bycatch awareness program	Raising awareness amongst fishing fleets regarding bycatch in tuna fisheries and management measures

Source: IOC 2011, 2013a, 2015a, 2016c, 2018b

Second, the documentary series “Des thons et des Hommes”, funded by the EU and commissioned by the IOC in 2015, included a series of short documentaries (20mins) about tuna fishing in the three islands, Madagascar, Mauritius and the Seychelles. While the documentaries attempted to discuss both coastal and offshore fishing, their outcome was mainly focussed on the economic impacts of the European industrial tuna fishing in the SWIO region. Through interviews of fishing authorities, processing companies, IOTC staff members, scientific experts and local fishers, the documentaries presented the importance of industrial tuna fishing for the three islands and discussed the existing management measures of tuna resources in the region (IOC 2015b).

Third, the regional monitoring and surveillance program or PRSP is one of the most successful projects of the IOC. The program started in 2007 and is mainly funded by the EU. It encompasses a system of satellite data sharing as well as a regional surveillance in the waters of countries members of the IOC. Each country member has patrolling agents from their respective countries as well as patrolling vessels and boats that are jointly used for surveillance in the WIO region (IOC 2015d). In the past ten years, the program has been considered as having drastically diminished illegal fishing in the region through “45 regional patrols, 930 hours of air surveillance and more than 70 offences recorded” (IOC 2016d).

As it can be seen in these tuna-related projects, the IOC has been instrumental in prompting technical collaboration between the three islands. It has prompted the creation of a network of scientific observers and fishing inspectors. It has also attempted to harmonise the management of tuna fisheries in the SWIO region by helping countries comply with the

IOTC measures or by establishing regional strategies of monitoring or an action plan for the coastal tuna fisheries. These collaborations have brought not only governments to cooperate in the adoption of policy, including for tuna fisheries, but also, it has brought technicians and representatives of fisheries departments in different divisions to work together on various projects. Here, regionalism, through regional cooperation, is materialised through highly technical involvements of both government and fisheries department's representatives.

### ***7.2.2. Attempts to establish a regional industrial tuna fleet***

Despite the existence of technical collaboration between the three countries, an area where regionalism has been a hard sell was the establishment of a regional industrial fleet. The story of two regional projects in the 1980s and 1990s will be presented here as illustration. They demonstrate that in WIO tuna fisheries there has been historically a lack of regional interest, strong national interests that have surpassed a regional spirit, and initiatives that have been reliant on donors with limited interests on the viability of projects.

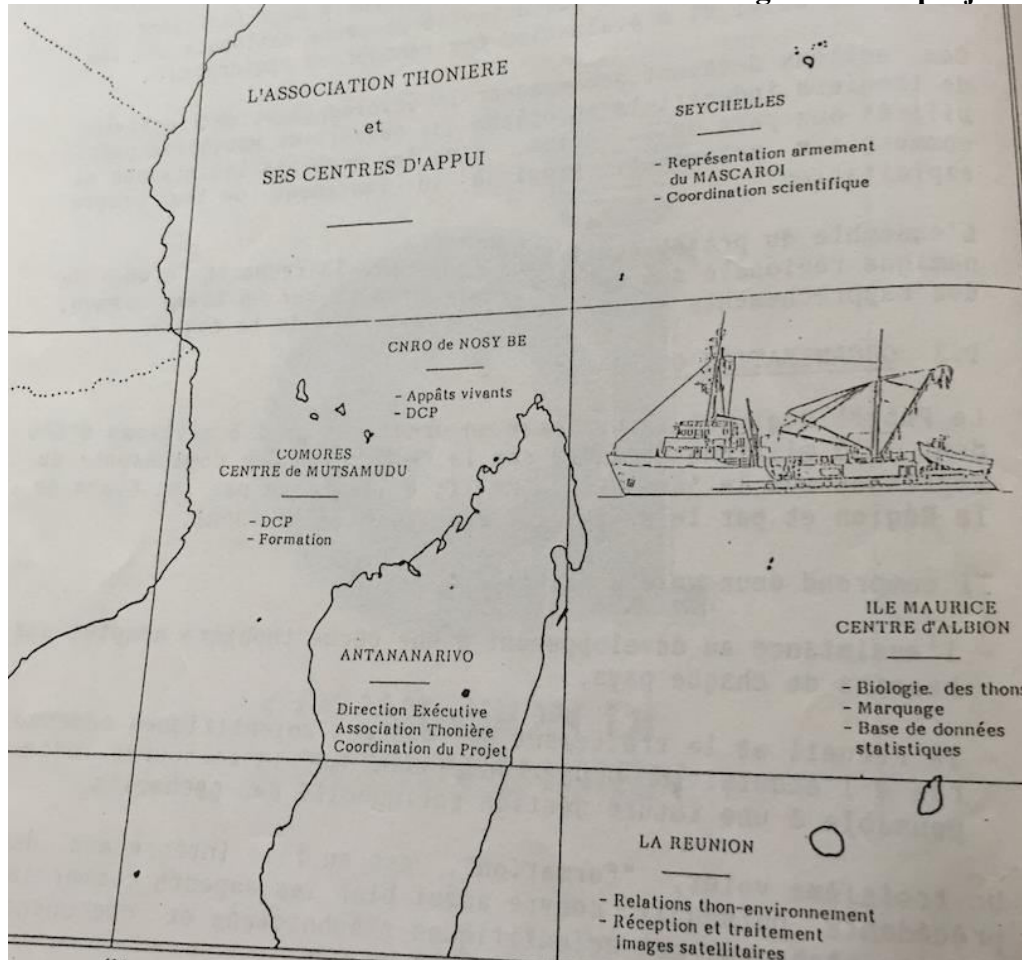
Tuna fisheries represents an important economic opportunity for the WIO. For that reason, countries of the region have aspired to have national fleets as well as a regional fleet that targets tuna and would be operated jointly by the countries. The first option being high in cost, Mauritius and the Seychelles have managed to maintain an industrial fleet only through flagging of EU and Asian vessels. Also, so far, only the Seychelles has managed to steadily develop its semi-industrial sector. Mauritius has flagged semi-industrial vessels and Madagascar has a handful of semi-industrial national boats that do not only catch tuna but also other pelagic and demersal species (GoMa 2017, GoMU 2017). The second option, of establishing a regional fleet, has been attempted a few times since the 1980s.

One attempt at establishing a regional tuna fishery was an IOC project, the regional tuna project "Projet thonier regional" under the management of a regional entity called the "Association thonière". The association was established in 1987 by the IOC with the aim of operating an industrial fleet in the region, from the collaboration of the five islands (Comoros, France (Reunion island), Madagascar, Mauritius and the Seychelles). The project was initiated in 1990, with funding from the European Economic Community. It started with a first phase that lasted two years with diverse objectives including the operation of a regional industrial vessel, establishment of FADs, data collection, tagging and observers (Association Thonière 1990). The five island countries were each in charge of a part of the operation. Madagascar was in charge of coordination of the association and FAD management, Mauritius was in charge of environmental and data analysis, the Seychelles were to operate

the tuna vessel and Comoros in charge of FAD management and training (**Illustration 18**). In its second phase, the project removed its focus on the establishment of a regional tuna operation and broadened its scope to the development of all segments of the fishery (artisanal, semi-industrial, industrial). The industrial segment was focussed on improving effectiveness of existing port infrastructures and the coordination of tuna operators. The second phase also included an emphasis on research regarding monitoring of population dynamics and tuna environment. It also included a focus on training: the management of FADs and fishing techniques for the small-scale fishery, the training in longline technique in Mauritius and the Seychelles and a training of technical crew members embarked on European industrial vessels (IOC 1995). After an investment of around 11 million Euros from the European Economic Community (EEC) and 1,5 million Euros from the IOC members, the project lasted about five years and ended in 1995. The closing of the project was due to lack of funding, difficulties in operating the industrial vessel and lack of interest from countries, notably with the Seychelles pulling out of the project at the end of the first phase (IOC 1995). During the 2017 fieldwork, one government representative that took part in the project was interviewed about the project and explained:

“I was part of the Association thonière. The project stopped because there was no funding left. Also, the trials we did were not conclusive on the tuna vessel, we did not catch many tuna, just a few numbers. Then, the project wanted to develop national fleets, it was a failure because national actors were not motivated nor interested in the end. It stayed too scientific for stakeholders. This country is a ‘trial country’, all we do is trials. In the end the sea is not for the poor countries”  
(MD 55)

**Illustration 18: Role of each IOC member under the regional tuna project**



Source: Synthesis report of the regional tuna project Phase I. Archive of the Malagasy Ministry of fisheries in Antananarivo

Another attempt was through the creation of the Western Indian Ocean Tuna Organisation (WIOTO) that was initiated by the Seychelles in 1991 and included other IO countries such as Comoros, India, Kenya, Madagascar, Maldives, Mauritius, Mozambique, the Seychelles, Sri Lanka and Tanzania. The WIOTO wanted to mirror the Pacific Islands Forum Fisheries Agency (FFA) and have a regional control of access to the tuna grounds (Campling 2012a; POSEIDON 2014). The aims of the WIOTO were to increase revenue from tuna resources and improve cooperation between countries on policies, surveillance and mutual access. However, the organisation did not last due to lack of interests from a majority of the members and due to geopolitical pressure from France in undermining the potentiality of the organisation at the international level (Campling 2012a).

These two attempts to establish a regional tuna fleet failed due to various factors, including technical difficulties, lack of financial and other means, and geopolitics. The interviewee cited above also mentioned that at a time of the trials at sea, the tuna catch was quite low (MD 55). It can, however, be highlighted that there is one common driver that prevented the

advancement of these initiatives: the variable implication and limited interest by regional countries. As early as the 1990s, it was apparent that countries, while interested by the idea of a regional tuna exploitation, were not fully engaged towards its implementation. They were, however, highly involved in the development of their own port infrastructures and tuna canneries. Another point to notice here is the involvement of the EU in the attempt to establish a regional tuna fishing while its fleet was also entering the SWIO region to fish at the same time. It already showed the important geopolitical role the EU was playing in the region for tuna fisheries. It was helping the countries to develop their fisheries, even though with limited success due to the time and funding limits of these activities. One could also argue that the EU in the end had no real interest in developing a regional fishery for the coastal states. The end of the project removed competition from a regional industrial tuna fishing and contributed to protecting EU interests as their fleets were starting operations in the SWIO. The two examples expose the weak and recurrent short-lived regional cooperation that takes place through tuna fisheries.

### ***7.2.3. Involving small-scale fishers in regional tuna fisheries management***

Only recently, have regional initiatives appeared to involve local tuna fishers. Small-scale tuna fishing has long been absent in the regional agendas of the WIO, and so have its small-scale tuna fishers. As illustrated in the previous section, since the arrival of industrial fishing in the early 1980s, the focus of countries and the IOC have been on the development of industrial fleets. In the past ten years, with the increased importance given to small-scale fisheries at the global level, activities of small-scale fishers have received more interest and led to international initiatives such as the creation of the confederation of professional organisations in the artisanal maritime and continental fisheries of Africa (CAOPA) in 2010 or the publication of the FAO Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in 2015 (FAO 2015). In this context, regional initiatives have usually been led by external actors such as NGOs or intergovernmental entities. As will illustrate the case of the FPAOI below, this regional cooperation of fishers, while an important step for the integration local perspectives in the regional fisheries management, is also fragile from its dependency on external actors.

The IOC, under its SMARTFISH program, mainly funded by the EU, supported in 2015 the development of a federation of professional associations of small-scale fishers of the Indian Ocean (FPAOI for 'Fédération des Pêcheurs Artisans de l'Océan Indien'). By 2017, the FPAOI included 18 professional organisations and associations representing artisanal fishers

in the five member countries (FPAOI 2017). The aim of the federation, according to a press release, is “to allow an efficient and informed participation of fishers to decision-making processes regarding the management of fisheries in the Southwest Indian Ocean” (IOC 2015c). While the activities of the Federation are aimed at fisheries in general, it is also involved in activities linked to tuna fisheries in particular.

Two examples of activities can be mentioned here. First was a workshop in 2018 entitled “The Coastal Tuna Fisheries Retreat” where the Federation brought its members together with other fishers and tuna stakeholders of the SWIO region to discuss the modernisation of the coastal tuna fishery (IOC 2018a). From the workshop and based on those themes, participants to the workshop adopted the 1<sup>st</sup> regional action plan for coastal tuna fisheries in the SWIO region (IOC 2018b). The plan was described by one of the members of the FPAOI as “in line with the aspiration of the FPAOI to make the tuna fisher a business man” and to bring a harmonised vision in the way coastal tuna fisheries are developed in the WIO region (ibid). The second example is the involvement of the FPAOI at the IOTC. Since its admission as an observer at the IOTC in 2016 and led mainly by Keith André, the president of the federation and a tuna fisher in the Seychelles, members of the FPAOI have also undertaken advocacy at the IOTC for better tuna management. Issuing statements to the members of the commission and advocating for the importance of tuna fisheries to small-scale fishers by publicly intervening during plenary debates, the FPAOI has brought more voices of the small-scale fishery to the IOTC. When interviewed about this involvement at IOTC, one member of the FPAOI declared:

“the presence of small-scale fishers at the IOTC has helped the adoption of more management measures since 2016, we have expressed the high stake that the fisheries represent for us, for our livelihoods and for food security” (SE 47).

In 2017, the FPAOI strongly advocated for the reduction of the number of FADs to be used in IO as well as the reduction of supply vessels and fishing capacity in general (FPAOI 2017). At the 2018 commission meeting, a member of the FPAOI spoke at the plenary to criticise the historical catch approach of DWFNs in discussions of allocations, alleging that it impeded the management efforts of coastal states (pers. obs.).

These activities of the FPAOI effectively bring fishers’ representatives together and involves them in policy-making. Since its creation in 2015, and mainly through the leadership of



members in the Seychelles, coastal tuna fishers have increased their presence in the broader Indian Ocean tuna fisheries' scene. This presence has led to more local perspectives being heard at the broader regional level of the Indian Ocean fisheries management. While only on paper so far, the establishment of an action plan for coastal tuna fisheries represents an important step for small-scale fishers in gaining more interests and funding for tuna-related activities.

Three important points, however, need to be highlighted here. First is that the principal source of funding for FPAOI activities as of 2018 is the EU through the IOC. The ability of FPAOI members, the fishers, to undertake activities is dependent on this funding. This may be problematic. The EU is the same actor that fiercely negotiates within the IOTC to adopt measures that are less beneficial to the local fishers of the region (Sinan 2018) or that increases its fishing opportunities in countries' EEZs at a questionable price (Standing 2016). This indirect dependency on an actor with sometimes conflicting interests represents a paradox for the Federation's viability in the longer term. Funding from the EU on these types of projects is typically for limited periods of around five years. If funding for the FPAOI follows this pattern, in 2020 the federation will face an issue of funding its activities.

A second point is the representativeness of tuna fishers within the federation. Since so far most of the activities have been attending workshops and meetings, one question that can be raised is the actual voice of the federation. Regarding tuna especially, out of the three countries studied, the Seychelles has the most organized fishing association with local leaders carrying fervent claims against industrial tuna fishing in the national waters. In Mauritius, there are also local leaders that voice their concern against industrial fishing. A national federation of fishers does exist but is less vocal than the one of the Seychelles. Concerns regarding tuna resources are mostly emitted by individual fishers rather than by the federation (pers. obs.). In Madagascar, such leadership is marginal. Since the inception of the FPAOI, the Malagasy representative at the FPAOI has been the representative of a fishing association (called Association Tazara) in the east of the country, whose fishers are not focussed on tuna but rather on deep-sea fish (pers. obs.). From the fieldwork done in Madagascar in three different regions, tuna fishers are not aware of activities undertaken by the Malagasy representative at the FPAOI. Amongst the more than one hundred fishers interviewed, the FPAOI was only mentioned by the Association Tazara. One question could therefore be the extent to which representativeness of tuna fishers within initiatives such as the FPAOI is ensured. This is especially relevant to maintain the long-term involvement of fishers in topics

and events that are discussed within the FPAOI. This issue of representativeness also represents a challenge for the IOC itself. As events are in English or in French and often discuss technical subjects in specialised terms, finding fishers speaking either of these languages and accustomed to technical discussions can be challenging. This probably explains the situation from the Malagasy part where meetings are attended more by an educated intermediary in the fishery rather than a tuna fisher with a lower level of understanding of regional and international management. It also explains the strong involvement and leadership coming from the Seychelles. One significant missing link in the work of the IOC could therefore be ensuring that representatives to the FPAOI spread the knowledge and information gained at events to the broader number of tuna fishers in their countries.

A third point that can be noticed in its fourth year of existence is the focus on policy that the FPAOI has chosen for its activity relating to tuna fisheries. While ensuring more voices from small-scale fishers is key to the management of the resources, interests of fishers are often difficult to sustain in the longer term without tangible activities that can increase their revenues or improve their fishing activities directly. This point can be supported by evidence from another initiative, the SWIOTUNA platform established by the WWF with other NGOs in the region in 2011. The platform gathers civil society organisations, private sector and fishers working on tuna in the SWIO region. The platform has as objectives to promote dialogue and promote collaboration towards sustainable management of the resources (WWF 2017). It has resulted so far in yearly meetings discussing management and small initiatives that do not directly relate to local tuna fishing. It has then been difficult for fishers within the region to see the value of the platform in the region and get involved nationally (pers. obs). As explained by an interviewee, in charge of the SWIOTUNA project:

“For the case of Madagascar, there is a great potential [in local tuna fishing] but it does not seem to be a priority for fishers, it seems that there are more important issues for them. Dealing with tuna requires work at high levels, at the policy level. It seems difficult to integrate that within the communities. In principle, they are not against the initiative”. (SK 01)

As of 2019, the SWIOTUNA platform is in its 8<sup>th</sup> year of existence but has not been involved yet in the IOTC nor represented within other regional projects of the IOC or SWIOFC (pers. obs.). The existence of this parallel platform to the activities of the IOC also shows how dispersed activities are within the region, with the IOTC, the IOC and multiple NGOs having

each their own activities. Lack of coordination and especially limited activities around direct fishing activities have made initiatives in the region difficult to sustain.

Here we can see that the FPAOI represents an important opportunity in building and reinforcing a regional identity amongst tuna fishers, through connecting small-scale fishers and building a regional voice in policy making. However, the current dependency of the Federation upon external funding, the challenges of increasing its reach to the dispersed tuna fishers of the region and its tuna policy-oriented focus could jeopardise its success. Without independent mechanisms to sustain itself and more direct activities linked to the fishing activities of the fishers, the future of the FPAOI could be uncertain.

#### ***7.2.4. Success stories with grey areas***

Two regional initiatives need to be highlighted as they directly impact tuna fisheries. These are the regional surveillance and monitoring program and the reciprocal fishing agreement between Mauritius and the Seychelles. They can be seen as tangible examples of successful regionalism. While their success is in particular promoted by government officials, this section will argue that, despite the fact that they have brought countries to cooperate directly in tuna fisheries, this cooperation is reliant on support from geopolitical actors who also have a strong interest in the success of these initiatives.

#### **An EU-dependent regional surveillance monitoring**

The regional fisheries monitoring program (PRSP, or ‘Programme Régional De Surveillance Des Pêches’) is one of the flagship projects of the IOC. When asked about the program, officials from the department of monitoring and surveillance in the three islands acknowledged the improvement that the program has brought to the fight against Illegal, Unreported and Unregulated (IUU) fishing in the waters of the IOC countries. One interviewee in Madagascar commented that “since PRSP, there is much less IUU fishing in our seas” (MD 37). Similar statements were made by officials in the two other countries. In 2016, the EU committed another €1,5 million to support the program (IOC 2016d). At the governmental level, commitment of countries has also been very high. In 2017, a new declaration was made to confirm the interest of countries in pursuing the program and the fight against IUU (IOC 2017). As an interviewee from a monitoring centre expressed regarding governmental involvement:

“As soon as there is a common interest there is cohesion in the region. The protection of resources, for example, or the fight against IUU fishing represents a common interest. When it comes to revenues, it is another story.” (MD 37)

The PRSP is then considered key to the sustainability of the Indianoceanic fisheries and especially tuna. This importance of the program to the region is also highlighted in press releases of the IOC where representatives emphasise that:

“the conservation and sustainable management of our fisheries resources is paramount to our economies. It is only by pooling our resources and means together [through PRSP for example] that our countries will be able to consolidate the fishing industry and protect the resource against pillage.” (IOC 2016d)

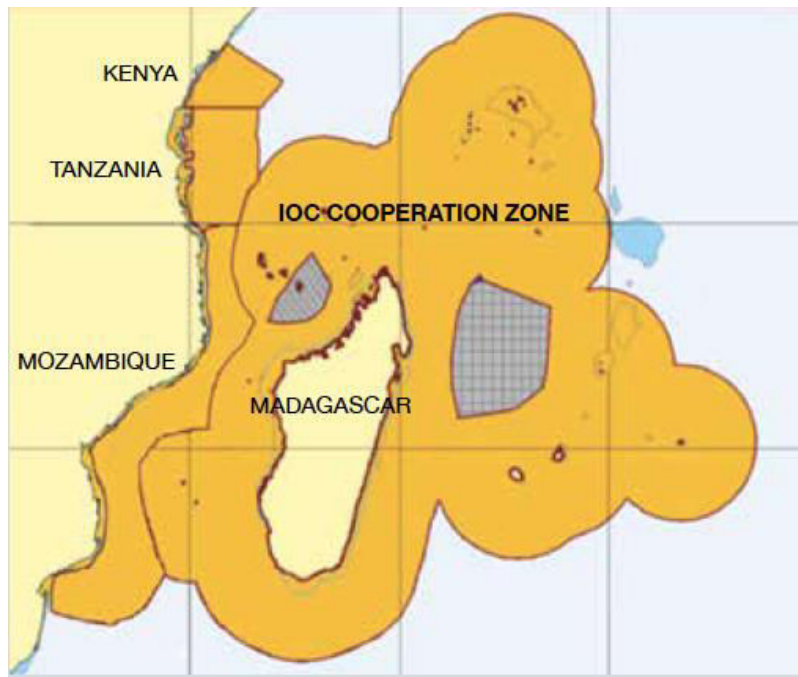
or

“the PRSP is the story of the evident willingness of countries to cooperate. The results of work since 2007 from this mechanism of combatting illegal fishing go far beyond what any country can do on its own” (IOC 2017)

The PRSP program is therefore an example where regionalism is present through regional collaboration at government levels. Officials are committed to the program in their public discourse and at the people level where inspectors from the different countries of the region work together to undertake the patrolling. For tuna fisheries, monitoring and surveillance is key to fostering the revenue that the countries can get. The PRSP is therefore a good illustration where the common interest of fight against IUU and willingness to retain the value of tuna through good monitoring bring countries together at different levels.

Two limitations need to be recognised here. The first one relates to the geographical reach of the program. The EEZ of Tromelin island, a contested territory between France, Madagascar and Mauritius is not covered the PRSP program and neither is the EEZ of Mayotte, the French territory that is also contested by Comoros (**Illustration 19**). This raises the question of the full efficiency of the program where some areas are not to be patrolled despite being in the middle of the IOC countries. As a migratory species, tuna travels around the different EEZs and beyond. If monitoring is not allowed in the grey areas, the loss of value from those areas in the region can be questioned.

**Illustration 19: Coverage of the PRSP program**



In yellow: area covered; grey zones are French or contested territories. Source: IOC 2011

A second point worth exploring is the involvement of the EU in the funding of the program and by extension its funding of the IOC activities. The contribution of the EU also serves its own interests since the French and Spanish boats dominate the regional purse seine fishery (Campling 2012a). The EU often describes its funding to the PRSP as an important one since “the programme is fully in line with the European Union's general guidelines on responsible and sustainable fisheries and regional cooperation” (IOC 2016d). This puts into question the argument that this is an example of regional interests coalescing. With its flagged vessels operating in the waters of the IOC members, and especially in the waters of the three countries studied, the funding of the PRSP largely benefit the fishing operators of the EU. Through the programme, the EU's tuna catches are protected from other non-EU entities fishing illegally in the region. As one interviewee expressed, “countries have to be aware that the EU also gives us money to protect its own interest, they benefit from their own investment in the region” (MD 01). This contribution of the EU can also be questioned in terms of its use as leverage in other interactions of the EU with the coastal states such as fishing access agreements. Entanglements of countries with the EU are therefore multiple and can represent a powerful leverage that countries can find hard to negotiate against. The EU here becomes a catalyst of regionalism while also succeeding to protect its interests in ensuring access to fishing grounds for its fleet.

### **A regional reciprocity to the benefit of DWFNs**

Another successful collaboration within the SWIO region is the reciprocal Mauritius and the Seychelles fishing access agreements put in place since the 1990s (as seen in Chapter 6). While those agreements allow reciprocity in terms of fishing grounds, they cover boats that are foreign-owned but flagged in one or the other country. Foreign operators in the WIO region, mainly Spanish, French and Taiwanese, flag their boats from Mauritius or the Seychelles against a flagging fee. In the Seychelles for example, 13 purse seiners and 45 longliners were put under the Seychelles flag for the year of 2015 (GoS 2016). Flagging can be seen as beneficial for both parties: first, it adds to the national fleet of the coastal countries while providing a flagging revenue. Second, it leads to foreign fleets having more vessels involved in the fishery beyond those under a bilateral agreement. One interviewee stated “the Spanish do double flagging as they prepare for the eventual measures that might stop them from fishing under their country’s flag” (MU 33). While these agreements do provide benefits to the countries involved, the involvement of DWFNs in the transaction can be questioned. This is highly relevant especially regarding the increase of their fishing capacity in the region at a time where the IOTC and its members are trying to implement measures to rebuild the tuna stock (IOTC 2017b). The fishing activities of those vessels also present other challenges, such as the difficulty of obtain accurate statistics of catch and effort, or the fact that they may fall under dubious tax regulations and ambiguous labour standards (Campling and Colás 2017). Here, the perceived successful cooperation between Mauritius and the Seychelles in tuna fisheries is only partly to the benefit of the two countries. Overall, below the surface of this cooperation lies fishing firms’ strategies to sustain access to fishing grounds and to ensure that economic benefits from the fisheries are fully extracted in the WIO region.

In the two cases above, the closeness of the oceanic territories of the three countries prompted regional interventions with the aim of protecting the economic interests of coastal countries in fisheries. However, cooperation is paved with socio-economic and geopolitical obstacles. Existing successes remain dependent on external actors who ultimately benefit from both the collaboration and lack of regional agreement. In the current setting, regionalism through tuna fisheries is fuelled more by DWFNs than the countries. It has only been present within the short span of projects’ time and through the funding that are invested by external actors.

### **7.3. CHALLENGES TO REGIONALISM IN TUNA FISHERIES**

Through the above presentation of regional efforts in tuna fisheries, it is apparent that regionalism is often difficult to implement when it comes to tuna. Moreover, sustained regional initiatives are often tainted with influences from actors outside the region. This situation is due to the various geopolitical and socio-economic challenges that countries face in their management of the fisheries and conservation of the resources. To explore these challenges, the section will look at three scales: regional – investigating interactions between the countries involved in the fishery during negotiation of management measures, national – looking at the national economic interests that drive the lack of regionalism in the region, and local – looking at interactions between local users of the resources. With an approach combining regional political ecology and geopolitics, the aim is to explore the difficulties of building an identity and sustaining cooperation through tuna fisheries.

#### ***7.3.1. Geopolitics as a persistent obstacle to regionalism***

This section will focus on interactions between countries involved in tuna fisheries in the Southwest IO region. Using the lens of geopolitical economy and aiming to contribute to a geopolitical ecology of tuna fisheries, it aims to contextualise and historicise the involvement of countries in tuna fisheries and the challenges of regionalism. It will do through looking at two interactions of countries that were observed during the fieldwork: the 8<sup>th</sup> Session of the Southwest Indian Ocean Fisheries Commission that took place in Antananarivo, Madagascar, 28-31 March 2017 and the 22<sup>nd</sup> Session of the Indian Ocean Tuna Commission that took place on 21–25 May 2018 in Bangkok, Thailand.

#### **Development aid and the WIO countries' dependency on DWFNs**

One of the reasons that makes tuna fisheries a prime stage for geopolitics is the role of foreign development aid given by DWFNs to the countries of the Southwest IO and particularly to the three islands studied. The European Union, France, Japan, China and South Korea, amongst others, are major donors in those countries for development aid and fisheries aid. The EU is for example engaged in a national development aid program amounting to 518 million Euros in Madagascar covering governance, infrastructure and rural development for the period of 2014 to 2020 (EU 2016a). On the Asian side, Japan's development aid to Madagascar amounts to a yearly average of 7,5 million Euros and addresses a wide range of development areas such as agriculture, fisheries, health and education (JICA 2018). In 2017, it has contributed to the construction of various buildings including some related to fisheries in Madagascar and Mauritius. Most notably, Japan has invested 370 million Euros in the

extension of the Port of Toamasina in Madagascar (Hanazaki 2017). Similarly, in 2017, South Korea donated more than 24 million Euros in equipment and vehicles for the risk and disaster centre of the Malagasy government (Présidence 2017). In Mauritius and the Seychelles, where the level of economic development is higher, there are also contributions from those DWFNs, even if it is to a lesser extent compared to Madagascar. Under the 11<sup>th</sup> European Development Fund for example, there was 9,9 million Euros program for Mauritius (EU 2016c) and a 2,2 million Euros program for the Seychelles (EU 2016b). Those contributions, even though they could be considered distant from the subject of tuna fisheries, have an impact on how coastal states interact with DWFNs and with each other. One interviewee in Madagascar made the statement “the money they give you, they will take it back in one way or another, tuna access agreement is one of them” (MD 01). As seen in the Pacific, for example, Japan’s development aid and diplomacy strategy were very much geared towards linking it to access to tuna resources by the Japanese fleet (Tarte 1995).

**Illustration 20: Inaugural sign for the extension of fisheries centre in Mauritius**



Photo by the author

While there is limited research on the role of Asian development aid in access to fishing grounds in the IO and particularly in the Southwest WIO region, there is, however, physical evidence of this link. As seen in **Illustration 20**, it is not a trivial detail that Mauritius has a strong friendship with Japan. The island nation obtains donations of fisheries buildings while also being the most important port for Asian longliners, including the Japanese fleet.

Fishing access agreements play a key role in the making of foreign aid. As seen in Chapter 6, a part of the financial contribution (labelled as sectoral support for the EU) is to be dedicated to the improvement of fisheries in the host countries. In the three countries studied, this



‘sectoral support’ has over the years contributed to the construction of different infrastructures such as fisheries buildings, port infrastructure or processing facilities (**Illustration 21**). It has also funded different projects within the departments of fisheries. Those include projects towards small-scale fisheries such as the registration of fishers or fishing equipment in Madagascar; the improvement of infrastructure for local ports, such as ice-making machines in the Seychelles, and improvement of patrolling capacity and fishing techniques such as fishing using anchored FADs in Mauritius (Cofrepeche 2014; COFREPECHE et al. 2016; EU 2014; SFA 2011, 2013). Such contributions, which have started since the beginning of industrial tuna fisheries in the region in the 1980s, have created a strong relation between the Southwest WIO countries involved in fishing access agreements and DWFNs. The latter have built an intricate relationship involving long-term involvement not only in trade but also in providing development aid. This long-standing entanglement between coastal countries and DWFNs is recognised by national actors, notably representatives of fisheries departments, especially as influencing discussions of access agreements (MD 78).

**Illustration 21: Newly built processing factory in the Seychelles, co-funded with the EU**



Photo by the author

Such interactions can influence the position taken by governments at regional tuna meetings such as at SWIOFC or IOTC meetings. This could be one of the factors that has prevented countries, especially weak ones like Madagascar, in supporting the position of other coastal states in the Indian Ocean. Historically, DWFNs have been strong geopolitical allies that provide much more to the coastal states than neighbouring countries. National interests lean more towards collaboration with DWFNs than other countries of the region. France, in particular, as a former colonial power in the three countries, has had a strong influence in the

establishment of tuna fisheries in these countries, including through investment in canneries, fleets' development and in building the capacity of tuna statistic units. An important postcolonial relation has been in place and can frame countries as historically indebted to France. DWFNs use their strategic and historical positions as long-term foreign aid 'partners' of coastal states to seek alignment of states like Madagascar or Mauritius to their side. The construction of the Indianoceanica as a region is therefore, in practice, highly difficult to achieve through tuna fisheries, if one takes into consideration the strong involvement of DWFNs in the countries of the region. The situation also raises the important question of real economic and political interests behind development aid in the region.

### **Unbalanced negotiation capacities at regional negotiations – Event ethnography at SWIOFC**

The second arena where evidence of geopolitics influencing the management of tuna fisheries was apparent was at the 8<sup>th</sup> Session of the Southwest Indian Ocean Fisheries Commission (SWIOFC) in March 2017. While the commission had various items on its agenda, including reports from its different subcommittees on stock assessments, countries collaboration regarding tuna fisheries or monitoring control and surveillance, one agenda item related to the tuna fisheries of the Southwest WIO region was particularly relevant. This was the attempt of the commission to adopt Minimum Terms and Conditions (MTCs) for fishing access agreements in the region. By 2017, this proposal had reached its 8<sup>th</sup> year of debates and proceedings (FAO 2017). The document was reviewed by the legal office of the FAO and came back with comments for the commissioners of each country to discuss. The countries were also asked by the secretariat of the commission to decide between a voluntary guideline and a binding document. However, a precision was made by the Secretariat that the legal office of the FAO advised that the document was not appropriately written for a binding document and that the commission could not be used as the forum to adopt such type of binding document.

During the meeting discussion, three interest groups were identified: those that were in favour of a binding instrument (including Kenya, Maldives, South Africa and Tanzania) and openly expressed it, those that were in favour of a guideline (France – representing Reunion Island, Mauritius and the Seychelles) with or without explicit support, and countries without strong opinion (such as Madagascar or Comoros) with limited interventions during the debates. Two countries were particularly opposing each other during the debates. They were South Africa, strongly pushing to move the process forward for a binding agreement and

France, asking for more precautionary approach by looking in detail in the content of the document and also demanding that the document come back to national legal offices before any decision.

During the debates, France excelled at delaying the process of the meeting with three negotiation techniques. First, it reverted to previously discussed articles in the document. During the three times it did so, South Africa intervened and requested that the process moves forward by not coming back to already discussed articles. Second, it proposed to the members of the commission highly debatable amendments such as requiring that coordinates of fishing zones of coastal countries are put in the document, which launched long debates between the delegates. Third, it reiterated it could not be part of a binding document and would require the guideline to pass through its national legal office (Pers. obs.). This negotiation tactic of France was mainly challenged by South Africa, supported by Kenya and Tanzania. France was accused of delaying of the discussions despite being involved in the process for many years. It was also accused of defending the interests of the industry rather than those of its overseas territory, Reunion island. Interventions as below were expressed by the commissioner from South Africa, in response to France's strategy (notes from pers. obs.):

“We need to go back to history. We are deliberately hostaged in the process. It is more important that we have a text and move forward with it. African states have worked really hard and ‘others’ just contribute.”

“Binding agreement seems to not be possible. We do not have an option. If not binding, it is losing the essence of what it was purposed for. Five years is a long time to develop just guidelines. A lot of concessions were already made in Zanzibar [site of previous meeting], and agreement on articles. We seem to go backward. Some of us do not care they are not necessarily affected like us. We are talking about our own EEZs, we negotiated a lot. When our land was taken, there was no negotiation but here we are. The aim of the MTC is that resources benefit coastal states.”

While such strong statements prompted support from countries like Tanzania and Kenya, they did not receive the same support from the three islands of the Southwest IO region. Mauritius and the Seychelles particularly supported the French position of adopting a guideline rather than a binding document. In a couple of interventions, the Seychelles argued that the document should not be too restrictive as a guideline while Mauritius openly stated it

was not willing to accept a binding agreement. Madagascar during the entire debate kept silent despite being the host country of the meeting.

An even more interesting discussion was when France was asked if DWFNs that were not from the EU fished in French waters. The question was asked by South Africa in order to see the real interest of France in having MTCs. France, after responding that it did in its other overseas' territories also mentioned that the Seychelles and Mauritius were fishing in its waters. The two latter countries confirmed they had agreements with France, which closed the debate in favour of France. Interestingly, no commissioner raised the point that those agreements covered EU-owned vessels that are flagged to Mauritius and the Seychelles.

The case of the discussion about MTCs is illustrative of the challenges that the Southwest IO faces. First, we can see that despite some countries trying to prompt the emotions of other countries of the region to appropriate the resources (as the South African delegate did), there is a manifest lack of unanimity between the coastal countries. The observable positioning of Mauritius and the Seychelles defending their involvement with DWFNs such as the EU (in this discussion, represented by France) show their interests in the fisheries. Their long economic relations with DWFNs through the fisheries prevailed against alignment with other coastal countries. Second, the presence of France within the commission, as a representative of Reunion Island, in the end jeopardises attempts of cooperation between coastal countries. The representative of France stated twice that "since the industry was not taken into consideration in the discussion, France will represent the interests of the industry" (notes from pers. obs.). This shows the economic stance that France has taken, despite being present in the commission as representing the interest of its coastal state. From informal discussions with coastal countries' delegates at the meeting, this stance of France preventing cooperation was common in the region (MD 76). Historically, France has also impeded regional negotiations by undermining the WIOTUNA initiative in the 1990s (Campling 2012a). Third, the strong ability of France to negotiate at the meeting was highly challenging for coastal countries to counter. With a team of well-trained negotiators and support from the EU, France had six delegates to rely on during the negotiations while most countries only had two and very few were intervening with strong points. This explains a strong geopolitical position that France can have in these types of negotiations. It also demonstrates the weak socio-political environment of the coastal countries. Even for a strong country like the Seychelles, one of its delegates was newly appointed at the fisheries department and a few months after, was not part of the department anymore. The same for Madagascar, which was represented

by a delegate just freshly appointed by an incoming Minister. With such political changes, it is difficult to maintain stability of proceedings within fisheries departments and such negotiations can fall short of consistent involvement if the departments do not have an established strategy regarding the matter discussed.

It has been shown in this section that economic interests, geopolitical strength of some actors and an unstable political environment are important factors impeding regional integration regarding tuna fisheries. As the SWIOFC is a regional country-related platform, the next section will show how in a larger platform such as the IOTC, DWFNs interact with coastal states and influence the management of tuna fisheries in the Indian Ocean. Within the IOTC, DWFNs are fully involved in discussions and not mere observers as they are within SWIOFC.

### **The weight of historical entitlement claimed by DWFNs – Event ethnography at IOTC**

A second illustration of the challenges of regionalism regarding tuna fisheries is within the broader regional level at the Indian Ocean Tuna Commission. As of the commission meeting of 2018, there was a substantial divide between the countries, members of the IOTC. On one side there is a group of DWFNs, including entities like the EU or countries like Japan, Korea. On the other side, there are the 21 coastal states of the Indian Ocean including the three islands studied that are gathered under the G16 group (named after Article XVI of the IOTC agreement<sup>40</sup> which acknowledges the sovereign rights of coastal states over living resources in their EEZs) (IOTC 1993). Since 2011, one of the recurrent subjects discussed is the allocation of tuna catch in the Indian Ocean. Two highly distinctive proposals have emerged from the two sides. One proposal, from the DWFNs and led by the EU, puts the majority of the allocation (85%) based on historical catch in the Indian Ocean (IOTC 2018c). This would mean that DWFNs would be the most entitled to the pie of allocations. The other proposal, from the G16 and led by Maldives, attributes the catch based on more criteria (a baseline for all coastal states, historical catch, a supplement of allocation on the high seas and a supplement for small island states and developing coastal states). In contrast to the EU proposal, the G16 proposal did not allocate proportions on these criteria (IOTC 2018b).

<sup>40</sup> Article XVI. COASTAL STATES' RIGHTS: This Agreement shall not prejudice the exercise of sovereign rights of a coastal state in accordance with the international law of the sea for the purposes of exploring and exploiting, conserving and managing the living resources, including the highly migratory species, within a zone of up to 200 nautical miles under its jurisdiction.

The G16 proposal is not sponsored by all the 21 states part of the G16 group. Madagascar, Mauritius and the Seychelles have three very different positions regarding the G16 proposal: the Seychelles, along with South Africa, are strong co-sponsors of the proposal. The delegation of the Seychelles for example requested the Commission to make progress on the allocation issue, whereas DWFNs wanted a more cautionary approach of looking at the proposals in more details through simulations (IOTC 2018b, pers. obs.). As early as when all the proposals were just presented to the commission, at the start of the meeting, DWFNs expressed their concern over the allocation proposal by the G16 with statements such as: “What about the simulations? If we do not see the exact effects of the proposals, we cannot discuss this” (Intervention by Japan’s commissioner).

“We share the dissent of Japan and are surprised why this is even on the table as a proposal because the issues are too complex and there are no simulations. We are happy to have a work programme. There is scope to have a roadmap in order to have two finalised proposals next year. The preconditions were the simulations” (Intervention by the EU’s commissioner).

“We are also surprised, why is the proposal on the table?” (Intervention by China’s commissioner).

To respond to the DWFNs, the co-sponsors within the G16 member repeatedly made counter-arguments. For instance:

“We have not made progress in the past 8 years, it has not been substantive. We acknowledge the need for simulation and have started those simulations. It is critical to make progress and agree on the principles [...] Maldives depend on the fish, the Seychelles and Mauritius depend on canneries, Bangladesh does not have anything yet, and Kenya would like to develop its industry more. We cannot make it simple. This has been a request of coastal states for 8 years. It will make access reasonable” (Intervention by Maldives’s commissioner).

“We need to make progress it has taken too long. We need to agree on the principles of allocation first” (Intervention by the Seychelles’s commissioner)

“We are surprised why distant fishing nations are not even willing to discuss the proposal because all proposals are to be proposed and improved within the

commission. [...] We are not against simulation but we need to decide about the principles” (Intervention by South Africa’s commissioner)

Madagascar and Mauritius were not co-sponsors despite being part of the G16 group. Mauritius, during the meeting, used the IOTC fora to make several sovereignty claims over the Chagos Archipelago against the United Kingdom. It did not want to get involved into any proposal that included the UK and repeatedly requested to the commission that the UK’s seat at the IOTC should be revoked. On the proposal of allocation, Mauritius stated that it “could not agree with the proposal due to the potential right of the UK and the issue of Chagos” (Intervention by Mauritius’s commissioner). During that 2018 meeting I attended, Madagascar kept silent through most of the meeting. One of its delegates intervened once towards the end of the commission meeting to ask for a collaborative approach and recognising the rights of the coastal states (pers. obs.). When asked about this position, the Malagasy commissioner at the meeting declared “we have been instructed to see how things unfold first, we support the G16 but it is a very sensitive issue for us” (BK 06). During informal interactions with the Malagasy commissioner, the latter mentioned that Madagascar and Mauritius both received a letter from the EU ambassador in the Southwest IO region questioning their position at the IOTC. The letter was asking the countries to align with the position of the EU as their long-term partner (pers. obs.). At the 2019 IOTC meeting, Madagascar switched its position and decided to co-sponsor the G16 proposal. This position of Madagascar could have been linked to its change of government after the 2018 meeting. Malagasy representatives at IOTC expressed within the G16 that the Malagasy government wanted to show it has sovereignty over the resources and the G16 proposal helped achieve this goal (pers. comm. with SE 38).

This interaction at the international stage on tuna shows that the ‘Indianoceanica’ concept is absent. Following Havice’s concept of a ‘more than territorial’ way of reclaiming state power (Havice 2018), we can see here a similar illustration of coastal countries that are using tuna discussions to defend territorial sovereignty. This is apparent for the case of Mauritius. For the Seychelles, its turn towards defending the interests of coastal states under the G16 has been recent since the change of head of delegation to the commission. While the Seychelles had for long the reputation of aligning with DWFNs (as seen in the SWIOFC forum), its change at the IOTC has mainly been through change of leadership. The case of Madagascar is more challenging and yet to some extent understandable. As a country highly dependent on foreign aid and as having a cannery dependent on EU supply, it cannot openly counter the

position of DWFNs (as do economically strong countries like the Seychelles or South Africa). On the other hand, under the leadership of Maldives and now the Seychelles, the G16 members are increasingly feeling empowered and entitled to assert more sovereignty over the resources in the region. Weaker countries like Comoros or Madagascar are starting to make discreet interventions in support of the G16 but treading carefully to not undermine their relationship with DWFNs. As expressed by one observer during the meeting “it is the first time so many G16 members have intervened in the discussion, it is usually a matter of DWFNs and a few G16 members” (BK 02). As argued by Glassman (2018), under a strong geopolitical setting, states are not unified and their practices strongly depend on their economic and political interests. Mauritius and Madagascar especially show flexible state practises to try to navigate their interests with both DWFNs and the G16.

Another point that could be raised here is the role of NGOs in facilitating regionalism between the coastal countries at IOTC. This is particularly relevant for the International Pole and Line Foundation (IPNLF), the NGO that currently supports the activities and meetings of the G16 along with assisting the group in defending its position<sup>41</sup>. The IPNLF has long been supportive of the Maldives for the certification of their skipjack tuna fisheries, one of the first small-scale fisheries to be certified by the Marine Stewardship Council (MSC). With the MSC certification, the Maldives have driven a number of conservation measures within the IOTC as part of their certification requirements, such as harvest control rules (IOTC 2016b). The IPNLF has also funded diverse activities of the G16. This involved funding coastal countries’ delegates, funding the meetings themselves, and also providing support on writing proposals to the IOTC (SE 39; pers. obs.). This support has helped the G16 evolve and fully participate in the challenging discussions at the IOTC. As recognised by one the of the NGO’s staff members,

“Five years ago, you would sit at a scientific meeting and the only people who would talk would be the EU’s industry scientists. They set the narratives but chances are people do not have much idea about they are talking about. So, he puts the discourses up but no one understands and that is how it worked. Now I think there is some empowerment, people have more confidence.” (SE 39).

This strong involvement of a non-state actor in the discussions of the IOTC introduces another element within the geopolitical dynamics between the G16 members and the DWFNs for tuna fisheries management in the IO. It brings another type of political pressure upon

<sup>41</sup> At the 2018 IOTC meeting, I was embedded with this NGO as a volunteer translator from English to French for Francophone delegates, during the internal meetings of the G16.



coastal states, one encouraging them to align to the G16's position, based on various types of support, including modest yet significant help to improve delegates' ability to attend G16 meetings. The current momentum of the coastal states is then fuelled by the IPNLF's support to the work of the G16. The latter could become reliant on such assistance. To respond to this "backstage" support to the G16 members, the EU for example has tried to further develop its partnership with countries of the IO and particularly those of the IOC region. This was, for example, materialised by a new project funded by the EU to promote dialogue between the EU and the IOC countries in fisheries governance (BK 05).

We can see here a counter initiative from the EU to align IOC countries more to its interests. The countries of the Southwest IO can be exposed to problematic geopolitical situations. They have to balance not only their national socio-economic interests but also have to manage their geopolitical allies as well as new alliances with NGOs. State practises of the Southwest WIO countries are therefore heterogenous and constantly evolving for tuna fisheries management. This, ultimately, makes regionalism an unpredictable and long-term challenging enterprise.

### ***7.3.2. Competition for landings as an economic factor against regionalism***

An important component of the relationship between the three coastal states in the Southwest IO is the competition that tuna brings in. The three countries all have landing ports, canneries and fishing grounds (Kaplan et al., 2014; POSEIDON, 2014). The three canneries were originally built in collaboration with foreign private companies. The Seychelles saw its first cannery built in 1987 in collaboration with French and Spanish companies (Marsac et al. 2014), Madagascar in 1990 in collaboration and funding from French companies (Gilbert and Rabenomanana 1996) and Mauritius in 1970 with funding from Japanese companies (Campling, 2012a). While this infrastructure all brought economic development to the countries, they were not built with a regional vision that required coordination between the three canneries.

Fishing operators have an open choice on where they land, and they usually make their decision based upon questions of cost, efficiency, and quality. This puts the cannery in Madagascar at the bottom of the competition. In a country with a difficult socio-economical context and where corruption is rated high and governance indexes relatively low (Razafindrakoto et al. 2017), inefficiency is a considerable obstacle. Over the years, fishing operators have only chosen to land in Madagascar as a last resort. While Madagascar saw around 30 vessels landing in the 1990s every tuna season, in the tuna season of 2018, only 6

vessels landed in the port of Antsiranana (MD 36). In the recent years, only Spanish vessels came to Antsiranana to tranship or land to the cannery. European interviewees that were landing in Madagascar made statements such as “we only go to Madagascar because we fish in the Canal [Mozambique Channel], it is faster to land here than in the Seychelles when we want to go back fishing in the Canal” (MD 45) or “it is very inefficient here, the stevedores take too long to unload the fish and there is theft all the time” (MD 43). Operators prefer to land or tranship in the Seychelles and Mauritius where the service is considered more efficient and where investments have been made over the years towards this efficiency (Lagier et al. 2005; Marsac et al. 2014).

As explained by Campling (2012b), industrial tuna exploitation in the WIO has been driven by a continuous need for satisfying demand and capitalist logics of extraction. Governments seeking to sustain the economic benefits from the fishery are favourable to access agreements and try to improve their port infrastructure to encourage the landing of tuna in country. Moreover, as seen in Chapter 6, the geographical position of the three countries puts the Seychelles as central to the tuna exploitation, with both ports, processing facilities and productive fishing grounds. This requires Madagascar and Mauritius to provide more services to be attractive to fishing vessels. Mauritius has done so by facilitating procedures of landing and exporting through the establishment of the Seafood Hub. Madagascar has, however, struggled to maintain a competitive position in the region.

### ***7.3.3. The absence of a regional identity at the local level***

Tuna is considered one of the shared resources of the ‘Indianoceanica’ countries. In a press release in 2016 on regional monitoring, the IOC emphasised the importance of tuna fisheries in the region, not only as a key provider of revenue and jobs but also to ensure food security for coastal population of the region (De l'Estrac 2016). Yet, a discussion with local stakeholders on regional identity through tuna shows a different picture.

Interviews with fishers in the three countries studied showed a lack of connection through tuna fisheries. Amongst the local fishers interviewed, only a handful had knowledge of interactions in tuna fisheries: two fishers in Madagascar knew there were other Malagasies working in the Seychelles at canneries, one in Mauritius knew some Seychellois are also fishing tuna in the waters of Mauritius and two fishers in the Seychelles had contacts with Malagasy and Mauritian fishers. Very few also knew about the potential in the different countries in terms of tangible collaboration in terms of tuna fisheries. One interviewee in the Seychelles explained he was sourcing his bait from China and did not think bait such as squid

could be sourced in the two neighbouring islands (SE 61). The same situation applies with crews of semi-industrial boats in the Seychelles of which the majority are Sri Lankans. When asked about working with other fishers from the region, 20 fishers in the Seychelles could only mention Sri Lankans. While the latter have built the skills in longline fishing for decades (Hewamanage 2010; Pajot 1978), regional initiatives have not actively tried to link tuna fishers of the region. They could, for example, benefit from each other's strengths such as man power in Madagascar, bait in Mauritius and Madagascar and local fishing vessels in the Seychelles.

Another aspect of tuna fishery that brings local actors to be involved in the fisheries is through the work in the canneries, more specifically Malagasy workers that go to work in Mauritius and the Seychelles. Those working relations can be opportunities to bring locals together as working on a shared resource. However, the reality depicts a common picture of work migration for higher wages without local integration (Craig 2015; de Haas 2010). Malagasy tuna workers in the Seychelles feel marginalised as they are only considered as cheap labour. One Malagasy worker who has been based in the Seychelles for three years made comments such as "they do not really like us here, they think we are only poor and low-level workers for the cannery" (SE 65). As a Malagasy myself, I personally experienced these biases during several interviews of local stakeholders in the Seychelles. Interviewees would first ask if I was working for the cannery and could not apprehend that I was a researcher from an overseas university (pers. obs.).

While migrant workers recognise the improved social and economic conditions, they experienced in the Seychelles compared to Madagascar, the tuna workers do not feel integrated nor part an 'Indianoceanian' community. Here, the geographical proximity of 'Indianoceanian' countries has allowed the practice of work migration. However, everyday practice of the workers shows the lack of appropriation of such identity.

#### **7.4. CONCLUDING DISCUSSION**

To conclude this chapter on regionalism, I argue that there is a fragile regionalism through tuna fisheries in the Indianoceanian region. While it is present through various initiatives, it is either dependent on external actors or often impeded by geopolitical interventions, especially by DWFNs. Furthermore, in the writing of this section, two comments come to mind. The first one was from a peer review of my paper published based on part of this chapter. The reviewer asked, "Why would one expect resource extraction (tuna in this case) to bind

nations together? Wood extraction in South Asia hasn't bound those nations together; soybean production in Africa hasn't brought those nations together" (Anonymous reviewer, JIOR paper). The second was a tweet in response to the paper from a fisheries practitioner in the WIO region. The tweet stated "[...] Glad to see the FPAOI mentioned as a catalyst for a regional vision for fisheries (not just tuna - fishermen knew from the beginning it is a cause of disunity)" (Tweet of March 15<sup>th</sup> 2019, Yann Yvergniaux). Those two comments seem to make this regional chapter difficult to defend. However, I suggest here that despite these realities, the WIO is rich in human and socio-economic interactions that could be used as a basis for reflection towards an improved regional cooperation and identity. Improving regional cooperation and strengthening a regional identity through the fishery requires strong will from countries – which does exist intermittently – and sustained exchanges between the people of the WIO, fisheries managers to fishers to other local and national actors.

#### ***7.4.1. Pathways towards making tuna fisheries a catalyst of regionalism***

Improving regionalism through tuna fisheries can be beneficial to the WIO region for two reasons. First, tuna as a shared resource of the region could benefit from a more harmonised management. While national interests need to be taken into consideration, another strong common interest needs to be built and that is the sustainability of different segments of tuna fisheries in the long term. Second, as seen in previous sections, DWFNs have a strong influence on countries' management decisions. Coastal countries can reinforce their position as a group against DWFN by pursuing current efforts of regional cooperation in the fishery. In the current context of strong dependency on DWFNs, reinforcing regionalism amongst coastal countries will provide geopolitical strength to the countries like in the South Pacific and will be key in determining the future of tuna fisheries management. To this end, three suggestions are made here at the local, country and DWFN levels.

#### **Increasing learning exchanges between the WIO people in tuna fisheries**

Based on my different interactions with various stakeholders in the Southwest IO tuna fisheries as well as observations of activities related to tuna fishing in the region, three pathways emerged which could be explored to foster regionalism amongst the people of the region.

First is within the FPAOI. A key step for the federation is to overcome its reliance on the EU for funding. As in various projects of the IOC, time limits inherent to funding have been one of the main causes of fading tuna-related initiatives. To ensure its long-term viability, the

federation needs to find other venues of funding for the next ten years, providing the time to generate its own income. Financial sustainability, as a key factor for both members buy-in and also long-term viability (Bennett 2017; Ebel et al. 2018) will determine the future of the federation. International donors such as the World Bank and other similar funders that have previously invested in the region on similar work have often only provided short to medium-term funding. Generating income will require a strategic approach towards improving economic exchanges between its members and gaining profits from this involvement. As the federation gathers fishing associations within the IO, it presents an occasion to explore trade opportunities including export and import between the countries of the region. Despite being a challenging endeavour between its members, especially in the capacity needs for such enterprise, generating more tangible value might incentivise fishers in being more involved in the federation and the latter could sustain its activities. Here, the involvement of each coastal state could also contribute to this development. As countries want to develop their national fisheries, assisting the development of trade between the countries has the potential to set a basis for better cooperation along with national development.

A second step would be to increase the policy outreach of the federation. As it stands, the federation has a couple of leaders who attend the IOTC meetings. During my two years of fieldwork, local tuna fishers interviewed were not aware of the policy work that representatives of the FPAOI were doing to defend their interests. The federation also has the potential to increase awareness amongst tuna fishers in the region regarding the state of the resources, conflicts with DWFNs and opportunities within the region. I argue here that tuna could effectively represent an opportunity for fishers to build a regional identity, based on tuna advocacy. This would require a rigorous outreach of activities undertaken by representatives of the federation at the regional, IOTC level for example, to their respective national levels. In the Seychelles and Mauritius, this outreach is currently done through the press which has provided a forum for fishers to express issues related to fisheries (see for example **Illustration 21**). This kind of outreach is, however, limited in Madagascar. The FPAOI representative in Madagascar, based in the east of country, has limited means, including translation challenges, to do this outreach in other parts of the country.

## Illustration 22: News report in the Seychelles after the 2017 IOTC commission meeting

 Today in Seychelles  
June 6, 2017 · 🌐

Monday 5 June, 2017

The Big Interview with Keith André,  
Chairman of the Fishing and Boat Owners' Association

"Today I look to the ocean with renewed hope"

Mr. André, who together with other fishermen fought hard to implement measures for sustainable fishing, opens up about how "tense" negotiations were at the Indian Ocean Tuna Commission (IOTC) meeting in Indonesia and how the Seychelles delegation eventually won a successful outcome - convincing European Union states and Asian countries to reduce the use of Floating Aggregation Devices (FADs) and supply vessels in our waters.

by S. Marivel

Source: Facebook feed of the newspaper Today in the Seychelles

There is a tangible opportunity here for countries like Madagascar to learn from the fishers of the Seychelles to better voice their interests and concerns in tuna fisheries. This information and learning exchanges also represent an important potential for Malagasy fishers who could see their views and perspectives better integrated in national management decisions. Moreover, the FPAOI could foster the creation of national associations of fishers in coastal countries to assist fishers in building a strong national voice. Finally, the FPAOI also needs to be presented to fishers as an opportunity to be involved in decision-making on tuna fisheries at different levels. Such representation is key to promote the interests of small-scale fishers in the adoption of management measures or policy at the national and Indian Ocean levels.

A second venue to link the tuna people in the Southwest IO is through the tuna canneries. The depiction of tuna workers, as seen in section 7.3.3, is currently one of key contribution to economies in terms of the number of employment provided by the canneries. There is, however, very limited information available regarding other added values of the migration of tuna workers to their home country and families or to the socio-economic benefits they might bring to host countries. This is particularly relevant for cannery workers from Madagascar to Mauritius and the Seychelles, or those of other WIO nationals working in canneries. The types of information that are not known include for example, to what level do tuna workers sustain their family in their home countries? Or how much do they contribute to the national economies of their host countries beyond employment? Public knowledge about these figures could contribute to an improved consideration of cannery workers beyond their 'low-skilled workers' reputation. In the Seychelles particularly, the integration of Malagasy workers would require involvement of the two governments, Madagascar and the Seychelles, as well as entities such as the IOC to undertake an appropriate evaluation and outreach regarding the

extended value of cannery workers' migration. Sharing this knowledge amongst the people of the three islands has the prospect to increase a better understanding between cannery workers but especially amongst the public. Addressing the current lack of integration of tuna workers can be a venue for an appropriation of a regional 'working on tuna' identity. Ultimately, the production of cans which contributes to the economies of the islands is dependent on the labour of the WIO nationals. The value of this WIO labour, not only economic in terms of jobs, is underestimated and under documented.

The third pathway that could be explored is between the tuna consumers of the region. While the economic value of tuna is widely recognised and advertised in the region, its contribution to food security, despite being widely acknowledged, is not fully known (Obura et al. 2017). Differently to countries like the Maldives where diets are mainly based on tuna, the three islands have different consumption traditions. Madagascar having a large surface of inland territory, only a distinct part of the population relies heavily on fish as protein. Furthermore, preference for tuna is not the same all over the country. While tuna is highly appreciated in the north of the country, the coastal population would prefer other fish in the east and southeast. This is the same in Mauritius and the Seychelles: even if tuna is widely consumed, it is not the preferred fish to consume and considered more as an export product. Moreover, while fresh tuna is consumed by hotel clients, tuna cans are considered expensive by locals. These perceptions on tuna could also contribute to the limited engagement that people of the Southwest IO region show towards tuna. If compared to Maldives, the population of the region has an entirely different attachment to tuna, beyond its economic value.

Building a regional identity through tuna could then be done by improving this attachment to the tuna amongst the people of the Southwest IO through tuna conservation and/or consumption. Western countries have internalised a view of tuna as an affordable source of protein with high nutritional value, a view contributing to the large demand of tuna. In the WIO, the contribution of tuna to the diets of local population has been unexplored beyond general statements in policy documents that tuna contributes to food security. To this end, more investment is needed towards documenting the local value of tuna, in nutrition but also in the culture, rather than limiting it to its economic one. Showing the dietary benefits of tuna and its contribution to food security for the people of the region can bring another element to the value of tuna for the region on top of revenues and job opportunities. Projects, such as those of the IOC, could focus more on such endeavour. By establishing an improved appropriation of tuna, consumers in the WIO might find more interests in defending an

improved use of the resources. This could contribute to reinforce the existing regional identity, putting tunas as both a shared resource but especially a shared source of food.

### **Developing more regional links within the segments of the fishery**

If these are the pathways to link people of the region through tuna work, exploring more opportunities of collaboration within the different segments of the fishery could also be a venue to reinforce regionalism. The current situation of tuna fisheries will not really contribute to regional identity, beyond a few EU-funded projects. An ‘Indianoceanica’ vision and ultimately a regional tuna fishery is only possible if interests of all parties are considered and individual socio-economic contexts are taken into consideration. This difficult enterprise requires a differentiated approach looking at the needs of each country that could be fulfilled by collaboration with the others.

Within the small-scale and semi-industrial tuna fisheries, fishers in the three islands, could, for example, fulfil each other’s needs by sourcing bait from each other or exchanging skills and fishers. Semi-industrial fishers in the Seychelles interviewed mentioned the need for bait – mackerel pike and squid bought locally or imported, and the lack of fishers as pressing issues. Madagascar has an important fishing ground within which bait could be harvested. Here, the Seychelles could look more to Madagascar where these baits are caught throughout the west coast and improve economic exchanges between fishers. Similarly, Madagascar is witnessing an increase in the number of coastal fishers due to the high rate of unemployment in cities and the highlands (MRHP 2015). This growing number of fishers can increase pressure on the local stock of fishing resources. The Seychelles could therefore bring Malagasy as labour fishers onto its semi-industrial vessels or even on small-scale vessels also facing a shortage of fishers. This could be a concrete collaboration of fishers that would also socially help both countries. Seafood is already traded between Madagascar and Mauritius, but at a very low rate (Randrianarifidy 2016). This type of trade, however, requires strong interventions between the governments. The FPAOI could also support such initiative since the federation has the potential to connect the different associations of fishers and their members in the different countries of the region. Exchange of skills from the more developed islands could also benefit fishers in Madagascar might that be for improvement of quality through processing and transport or through exchanges of fishing skills between fishers. Leadership from the Seychelles is also key to bring to the other islands of the region and especially in Madagascar. While there is an apparent strong movement towards marine conservation in Madagascar (Gardner et al. 2018; Harris 2011), fishing associations including



for those working on tuna have a very limited lifespan. Local fishers are less involved in policy advocacy before the state regarding tuna fisheries, as is seen in the Seychelles and to smaller extent in Mauritius. Current initiatives of fishers are mostly channelled through marine conservation efforts (Gardner et al. 2018; Gardner et al. 2017; Roccliffe et al. 2014). The efforts of the Seychelles' fishers in being heard and in being able to join the Seychellois' government delegation at IOTC represents an important step in the voice given to fishers. Without a strong voice from local fishers, improving the currently underdeveloped local tuna fisheries in Madagascar is unlikely to be considered a priority by the state. Considering the socio-political context in Madagascar, different from the two neighbouring islands, the development of the local tuna fisheries also requires a strong protection of the rights of local fishers as the main beneficiary of such development. As seen in the case of the Seychelles, the development of the semi-industrial sector has involved foreign investors. In Madagascar, the local tuna fishery could be an easy target for elites that would concentrate capital and benefits. Learning from the experience of the Seychelles can therefore be valuable in this process of development.

This development of a locally owned semi-industrial fleet in the Seychelles represents an important experience and lesson learnt to be shared with the other countries. However, the specific socio-economical context of the two neighbouring islands needs to be at the forefront of any attempt of replication. More specifically, Mauritius, as it started to do in 2017, could more easily replicate the loan system that the Seychelles has established to increase its national fleet. In Madagascar, such system could be difficult to put in place considering challenging investment and business environment in the country. The shortage of fishers in the Seychelles also requires attention. Considering the number of fishers in Mauritius and the limited involvement of locals in fisheries, Mauritius could face a similar issue while developing its national fleet. On the other hand, while Madagascar could collaborate with the Seychelles regarding its potential supply of a labour force, the involvement of Malagasy fishers outside the country requires capacity building so that fishers are able to undertake such fishing. This represents another tangible opportunity to bring local fishers of the Southwest IO region together. The IOC and its members could play an important role in these developments. While the FPAOI can be a catalyst and intermediary between fishers and the IOC, the strong involvement of governments and the IOC is required to develop these pathways of collaboration.

In the industrial segment, currently dominated by DWFNs, two avenues can be explored. First is through an improved collaboration amongst the countries of the WIO in harmonising management of distant water fishing in the WIO. Considering the economic importance of tuna fisheries in national revenues, countries of the region have an interest in continuing granting access to foreign industrial fleets. However, that also requires them to sustain the tuna resources in the WIO. As already occurs in regional monitoring efforts, countries of the region could also benefit from helping each other in data management or in sharing experiences regarding the implementation of IOTC management measures. Despite the difference in geographical setting, lessons could also be learnt from the Pacific islands and their regional management. An improved regional management of fisheries could help replenish the tuna stocks but also increase the strength of the region in managing industrial fishing. Second is regarding the management of bycatch retained on-board from purse seiners represents an opportunity for the three islands to collaborate. At the IOTC and SWIOFC level, more advocacy is currently undertaken to require the landing of this bycatch at local ports. The use of bycatch in country in a coordinated manner can ensure that the three islands take full advantage of the bycatch landed. The Seychelles has started to develop more its bycatch market and have processing facilities, from which the two other islands could learn. This is particularly relevant for the case of Madagascar where bycatch is either sold by stevedores or by intermediaries who have access to the high-ranked crew on the tuna vessels. An improved access system to bycatch by having a locally owned and run processing facility could decrease monopoly in the port of Antsiranana. Learning from the other islands will help raise awareness regarding the challenges in the different islands and help the governments and the IOC to focus their actions regarding the management of bycatch.

### **Untangling the intricate relation with DWFNs**

The most challenging venue to foster regionalism consists of addressing the intricate relationship with DWFNs. A first action is to encourage improved transparency on the role of foreign aid in tuna access. DWFNs and coastal countries are entangled in relations that include foreign aid, economic access, trade, and geopolitics. The lack of explicit mention of access to natural resources, and tuna in particular, in foreign aid policy puts coastal states in an intrinsically weak position when they are negotiating access to the marine resources. Transparency regarding the link between development aid and access to the fish is greatly needed. This will allow coastal states to act with full knowledge when either accepting development aid or signing access agreements. It will also force DWFNs to be more open

about their interests in country when it comes to development aid. At the moment, there is no official explicit link between the two whereas the link is then verbally raised by DWFNs when negotiating access (MD 10).

Second, the involvement of DWFNs in fisheries development in the region requires better attention by the coastal states. It also needs to be recognised that DWFNs are non-homogeneous entities. The EU is a good illustration with its contradictions highly visible in tuna fisheries in the Indian Ocean. Its ‘foreign aid’ arm is funding key projects to improve regional identity, collaboration and capacity building while its ‘commercial’ arm, eagerly opposes the same countries it is helping, either at the IOTC or in access negotiations. This demands caution from countries of the Southwest IO and the IOC when receiving funding for regional projects. A rigorous reflection is needed to investigate the real interests of donors involved in tuna fisheries. As for the Asian intervention in the region, the limited knowledge on the subject needs to be addressed. Very little is known on negotiations of access to tuna by Asian countries in the region and even less on the link between Asian foreign aid and access to tuna in the countries studied. Increased transparency on this issue will only benefit the region and improve the current leverage that coastal countries are building in the Indian Ocean.

Third, it is necessary to decolonise interactions between coastal countries and DWFNs during regional negotiations including within the IOTC and SWIOFC. The historical and colonial past of coastal countries, including the three countries studied, requires a change of paradigm from DWFNs especially those of the EU. The EU speaks of ‘sustainable partnerships’ in setting up access agreements; but this rhetoric should also be applied in negotiation practises – especially at the IOTC such as in its proposal of catch allocation. As DWFNs have long claimed to have supported the capacity and development of coastal countries, they need to recognise that coastal countries now want more endorsement of their sovereignty on the resources. Since highly migratory resources require cooperation for their conservation and utilisation, this cooperation as it currently stands, seriously lacks equity amongst parties involved. The initiatives of coastal states, including within the G16, need to continue to ensure that equity and fairness are established between the actors involved in the Southwest IO and IO tuna fisheries. For the case of the ‘Indianoceanica’ region especially, an agreement over a stronger common interest in tuna fisheries will be key for the future of the resources and for the development of the region.

#### ***7.4.2. Reflecting on the study of regionalism through actors' practices and geopolitics***

Inspired by political ecology's tradition of combining analysis of discourses and empirical practices and of exploring power dynamics, this chapter has been able to bring three types of insights in the study of regionalism. The first input is regarding the making of a regional identity through tuna fisheries. I investigated both narratives of 'Indianoceanica' and practices of different actors at various scales in tuna fisheries. Tuna is portrayed as a common resource of the region. However, practices through fishing, within canneries and during regional management discussions show that existing initiatives have not built a regional identity beyond a few unsuccessful attempts of regional fishing and policy-related initiatives.

Second, tuna fisheries were a prime arena to explore the link between local use, global socio-economic processes and power dynamics. Through a geopolitical ecology and economy lens, I was able to go beyond exploring local and national rationalities and unveil the role of DWFNs in contributing to the challenging implementation of regionalism in the Southwest IO. This explicit investigation of the role of broader scale actors and geopolitics in the making of regionalism showed how and why countries of the region adopt certain stances at the regional Indian Ocean level. Decisions by governments of coastal countries can be strongly influenced by geopolitically strong actors.

Finally, a look at the interactions of the three countries studied at international meetings as well as a consideration of their socio-economics and history showed that the countries of the Southwest IO have as many differences as they do commonalities. Resource extraction in itself, especially within a capitalist logic as seen in tuna fisheries, is a very challenging forum for fostering collaboration between actors. An improved regional approach with a coordinated management within joint EEZs and building a more shared identity might be useful to break the current dependency relations with DWFNs. From the views and practices seen in the field, it can be said that opportunities of collaboration are diverse. They, however, require both strong state interventions and sustained involvement of regional entities such as the FPAOI or the IOC. Other regional initiatives in the WIO that have received support at the local and governmental levels include learning exchanges in marine sciences and conservation, as well as in managing coastal fisheries like octopus. As less contentious compared to tuna fisheries, these avenues present opportunities for collaboration at various levels and could also be used to discuss the needs in tuna fisheries of the region. In addition, addressing issues related to the high seas remains an important component in the existing barriers against a regional tuna fishery. The limited capacity of the IOTC members in

managing the high sea makes regional efforts in EEZs of restricted reach. Tuna vessels and especially DWFNs are largely out of sight and reach in their activities in the high seas. Ongoing international negotiations for a new international treaty for the high seas could represent a venue to provide some answers to this issue (Gjerde et al. 2018; ICTSD 2018).

This chapter on regionalism has highlighted the importance of both local socio-economic contexts, geopolitical interactions and their influences in advancing or not regional initiatives. An examination of state practises was necessary to understand existing challenges in regionalism from a state point of view. This includes exploring the role of states in shaping policy at the regional level and their interactions with DWFNs. The chapter has also uncovered how capitalist exploitation of the resources involving geopolitical actors influences regional management and use of the resources. The chapter suggests that the building of stronger links between countries and their people through tuna fisheries is essential if an Indianoceanica is to truly exist and for the region to defend a sustainable tuna fishery.

## **CHAPTER 8. CONTRIBUTING TO AN IMPROVED KNOWLEDGE OF THE WIO TUNA FISHERIES**

I would like to finish this monograph with some concluding thoughts on how the thesis could serve the prosperity of the WIO including for the countries and their people but also for the tunas in the region. Having titled the thesis a political ecology study of tuna fisheries, I will also share some thoughts on the contribution of this study to the field of political ecology.

### **8.1. MEETING THE MULTI-SCALAR NEEDS OF THE WIO COUNTRIES**

For the island countries of the WIO and especially the three case studies, tuna fisheries have an important place, might that be for the national economies, local livelihoods or food security. However, knowledge on the real extent of those three contributions is still limited in the region especially when it comes to a comprehensive look at the three segments of the fisheries. Despite the various investments made by countries to develop the fishery and the contribution of DWFNs in building capacity of countries regarding catch monitoring for example, there has been limited investment in building scientific capacity to assess the impacts of tuna fisheries both on the WIO marine ecosystems and on the livelihoods of coastal communities. This thesis has attempted to fill this gap and provide a clearer picture regarding the politics and the people behind the three segments of the fishery as well as their impacts on the tuna resources.

#### ***8.1.1. Lessons learnt from exploring overfishing narratives, access politics and regionalism***

My analysis of narratives surrounding the state of tuna resources in the WIO highlighted that while the existence of overfishing is acknowledged by different actors, perspectives and knowledge on the state of the resources are produced differently. The strong perspective of local fishers regarding the presence of overfishing is mainly based on their long-standing experience. It needs to be considered as a warning sign for both fisheries departments but also entities such as the IOC regarding the future of the resources. The presence of a common narrative despite the current limited interactions of fishers in the three countries is a powerful story. While regional initiatives such as the FPAOI have allowed the voice of local fishers to be better heard at the IOTC level, it is still currently a very first step towards an increased consideration of local fishers in management decision-making at the regional level. The chapter on overfishing narratives also showed that at the national and regional level, governments have variable discourses. National reports produced by fisheries departments do not mention overfishing of resources; yet at the IOTC level, representatives from the same

governments have assessed the state of tuna resources, mainly yellowfin, as subject to overfishing. Despite sustained high level of catch and scientific advice to reduce effort since 2011, this status of overfishing was only confirmed in 2015 and the following years. This delay in confirming the status of overfished tuna shows that countries, at the national level, are depicting the state of tuna resources in ways that sustain exploitation. At the regional level, as parties to the IOTC, countries delayed the adoption of management measures by hiding behind the bureaucratic science of the IOTC and conflictual negotiations. Similarly, industrial actors, while acknowledging the status of the yellowfin stock as overfished, claim that management measures are unjustly affecting the tuna industry as other segments, especially data deficient ones, could have contributed to the collapse of the resources. To ensure that tuna resources re-flourish in the region, parties to the IOTC need to refocus on their mandate to conserve the tuna resources and adopt the precautionary principle in both stock assessments and in their management decisions.

The investigation of the politics of access to tuna resources in the three countries of the region has highlighted a diversity of livelihood stories but also intricate accounts of local and national interests confronted with capitalist industrial exploitations. For the three countries, tuna brings stories of local livelihoods where tuna fishers, boat owners and intermediaries have established modalities of interactions along the value chain. This manuscript has attempted to discuss these stories and expand on how different actors access the resources and benefit from them. Small-scale tuna fisheries in the sites studied have generated relations of labour and market access that are well recognised within their fishing communities. In Madagascar, despite a limited investment into small-scale fisheries by the state, with a consequence of limited technology to access the resources, local tuna fisheries have with their available means created a variety of livelihoods. In both Mauritius and the Seychelles, the advancement of the small-scale fishery and improved access to the resources, especially for the semi-industrial sector, are largely attributed to the investment of the state, that are often linked to revenues obtained through fishing access agreements' revenues. The livelihoods created around local tuna fisheries are key to the well-being of community members but also to the local economies of these tuna villages and towns. The analysis also demonstrated that while countries try to sustain economic revenue by allowing industrial fishing by DWFNs within their EEZs, the impact of the fishery on the resources and coastal livelihood are not weighed in the balance of national interests. Through the continued access

granted to DWFNs, coastal countries are putting at risk the livelihoods of their coastal communities and the long-term sustainability of tuna populations in the region.

My exploration of regionalism has confirmed existing geopolitical theories regarding conflictual natural resources such as tuna. Exploitation of resources that are high-valued commodities is shaped by geopolitical interactions with DWFNs and the prioritisation of national interests above those of the resources. Because of these, tuna fisheries provide a very limited sense of regionalism. As local people working on tuna have limited contact and ports are in competition, a better regional integration through tuna fisheries remains challenging. However, there are various opportunities in which the region can advance a regional identity and regional cooperation through tuna. They need to take place at different levels, from fishing activities to policy and management decision makings. They require the countries of the region to assess the real benefits they gain from cooperating with DWFNs compared to the need for the long-term conservation of tuna. The thesis has also shown that the mainstream narrative of 'Indianoceania' hardly finds its place in tuna fisheries. This identity, however, represent an opportunity to improve the WIO's public attachment to the resources. While in countries like Maldives tuna is considered a full part of daily life, in the case study islands such an association with tuna only exists to a limited extent. Tuna is considered as mostly only tuna for the canneries. An improved anchoring of a regional identity linked to tuna fisheries could help entities such as the IOC or the FPAOI to coordinate regional management measures of the resources and an increased engagement with tuna issues at different levels including at governmental level but also at local levels such as amongst the public, fishers and within the canneries.

### ***8.1.2. Improved knowledge on Madagascar, Mauritius and the Seychelles' tuna fisheries***

As seen in Chapter 4, tuna fisheries in the three countries studied are a rich field of enquiry. Here, I will come back to each country and present what the thesis has contributed to knowledge on tuna fisheries.

For Madagascar, regarding the tuna fisheries, I showed that the question of competition over the resources, while less pressing due to the limited number of semi-industrial vessels, still exists considering that available data shows that some species caught by small-scale/artisanal fishers are also caught by industrial vessels as bycatch. The thesis also showed that local fishers in Madagascar do not mainly attribute the overfishing of resources to industrial tuna vessels (different to the two neighbour countries). Local fishers attribute the cause of reduced resources to climate change, environmental degradation and the increase of fishers' numbers.



The thesis also highlighted that despite its limited tuna fisheries, there is a vast array of social relations and job opportunities behind every segment of the fishery. Many actors indirectly access tuna and are key to local economies, from the intermediaries in Ste Luce to women boat owners in Mahajanga and Ramena and the stevedores in Antsiranana. I also showed that managing industrial fishing in Madagascar is the trickiest. It is not surprising that industrial fishing is criticised, for the case of Madagascar, as its contribution is only known through the foreign revenues it provides to the state. The critique of industrial fishing by NGOs and academics in Madagascar has to be tempered with the consideration of its role in supplying the cannery (the main job provider in Antsiranana), and in the job opportunities and revenues for stevedores, crew members working on vessels, and Malagasy immigrants working in canneries of the WIO region. For the role of Madagascar in tuna fisheries regionalism, I showed that the country has to the extent of its possibilities always adhered to regional projects from the 1980s to the current G16 discussion at the IOTC. Its difficult position, being reliant on development aid, influences its capacity to align with other stronger coastal countries or adhere more to regional programs supported by DWFNs. Political stability also impedes on its efforts and its management decisions. The Importance given to the development of national tuna fisheries or to regional initiatives can vary according to leadership in the country. Despite a very active country in regional management, one has to always consider decision-making regarding tuna fisheries in the socio-economic and political context of that specific moment.

For Mauritius, while tuna fisheries are not at the centre of its economy, they represent an important contributor to the socio-economic development of the country including through the Prince Tuna cannery (the country's the largest employer), through the different activities at the port, and also through the livelihoods they provide to local fishers. The thesis highlighted that Mauritius, despite a lower tuna productivity in its EEZ, has managed to gain an important place in the WIO tuna exploitation. First, in terms of access politics, Mauritius has improved its access to tuna resources by two rights-based mechanisms: flagging of vessels and the reciprocity agreements with Seychelles. The former has allowed the increase of vessels in its national fleet and the latter has allowed access to fishing grounds beyond the EEZ. Second, its enabling business environment has generated various interests by local entrepreneurs in the processing of tuna as well as the retention of companies such as Prince Tuna and IBL. While these largely contribute to the national economy they also benefit DWFNs, operating the flagged vessels, and Asian ones using the port for transshipment. At

the local level, the thesis also showed that similar to Madagascar, tuna fishing provides important economic opportunities to other members of the local community such as women who play an important role in the supply chain of local tuna. Moreover, the development of the semi-industrial sector and upgrading of the artisanal vessels represents a welcomed opportunity for local fishers. The state might, however, face increasing resistance from local fishers due to potential conflicts in fishing grounds with the industrial segment, as seen in Seychelles. Regarding overfishing, fishers in Mauritius have, like in the Seychelles, a strong view regarding the involvement of industrial vessels in the state of tuna resources, their view is, however, complemented by putting the state as partly responsible to the reduction of resources by granting licences. Like in Madagascar, the contribution on the local fishing activities of the industrial segment especially through fishing access agreements is not felt by local fishers despite existing projects of fisheries development funded by such agreements. In terms of regionalism, the thesis presented the special case of Mauritius at the IOTC level where its non-alignment with other countries is mainly geopolitical and linked to sovereignty claims. While Mauritius is one of the key countries of the IOC – hosting its headquarters, when it comes to tuna fisheries, the country is faced with the challenges of balancing geopolitical interests and regionalism.

For Seychelles, the thesis showed that the central role of the Seychelles in the WIO tuna fisheries stems from a combination of productive fishing grounds, enabling administrative services, a favourable socio-economic and political context and also high levels of investment from the private sector including from foreign fishing firms. In terms of access politics, the Seychelles have optimised their access to tuna resources by both developing a national semi-industrial fleet, flagging foreign vessels and concluding fishing access agreements. While they are key to the prominent role of the Seychelles in the region, they have also created a conflict between the different segments of the fishery especially as the semi-industrial fleet grows. The competition over the resources is apparent especially as the semi-industrial fleet and to some extent some artisanal vessels fish in the same areas as industrial vessels within the EEZ. Structural mechanisms of access such as technology, knowledge and capital exacerbate the divide, with local fishers feeling outplayed by the industrial sector in the fishery. This has led to fishers building a strong voice in the country and in the region for a reduced industrial fishing. Fishers involved in tuna fisheries and other fisheries have consequently built a compelling narrative of overfishing being caused by the industrial segment, without mentioning the increase of the semi-industrial fleet. The thesis showed that

local fishers in the Seychelles, through a combined public advocacy, support from international media and a global favourable environment for small-scale fishers, have taken the lead in the region including through the FPAOI. This has led to more access to the state including being able to join the Seychelles's delegation at the IOTC. This leadership constitutes an important lesson learnt for the other countries of the region. In terms of regionalism, the Seychelles are also presented with a dilemma, while it is considering the interests of its local fleets, its economy is also highly dependent on the industrial segment especially landings from purse seiners. While the change of position of the Seychelles from a long-term ally of DWFNs to more alignment with coastal countries is fairly recent, the country has a difficult balance of interests that it has to weigh during regional discussions.

An important question for the three countries studied is “do tuna fisheries actually bring benefits to the countries?”. While the thesis has attempted to provide a picture of winners and losers in the fishery, there is still missing information to respond to the question including the real value of tuna as contributing to food security and livelihood of hidden actors. More detailed research is needed to fully examine these contributions. The same also applies to less seen actors such as stevedores and fishing crew members who come from beyond the WIO region. Their contribution to their own national economies as well as the livelihoods linked to their activities require more attention. Through such future investigation, the value of local fishing and involvement of local actors could be better considered by countries and provide more arguments to debate for or against the perpetuation of foreign industrial exploitation as currently undertaken in the WIO.

For the three countries of the WIO to continue to benefit from tuna fisheries and improve such benefits, three action points are needed: expand knowledge on the impact of tuna fisheries on local livelihoods, improve the attention and support given to local fisheries and investigate the impact of the different segments of the fishery on the resources. It may require a change of paradigm in the sector and consider the need to degrow. Echoing the degrowth movement calling for a more just society and positive socio-ecological changes, I argue for a fairer distribution of benefits. Tuna fisheries are a key ocean-related activity that requires a fairer balance of benefits received, especially to the local actors and coastal communities.

## **8.2. ‘SPEAKING’ TUNA**

Here I will share my concluding thoughts regarding the conservation of tuna and the management of the fisheries. As seen on land, managing stationary natural resources within

clearly established legal boundaries can pose various challenges. Managing tuna resources that move within fluid boundaries of the WIO can then be even more challenging. As this thesis has shown, the materiality of the tuna and the WIO bring both opportunities and challenges. While the movement of this valuable species through EEZs brings some forms of national development to the countries, it also generates competition between host countries and especially challenges in management. Three points need to be raised here regarding the management and conservation of tuna in its current state in the WIO.

The first key point relates to the industrial segment of the fishery. The current exploitation of tuna resources in the WIO through highly industrialised purse seiners and longliners is one of the biggest challenges that the countries of the WIO encounter. First, as behind the industrial fleets are strong capitalist companies and powerful DWFNs, the countries of the WIO are put in a difficult position of managing access to the resources by companies that bring revenues, jobs and tuna to the canneries. Under this setting, putting the conservation of tuna resources on government agendas is difficult. Perceived national interests, linked to the economics of the industrial fishery rather than the impact of the fishery in the longer term, override the need to sustain the resources. Second, the impact of tuna fisheries and especially the industrial segment is still largely unknown. Current knowledge on the state of tuna resources are produced only at the Indian Ocean level. From the IOTC's stock assessment in 2018, at least three fish species are more likely to be overfished in the Indian Ocean: yellowfin tuna, longtail tuna and narrow-barred Spanish mackerel. The last two are species that are also caught by coastal fisheries and are key to coastal communities. Knowledge on the interactions between industrial fishing and those coastal resources is limited to local stories of overfishing by the industrial fleet. This limited knowledge also applies to the case of bycatch species caught in the nets of purse seiners, such as sharks, marine turtles, and albatross, which are substantially affected by industrial exploitation and only assessed at the IOTC level. Addressing this knowledge gap at the WIO level can help countries understand the broader impact of industrial fishing on the marine resources and the ecosystem, as well as provide arguments to weigh the impacts of the current industrial exploitation in the WIO.

A second reflection is around the materiality of tuna and the WIO within which it moves. Through discussions with fishers and presence in the field, it was noticed that tuna has a fluid ontology, especially in Madagascar. What is considered tuna or not can be strongly debated in Madagascar, and this especially due to the diversity of local dialects that qualifies one fish as tuna or not, in one region compared to another. This then brings questions of which tuna is

overfished at the national level while tuna is differently defined in different parts of the country. Efforts of conserving tuna become challenging for the state. To succeed in any effort of improving knowledge on tuna resources, an active capacity building is required for the fishers and statisticians of the fisheries department regarding the various species. In Mauritius and the Seychelles, due to a more tuna-oriented semi-industrial fishery, this confusion over tuna is less pronounced. There is a fairly clear divide between coastal tunas sold on local markets and industrial tunas exported directly or used at the canneries. As seen in Chapter 5, however, the discourse of the reduction of tuna resources at the local level is for undifferentiated “tuna” in the three countries and especially in Mauritius and the Seychelles. This distinction between the various species of tuna being blurred when questions of overfishing are discussed at the local level can portray local claims as too general and difficult to address at the national and even regional level. A second point is the fluidity of the WIO itself and how it shapes the fisheries. While the WIO has historically been portrayed as a space of trade, through the development of tuna fisheries since the 1980s, it has also evolved to a space of strong geopolitical negotiations, territoriality and especially diverse livelihoods.

The third aspect I would like to bring is the idea of ‘speaking tuna’. In an article by Bill Adams entitled ‘speaking lion’, he promotes the need for nature conservation to reach out to other fields and approaches to succeed. His vision is that “conservation success could be improved by effective interdisciplinarity, openness to new and contrasting ideas, and a commitment to transparency to encourage dialogue about alternative management actions.” (Adams 2016: 868). I contend here that the management of tuna could benefit from a similar change of paradigm. Too often associated with fisheries management, surrounded by stock assessments, probabilities and economic models of cost effectiveness, an improved management of the fishery requires a better consideration of other approaches and contrasting ideas. This is particularly needed considering the current situation of overfished species like yellowfin.

For a start, management of tuna fisheries at the regional IOTC level urgently requires inputs on solving geopolitical conundrums. While the issue of politically powerful actors (DWFNs), dominating within RFMOs is way too common, the IOTC is currently strongly affected by such issues. As long as geopolitical interests are not addressed and kept as the elephants in the room, important management measures will keep being delayed, to the detriment of the future of the tunas.

At the national level, coastal states need a better consideration of contrasting ideas, including those of local fishers, often less heard due to the louder voice brought in by revenues and benefits from fishing access agreements. Coastal states need to refocus on the long-term future of local livelihoods in tuna and the long-term sustainability of marine resources. This will require difficult trade-offs that might impact the present economic interests of the state and its geopolitical partners.

Finally, improving the current management of tuna fisheries also requires integrating alternative views and ways of resource exploitation. As part of building an argument for degrowth in tuna fisheries, one aspect of such an approach that could be brought to tuna fisheries is the concept of care. Care as seen in degrowth includes the idea of ‘giving care’ which implies a commitment and work to satisfy a need of care in a direct relationship (D’Alisa et al. 2015: 64). The suggestion here is to consider the idea of giving care and bring actors to commit to take actions towards the needs of tunas – here their long-term sustainability through conservation and management. One of the challenges in enacting such an approach is the ‘out of sight’ character that the fish may present to the policy-makers. Implementing the idea of care calls to establish a direct relationship with the fish. This relationship, while present in local offices of fisheries departments, on fishing boats or in canneries, is often inexistent at the table of negotiations. To establish care, these interactions with the resources need to be made familiar to policy-makers, especially before they sit and negotiate access or management measures. This is particularly relevant for coastal countries that are put to negotiate with highly trained negotiators of DWFNs. By bringing alternative views and approaches into solving the tuna conundrum, countries of the WIO have the opportunity to free themselves from the structural weight of geopolitics and capitalist ways of exploiting the fish.

### **8.3. ENRICHING THE FIELD OF ‘MARINE’ POLITICAL ECOLOGY BY STUDYING TUNA FISHERIES**

As seen in Chapter 3, studies of tuna fisheries have been rather prolific within other disciplines and in other oceans. With this thesis, I have then attempted to develop the field of ‘marine’ political ecology with the study of tunas and the western Indian Ocean. The thesis demonstrated how tuna fisheries in the WIO present the case of unsustainable blue growth, perpetuating ecological degradation through industrial fishing and marginalisation of local actors. It also provided an interesting case of multiscale interactions of actors and showing

the challenging politics of resources management at different scales. It finally emphasised the need for more attention to the non-humans when it comes to analysing activities at sea.

### ***8.3.1. Discussion of blue degrowth***

Given the current enthusiasm about the blue economy and blue growth, the study of tuna fisheries serves as a reality check for ocean-based activities undertaken under a capitalist type of exploitation. As presented in this thesis, the usual winners and losers will be generated if other initiatives involving marine resources follow the example of tuna extraction. Other blue economy activities will face even greater challenges in developing countries that are mainly dependent on foreign actors for exploitation and with limited knowledge production regarding the state of various marine species and ecosystems. As seen in tuna fisheries and as it currently stands, coastal countries will not get the benefits promised under the blue economy. In a capitalist-oriented system, the same dominant actors – firms and geopolitically strong countries – will be the ones profiting from the activities under the blue economy. In line with current calls for a more ‘just’ blue economy especially for small-scale fisheries (Bennett 2018), the study has also brought in more local voices that are currently less heard in the blue growth dialogue. In tuna fisheries, these local views are often overridden by the hegemonic narratives of sustainability that are currently pushed by national governments and industrial actors. Contributing to ‘the seed’ effort of political ecology, the study of tuna fisheries in the WIO has shown the difficult if not impossible way to achieve sustainability in the existing capitalist way of using the tuna and the sea. Coastal countries need to adopt robust actions for the improvement of the state of tuna resources. Those will require difficult trade-offs. Nationally, there is a strong need to refocus the fishery towards local fishing communities that are the most dependent on the fish. The question of pursuing industrial fishing or not can only be addressed by systemic change at the global level, where the socio-ecological impacts of the exploitation are fully revealed and prompt the adoption of less growth-oriented exploitation. In tuna fisheries and other blue economy activities, there will be no win-win solution to sustain the marine resources. Solutions will demand putting the fish, the sea and their custodians first, at a potential loss for some economic and political actors. In other words, tuna fisheries need a blue degrowth, that will question claimed sustainability, focus more on the custodians of the resources and a positive socio-ecological change in the use of marine resources. While achieving these will represent a real challenge for coastal countries, a strong argument is needed to motivate countries. This could be built based on three foundations: the opportunity to further defend sovereignty of coastal countries

over tunas in the region; the need to sustain the fish for the long-term benefits of the region and its people; and the opportunity to lead by example at the global level by implementing an inclusive and more just blue economy agenda.

### ***8.3.2. An empirical contribution to discussions of spatial scale***

Political ecology studies of natural resources have often been accused of being limited to local analyses or on the contrary accused of treating scale too loosely moving from the local to the global (Neumann 2015; Rangan and Kull 2009). The use of a political ecology lens to study tuna fisheries has required a careful consideration of scale. Due to the movement of the resources and the strong influence of the external actors, the study of tuna fisheries required to work at local/national scales in countries and regional scales at the WIO and Indian Ocean level. I have given less attention to the global scale as other scholars have addressed questions of markets, firm strategies and state of the resources. The study has therefore tried to address the above-mentioned critique and to carefully take into consideration the relationships between actors and the impact of natural resource use across scales. First, at the local level, the thesis has tried to ‘humanise’ the tuna fisheries by telling stories of local and regional fishing, fishers, intermediaries, stevedores or cannery workers. At the national and regional levels, the study showed the limited visibility of local stories from the three islands studied in management discussions and the shifting positions of coastal state actors when it comes to adopting management measures at the IOTC. This disconnection between scales is not uncommon in a high value resource such as tuna. As presented in Chapter 7, the study also contributes to expanding the field of geopolitical ecology. Through this angle, the study of mobile and cross-border resources such as tuna adds an empirical element to the field and opens it up to the study of similar resources that are dependent on geopolitical interactions for their use and management. For the field of political ecology, the study of highly mobile species such as tuna complies with the idea of Blaikie and Brookfield (1987) of analysing local resource use in the context of broader factors. The specific focus at the regional level was key as that is where state practises are the most diverse and have a strong impact on the management of tuna fisheries in both coastal waters, EEZs and the high seas.

### ***8.3.3. Reiterating the importance of non-humans***

The role of non-humans in political ecology has been widely recognised, as seen in Chapter 6. While there has been criticism regarding giving more place to the non-humans in social practices and about the emergence of ideas around new materialism and post-humanism (as seen in Malm 2019), this thesis contends that mobile tuna fish and the sea in general play a



non-negligible role in shaping their use and management. The thesis has offered a contribution on two fronts. Empirically, it presents how the materiality of tuna and the WIO shapes questions of access, geopolitics and perception on resource use. With the increase of interests in marine issues within political ecology, the study of tuna provides a comprehensive example of the role of non-humans and their impact on social practices at different scales. Theoretically, studying tuna fisheries has also brought reflection on the idea of co-producing materiality as the tunas are also impacted by fishing practices and political decisions taken about their management. In line with discussions about new materialism, I argue that tuna, its fishers and managers co-exist and influence each other's being and practices. While fishers strongly depend on the availability of the fish to gain benefit from the fishery, the tuna's availability and productivity are also influenced by the fishers' practices and more generally by the political management measures taken – or not – to sustain the fisheries. Tuna are both 'cooperative', for instance by aggregating under FADs to the point of its overfishing but also 'undisciplined', refusing to comply with human-established boundaries or prediction of productivity. For an out of sight resource that a handful of its consumers would have seen alive, tuna generates multiple interests and conflicts amongst an array of actors and across borders.

#### **8.4. FUTURE RESEARCH PERSPECTIVES**

Tuna fisheries present a double conundrum for research. On the one hand, it appears like it has been extensively researched including in the Indian Ocean (for example the work of Liam Campling – political economy, Frederic Le Manach – access agreements, Alain de Fonteneau – biology of tuna, Laurent Dagorn – biology of tuna and FADs, Marie Le Comte – governance and sustainability, this thesis – political ecology). On the other hand, there are questions that remain unanswered mainly due to the large extent of tuna fisheries in the Indian Ocean and even in the WIO and also due to the multiplicity of actors and sites that need to be considered for the fishery. The following questions emerge from the thesis.

First, knowledge on the ecological impact of tuna fisheries in the region is still limited. As it stands, only the main commercial species are being properly assessed, with knowledge on other neritic tuna and bycatch species still lacking. The thesis has provided perspectives on the ecological status of tuna species in the WIO, based on IOTC assessments and local perceptions. A step further that would be needed is a deeper ecological history of the tuna resources in the region. The challenge in this future research agenda lies in the availability of environmental data regarding the tuna species and their associated species in the WIO region.

At this current time, lack of data and uncertainty rule the science of IOTC assessments and contribute to the perpetuation of tuna exploitation at a pace that might not sustain the resources in the long-term. While there is scientific capacity available in the region, there has been limited interest in focussing on tuna fisheries. This represents an opportunity for the scientific community of the WIO to expand knowledge on the subject but also for the countries to be provided with more scientific evidence for better decision-making.

Second, more localised explorations of coastal tuna fisheries including their catches, the socio-economic impacts of their fishing and their nutritional needs met through tuna fisheries, are strongly needed especially in the three countries studied. The local tuna catches are largely underestimated. Other socio-economic and political aspects also require attention, including micro-politics in those fisheries and social impacts. The thesis has only provided a glimpse of a larger story that needs to be told from each tuna village. At the current time, provision of jobs and food security are the main arguments to protect the marine resources for local communities, without being fully apprehended. The broader social impacts of the fisheries or the politics involved are less known. Local tuna fisheries will highly benefit from a more anthropological and ethnographic approach that would provide detailed stories regarding the local communities and the tunas they fish. Another approach that could also expand this would be a decolonial, environmental justice or feminist lens from which the structural implications of countries' colonial past, class and gender on local practices in coastal communities could be highlighted. This could provide a rich knowledge and further highlight various forms of injustice.

Third, the question of national compliance to IOTC resolutions is an important issue, understudied at the regional level. It has received limited attention, included from this thesis. Other researchers are currently exploring the IOTC and its proceedings (for example, Sinan and Bailey (2019) or the performance of RFMOs overall (for example Aranda et al. (2012); Cullis-Suzuki and Pauly (2010)). What has been missing in the literature and especially in the WIO is an analysis of the implementation of management measures at country levels. While the IOTC has a compliance committee that monitors how member parties implement resolutions, those are limited to reports presenting what countries have been compliant to or not and what measures countries are taking to be compliant. An analysis of the politics and the socio-economic challenges that countries face to implement management measures is needed. It could provide more guidance to parties on how to adopt measures that are

achievable or invest in means and options needed to improve compliance of countries, especially the poorest ones such as Madagascar.

Finally, something that could also be explored is the link between tuna fisheries and more global policies, for example the Sustainable Development Goals (SDGs). There are increasing studies of how various uses of natural resources contribute or not to the SDGs (see for example Waldron et al. (2017) for agroforestry, Mugagga and Nabaasa (2016) for water resources, or Cooke et al. (2016) for inland fisheries). It can be interesting to investigate how tuna fisheries contribute or not to achieving specific SDGs including SDG 14 that refers to the management of life below water or SDG 2 that refers to food security. This could involve doing research on one site or one country and provide an assessment of the impacts of tuna fisheries in their situated contexts. Such exploration could help policy makers in their decision-making on tuna fisheries at different levels, since the SDGs are now well integrated in various political discourses (FAO 2018b; Halvorsen and Higgins 2020).

As a last thought, it needs to be acknowledged that tuna fisheries have provided a rich and vast array of study and analyses for researchers. Despite current advancement in the different disciplines, many questions remain unanswered and might contribute to the continuous exploitation of the resources that currently causes their depletion. This thesis has attempted to provide an idea of the across-scale socio-political interactions that take place in the WIO which requires more attention to better understand and improve the management of the fishery.

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## Appendix

### Appendix 1. List of interviews

Interview code	Category of interviewee	Affiliation (or village for fishers)	Interview date	Type of interaction
BK 01	Government official	EU DG Mare	May, 2018	Open discussion
BK 02	Policy Officer	IPNLF	May, 2018	Open discussion
BK 03	Semi-industrial boat owner	Victoria	May, 2018	Semi-structured interview
BK 04	South Korean industry representative	Dae Young Fisheries	May, 2018	Open discussion
BK 05	Spanish industry representative	OPAGAC	May, 2018	Semi-structured interview
BK 06	Government official	Malagasy Ministry of Agriculture, Livestock and Fisheries	May, 2018	Open discussion
MD 01	Government official	Malagasy Ministry of Agriculture, Livestock and Fisheries	February, 2017	Semi-structured interview
MD 02	Government official	Malagasy Ministry of Agriculture, Livestock and Fisheries	February, 2017	Semi-structured interview
MD 03	Malagasy crew member	French purse seiner	February, 2017	Open discussion
MD 04	Government official	Malagasy Ministry of Agriculture, Livestock and Fisheries	February, 2017	Semi-structured interview
MD 05	Government official	USTA	February, 2017	Semi-structured interview
MD 06	Fish shop owner	Poissonnerie Joreda	February, 2017	Semi-structured interview
MD 07	Small-scale fisher	Antsiranana	February, 2017	Open discussion
MD 08	Sport fishing operator	Antsiranana	February, 2017	Open discussion
MD 09	Small-scale fisher	Antsiranana	February, 2017	Open discussion
MD 10	Government official	USTA	February, 2017	Semi-structured interview
MD 11	Government official	CSP	February, 2017	Semi-structured interview
MD 12	Small-scale fisher	Ramena	February, 2017	Open discussion
MD 13	Small-scale fisher	Ramena	February, 2017	Semi-structured interview
MD 14	Small-scale fisher	Ramena	February, 2017	Open discussion
MD 15	Small-scale fisher	Ramena	February, 2017	Open discussion
MD 16	Small-scale fisher	Ramena	February, 2017	Open discussion
MD 17	Small-scale fisher	Ramena	February, 2017	Open discussion
MD 18	Small-scale fisher	Ramena	February, 2017	Open discussion
MD 19	Government official	Ramena district	February, 2017	Semi-structured interview
MD 20	Small-scale fisher	Ramena	February, 2017	Open discussion
MD 21	Small-scale fisher	Ramena	February, 2017	Semi-structured interview

MD 22	Small-scale fisher	Ramena	February, 2017	Semi-structured interview
MD 23	Small-scale fisher	Ramena	February, 2017	Semi-structured interview
MD 24	Boat owner and small-scale fisher	Ramena	February, 2017	Semi-structured interview
MD 25	Boat owner	Ramena	February, 2017	Semi-structured interview
MD 26	Boat owner and small-scale fisher	Ramena	February, 2017	Semi-structured interview
MD 27	Small-scale fisher	Ramena	February, 2017	Semi-structured interview
MD 28	Small-scale fisher	Ramena	February, 2017	Semi-structured interview
MD 29	Small-scale fisher	Ramena	February, 2017	Semi-structured interview
MD 30	Former small-scale fisher	Ramena	February, 2017	Open discussion
MD 31	Small-scale fisher	Ramena	February, 2017	Semi-structured interview
MD 32	Small-scale fisher	Ramena	February, 2017	Semi-structured interview
MD 33	Former small-scale fisher	Ramena	February, 2017	Open discussion
MD 34	Small-scale fisher	Ramena	February, 2017	Semi-structured interview
MD 35	Small-scale fisher	Ramena	February, 2017	Open discussion
MD 36	Surveyor	USTA	February, 2017	Semi-structured interview
MD 37	Government official	CSP	February, 2017	Open discussion
MD 39	Staff member	AZIMUT NGO (in Antsiranana)	February, 2017	Semi-structured interview
MD 40	Tuna snack seller at market	Antsiranana	February, 2017	Open discussion
MD 41	Staff member	Conservation International (in Antsiranana)	February, 2017	Semi-structured interview
MD 42	Senegalese crew member	Spanish purse seiner	February, 2017	Open discussion
MD 43	Senegalese crew member	Spanish purse seiner	February, 2017	Open discussion
MD 44	Spanish captain	Spanish purse seiner	February, 2017	Open discussion
MD 45	Spanish captain	Spanish purse seiner	February, 2017	Open discussion
MD 46	Senegalese crew member	Spanish purse seiner	February, 2017	Open discussion
MD 47	Spanish crew member	Spanish purse seiner	February, 2017	Open discussion
MD 48	Surveyor	USTA	February, 2017	Open discussion
MD 49	Staff member	PFOI	February, 2017	Open discussion
MD 50	Government official	Malagasy Ministry of Agriculture, Livestock and Fisheries	March, 2017	Semi-structured interview
MD 51	Intermediary and boat owner	Mahajanga	March, 2017	Semi-structured interview
MD 52	Intermediary and boat owner	Mahajanga	March, 2017	Semi-structured interview
MD 53	Intermediary and boat owner	Mahajanga	March, 2017	Semi-structured interview
MD 54	Small-scale fisher	Antsahabingo	March, 2017	Open discussion

MD 55	Government official	Malagasy Ministry of Agriculture, Livestock and Fisheries	March, 2017	Semi-structured interview
MD 56	Sport Fisher	Mahajanga	March, 2017	Open discussion
MD 57	Small-scale fisher	Amborovy	March, 2017	Open discussion
MD 58	Small-scale fisher	Amborovy	March, 2017	Semi-structured interview
MD 59	Small-scale fisher	Amborovy	March, 2017	Open discussion
MD 60	Small-scale fisher	Amborovy	March, 2017	Semi-structured interview
MD 61	Small-scale fisher	Amborovy	March, 2017	Open discussion
MD 62	Small-scale fisher	Amborovy	March, 2017	Open discussion
MD 63	Intermediary and fisher's spouse	Amborovy	March, 2017	Open discussion
MD 64	Small-scale fisher	Amborovy	March, 2017	Open discussion
MD 65	Small-scale fisher	Amborovy	March, 2017	Semi-structured interview
MD 66	Intermediary and fisher's spouse	Amborovy	March, 2017	Open discussion
MD 67	Small-scale fisher	Antsahabingo	March, 2017	Semi-structured interview
MD 68	Small-scale fisher	Antsahabingo	March, 2017	Semi-structured interview
MD 69	Staff member	DELC NGO	March, 2017	Open discussion
MD 70	Staff member	REFRIGEPECHE EST	March, 2017	Open discussion
MD 71	Government official	Malagasy Ministry of Agriculture, Livestock and Fisheries	March, 2017	Semi-structured interview
MD 72	Government official	CSP	March, 2017	Open discussion
MD 73	Government official	CSP	March, 2017	Open discussion
MD 74	Government official	CSP	March, 2017	Open discussion
MD 75	Government official	CSP	March, 2017	Open discussion
MD 76	Government official	Malagasy Ministry of Agriculture, Livestock and Fisheries	March, 2017	Open discussion
MD 77	Government official	CSP	March, 2017	Open discussion
MD 78	On-board observer	CSP	March, 2017	Open discussion
MD 79	Former on-board observer	CSP	March, 2017	Open discussion
MD 80	NGO staff	MIHARI network	March, 2017	Semi-structured interview
MD 81	NGO staff	MIHARI network	March, 2017	Semi-structured interview
MD 82	NGO staff	Blue Ventures	March, 2017	Open discussion
MD 83	NGO staff	Blue Ventures	March, 2017	Semi-structured interview
MD 84	Staff member	PFOI	March, 2017	Open discussion
MD 85	Senegalese crew member	Txori Tori (Spanish purse seiner)	March, 2017	Open discussion
MD 86	Senegalese crew member	Txori Tori (Spanish purse seiner)	March, 2017	Open discussion
MD 87	Senegalese crew member	Txori Tori (Spanish purse seiner)	March, 2017	Open discussion

MD 88	Fish shop owner	Poissonnerie Toky	March, 2017	Open discussion
MD 89	NGO staff	WWF	March, 2017	Open discussion
MD 90	Government official	Malagasy Ministry of Agriculture, Livestock and Fisheries	March, 2017	Open discussion
MD 91	Intermediary	Toamasina	October, 2018	Semi-structured interview
MD 92	Small-scale fisher	Toamasina	October, 2018	Semi-structured interview
MD 93	Small-scale fisher	Toamasina	October, 2018	Semi-structured interview
MD 94	Small-scale fisher	Toamasina	October, 2018	Semi-structured interview
MD 95	Small-scale fisher	Toamasina	October, 2018	Semi-structured interview
MD 96	Small-scale fisher	Toamasina	October, 2018	Semi-structured interview
MD 97	Intermediary	Toamasina	October, 2018	Semi-structured interview
MD 98	Small-scale fisher	Ste Luce	November, 2018	Semi-structured interview
MD 99	Intermediary and boat owner	Ste Luce	November, 2018	Semi-structured interview
MD 100	Intermediary and boat owner	Ste Luce	November, 2018	Semi-structured interview
MD 101	Government official	Malagasy Ministry of Agriculture, Livestock and Fisheries	November, 2018	Semi-structured interview
MD 102	Small-scale fisher	Ste Luce	November, 2018	Semi-structured interview
MU 01	Small-scale fisher	Grand Baie	April, 2017	Open discussion
MU 02	Former small-scale fisher	Rose Hill	April, 2017	Open discussion
MU 03	Government official	Albion Fisheries Centre	April, 2017	Open discussion
MU 04	Small-scale fisher	Trou aux Biches	April, 2017	Open discussion
MU 05	Small-scale fisher	Tamarin	April, 2017	Semi-structured interview
MU 06	Small-scale fisher	Tamarin	April, 2017	Semi-structured interview
MU 07	Small-scale fisher	Rivière Noire	April, 2017	Semi-structured interview
MU 08	Intermediary and boat owner	Flic en Flac	April, 2017	Semi-structured interview
MU 09	Intermediary	Rivière Noire	April, 2017	Open discussion
MU 10	Small-scale fisher	Tamarin	April, 2017	Semi-structured interview
MU 11	Small-scale fisher	Tamarin	April, 2017	Semi-structured interview
MU 12	Small-scale fisher	Tamarin	April, 2017	Semi-structured interview
MU 13	Small-scale fisher	Rivière Noire	April, 2017	Semi-structured interview
MU 14	Sport fisher operator	Rivière Noire	April, 2017	Semi-structured interview
MU 15	Small-scale fisher	Rivière Noire	April, 2017	Semi-structured interview
MU 16	Intermediary and fisher's	Tombeau Bay	April, 2017	Semi-structured

	spouse			interview
MU 17	Small-scale fisher	Tombeau Bay	April, 2017	Semi-structured interview
MU 18	Small-scale fisher	Le Morne	April, 2017	Semi-structured interview
MU 19	Intermediary and fisher's spouse	Bain des Dame	April, 2017	Open discussion
MU 20	Small-scale fisher	Bain des Dame	April, 2017	Semi-structured interview
MU 21	Government official	Albion Fisheries Centre	April, 2017	Open discussion
MU 22	Government official	Mauritius Port Authority	April, 2017	Open discussion
MU 23	Government official	FiTEC	April, 2017	Open discussion
MU 24	Small-scale fisher	Tombeau Bay	April, 2017	Semi-structured interview
MU 25	Small-scale fisher	Bain des Dame	April, 2017	Semi-structured interview
MU 26	Staff member	Mer des Mascareignes	April, 2017	Semi-structured interview
MU 27	Government official	FiTEC	May, 2017	Semi-structured interview
MU 28	Staff member	IOC	May, 2017	Semi-structured interview
MU 29	Staff member	Princes Tuna	May, 2017	Semi-structured interview
MU 30	Government official	Seafood Hub	April, 2017	Semi-structured interview
MU 31	Sport fishing operator	JPH Charters	April, 2017	Semi-structured interview
MU 32	Small-scale fisher	Tamarin	May, 2017	Open discussion
MU 33	Processing company representative	IBL Seafood	May, 2017	Semi-structured interview
MU 34	Government official	Mauritian Ministry of Blue Economy, Marine Resources, Fisheries and Shipping	May, 2017	Open discussion
MU 35	Small-scale fisher	Pointes au Sable	May, 2017	Semi-structured interview
MU 36	Small-scale fisher	Tamarin	May, 2017	Open discussion
MU 37	Small-scale fisher	Trou aux Biches	May, 2017	Semi-structured interview
MU 38	Small-scale fisher	Trou aux Biches	May, 2017	Semi-structured interview
MU 39	Small-scale fisher	Trou aux Biches	May, 2017	Semi-structured interview
MU 40	Small-scale fisher	Trou aux Biches	May, 2017	Open discussion
MU 41	Small-scale fisher	Pointe aux sable	May, 2017	Semi-structured interview
SE 01	Advisor	SFA	May, 2017	Open discussion
SE 02	Government official	Seychelles Port Authority	May, 2017	Open discussion
SE 03	Small-scale fisher	Victoria	May, 2017	Semi-structured interview
SE 04	Small-scale fisher	Victoria	May, 2017	Semi-structured interview
SE 05	Small-scale fisher	Victoria	May, 2017	Semi-structured interview

SE 06	Small-scale fisher	Victoria	May, 2017	Semi-structured interview
SE 07	Small-scale fisher	Providence	May, 2017	Semi-structured interview
SE 08	Small-scale fisher	Beau-Vallon	May, 2017	Semi-structured interview
SE 09	Small-scale fisher	Bel Ombre	May, 2017	Semi-structured interview
SE 10	Small-scale fisher	Bel Ombre	May, 2017	Semi-structured interview
SE 11	Small-scale fisher	Bel Ombre	May, 2017	Semi-structured interview
SE 12	Government official	Seychelles Ministry of Agriculture and fisheries	May, 2017	Semi-structured interview
SE 13	Semi-industrial fisher	Victoria	May, 2017	Semi-structured interview
SE 14	Semi-industrial fisher	Victoria	May, 2017	Semi-structured interview
SE 15	Semi-industrial boat owner	Providence	May, 2017	Semi-structured interview
SE 16	Processing company representative	Sear Harvester	May, 2017	Open discussion
SE 17	Government official	SFA	May, 2017	Open discussion
SE 18	Semi-industrial fisher	Victoria	May, 2017	Semi-structured interview
SE 19	Staff member	Nature Seychelles	May, 2017	Semi-structured interview
SE 20	Semi-industrial fisher	Victoria	May, 2017	Semi-structured interview
SE 21	Semi-industrial boat owner	Victoria	May, 2017	Semi-structured interview
SE 22	Sri-Lankan crew member	Victoria	May, 2017	Open discussion
SE 23	Semi-industrial boat owner	Providence	May, 2017	Semi-structured interview
SE 24	Small-scale fisher	Anse à la Mouche	May, 2017	Semi-structured interview
SE 25	Small-scale fisher	Anse à la Mouche	May, 2017	Semi-structured interview
SE 26	Small-scale fisher	Anse à la Mouche	May, 2017	Semi-structured interview
SE 27	Sri-Lankan crew member manager	Victoria	May, 2017	open discussion
SE 28	Small-scale fisher	Victoria	May, 2017	Semi-structured interview
SE 29	Member	Seychelles Fishing Boat Owners Association	May, 2017	Open discussion
SE 30	Government official	SFA	May, 2017	Semi-structured interview
SE 31	Government official	SFA	May, 2017	Semi-structured interview
SE 32	Small-scale fisher	Victoria	May, 2017	Semi-structured interview
SE 33	NGO staff	Island Conservation Seychelles	May, 2017	Open discussion
SE 34	Small-scale fisher	Victoria	June, 2017	Semi-structured interview
SE 35	Semi-industrial boat owner	Victoria	June, 2017	Semi-structured

				interview
SE 36	Staff member	Green Island Foundation	June, 2017	Open discussion
SE 37	Former small-scale fisher	Victoria	June, 2017	Open discussion
SE 38	Staff member	IPNLF	June, 2017	Open discussion
SE 39	Staff member	IPNLF	June, 2017	Open discussion
SE 40	Government official	Ministry of Finance, Trade Investment and Economic Planning	June, 2017	Open discussion
SE 41	Semi-industrial fisher	Victoria	June, 2017	Semi-structured interview
SE 42	Semi-industrial fisher	Victoria	June, 2017	Semi-structured interview
SE 43	Small-scale boat owner	Victoria	June, 2017	Semi-structured interview
SE 44	Quality Manager	Fresh Seafood Ltd	June, 2017	Semi-structured interview
SE 45	Semi-industrial boat owner	Providence	June, 2017	Semi-structured interview
SE 46	Semi-industrial boat owner	Providence	June, 2017	Semi-structured interview
SE 47	Member	Seychelles Fishing Boat Owners Association	June, 2017	Open discussion
SE 48	Member	Seychelles Fishing Boat Owners Association	June, 2017	Open discussion
SE 49	Small-scale boat owner	Victoria	June, 2017	Semi-structured interview
SE 50	Sri-Lankan crew member	Victoria	June, 2017	Open discussion
SE 51	French captain	SAPMER (French purse seiner)	June, 2017	Open discussion
SE 52	French researcher	IRD	June, 2017	Open discussion
SE 53	Surveyor	SFA	June, 2017	Open discussion
SE 54	Sport fishing operator	Victoria	June, 2017	Open discussion
SE 55	Semi-industrial boat owner	Victoria	June, 2017	Semi-structured interview
SE 56	French researcher	IDDDRI	June, 2017	Open discussion
SE 57	Surveyor	SFA	June, 2017	Open discussion
SE 58	Small-scale fisher	Victoria	June, 2017	Semi-structured interview
SE 59	Semi-industrial boat owner	Victoria	June, 2017	Semi-structured interview
SE 60	Government official	SFA	June, 2017	Semi-structured interview
SE 61	Semi-industrial boat owner	Victoria	June, 2017	Semi-structured interview
SE 62	French Researcher	IRD	June, 2017	Open discussion
SE 63	Ivorian crew member	French purse seiner	June, 2017	Open discussion
SE 63	Staff member	Indian Ocean Tuna Ltd	June, 2017	Open discussion
SE 65	Staff member	Indian Ocean Tuna Ltd	June, 2017	Semi-structured interview
SE 66	Spanish Captain	Spanish purse seiner	June, 2017	Semi-structured interview

SE 67	Malagasy crew member	Spanish purse seiner	June, 2017	Open discussion
SE 68	French Researcher	IRD	June, 2017	Open discussion
SK 01	Staff member	WWF Madagascar	March, 2017	Semi-structured interview
SK 02	NGO staff	WWF WIO	June, 2017	Semi-structured interview
SK 03	Spanish industry representative	OPAGAC	April, 2018	Semi-structured interview
SK 04	French industry representative	SAPMER	May, 2018	Open discussion
SK 05	French industry representative	ORTHONGEL	May, 2018	Open discussion
SK 06	French government representative	French Ministry of Agriculture and Food	May, 2018	Open discussion
SK 07	Staff member	Greenpeace	March, 2017	Open discussion
SK 08	French Researcher	IRD	May, 2018	Open discussion
SK 09	French industry representative	Previously worked for SAPMER	May, 2018	Open discussion



## Appendix 2. Guiding questions during interviews

FOR FISHERS (also adapted for intermediaries and representatives of processing companies)

0	<b>Nom, prénom (et âge)</b>	
1	<b>Statut :</b> Êtes-vous pêcheurs à plein temps ou mi-temps (pêcheur saisonnier/récréatif) ?	
	<b>Statut :</b> Est-ce que vous pêchez le thon ?	
2	<b>Espèces :</b> Quelles espèces de thon pêchez-vous ?	
3	<b>Saison :</b> Quelle est la saison du thon ?	
4	<b>Effort :</b> Pêchez-vous tous les jours toute l'année ? Tous les jours en saison du thon ?	
	<b>Capture :</b> Combien de kg de thon pêchez-vous environ par jour/semaine en saison?	
	<b>Capture :</b> Combien de kg de thon pêchez-vous environ par jour/semaine hors saison?	
5	<b>Localisation :</b> Où se trouve le thon et à quelle distance devez-vous aller le pêcher?	
6	<b>Technologie:</b> Quelle technique de pêche utilisez-vous (ligne, palangre, traine, senne, poteau et ligne, filets maillants, autres?)	
7	<b>Capital:</b> Comment avez-vous financé votre bateau et le matériel ? (propriété, prêt, subvention, autre?)	
8	<b>Travail:</b> Combien de personnes participent à la pêche ? (famille, membres d'équipage, membres d'équipage nationaux et locaux)	
9	<b>Travail:</b> Comment les personnes impliquées sont-elles embauchées et comment sont-elles payées ?	
11	<b>Négociation d'autres relations sociales:</b> Avez-vous besoin de négocier votre accès à la pêcherie (et avec qui) ?	
12	<b>Accès légal:</b> Avez-vous besoin de permis/licences pour pêcher ? (venant du ministère ? de la ville ?)	
13	<b>Autorité:</b> y-a-t-il une autorité particulière qui fait des règles sur la pêche thonière et qui pose des conditions pour accéder à la pêche ?	
14	<b>Identité sociale:</b> Faut-il appartenir à une coopérative ou un groupe pour pêcher le thon ?	
15	<b>Marchés:</b> Comment utilisez-vous votre capture ? (subsistance ? marché?)	
16	<b>Marchés:</b> Pour le poisson vendu, qui sont les clients finaux ?	
17	<b>Marchés:</b> Quel est le circuit du poisson avant d'arriver au marché final ? Y a-t-il des collecteurs ? Vente direct ?	

18	<b>Négociation d'autres relations sociales:</b> avez-vous besoin de contacter ou payer quelqu'un pour faciliter la vente de votre poisson ?	
19	<b>Revenus :</b> Combien coute le kg du thon au débarquement ?	
20	<b>Revenus :</b> Combien peut-on gagner avec la pêche par semaine/mois?	
21	<b>Revenus :</b> Quel pourcentage du revenu hebdomadaire/mensuel représente le thon quand c'est la saison ?	
22	<b>Revenus :</b> La pêche au thon est-elle importante pour les locaux ? Pourquoi ?	
23	<b>Accès illicite:</b> Pensez-vous qu'il y a des pêcheurs illégaux? Comment sait-on qu'ils sont illégaux ?	
24	<b>Etat des Res :</b> Pensez-vous qu'il y a plus ou moins de thon dans les eaux nationales ? Pourquoi ?	
25	<b>Etat des Res :</b> Combien de kg pêchiez-vous il y a 10 ans 20ans ? d'autres pêcheurs le disent-ils?	
26	<b>Etat des Res :</b> Quelles sont les causes de la situation actuelle ?	
27	<b>Etat des Res :</b> Quelles seraient les solutions au problème? Quelles actions existent ?	
28	<b>Perspective :</b> Qu'est-ce que vous pensez de l'avenir de la pêche et plus particulièrement la pêche au thon ?	
29	<b>Région :</b> Connaissez-vous des pêcheurs de la région WIO ?	
30	<b>Région :</b> Travaillez-vous avec des pêcheurs de la région dans le domaine du thon ?	

FOR GOVERNMENT OFFICIALS

0	<b>Name and position</b>	
	<b>Fisheries socio-economics</b>	
1	How are the different fishing operators managed within the country?	
2	What is the historical and socio-economic context of fishery?	
3	When are the fish present during the year?	
4	How do the movement of the fish influence the management of actors?	
	<b>Access</b>	

5	What are the access rights and legal documents required to undertake tuna fishing?	
6	Is there some fishing that is not officially reported to the government/authorities	
7	What gears and technology are used (longline, purse seine, pole and line, gillnets, VMS, other?)	
8	How is the fishery funded in general (own property, loan, subsidy, other?)	
9	Where do the fish go (subsistence, who do you sell it to as final market clients/others?, what journey does it take to arrive in the end market)	
10	Does association with a group (specific community, country - national/foreign/EU) facilitate access to the fishery?	
11	Who has the authority to allow access to tuna resources at different levels	
<b>State of the resources</b>		
12	What do you think of the state of tuna resources?	
13	How do build the national catch/state of resources?	
14	Why do you think there is/there is no overfishing?	
15	Do you need to promote your position? If so how?	
<b>Regional fisheries</b>		
16	What are your interests/what is at stake in the access to the resources?	
17	Could you perceive tuna fishery as providing a regional identity because of its movement within the region?	
18	Would you have an interest in a regional fishery?	
19	What would be the drivers and/or obstacles to a regional fishery	

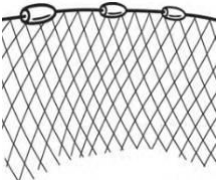
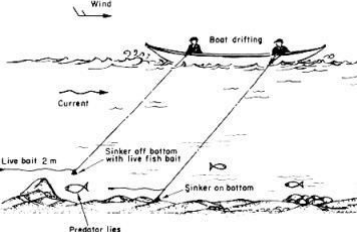
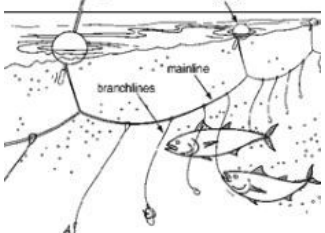
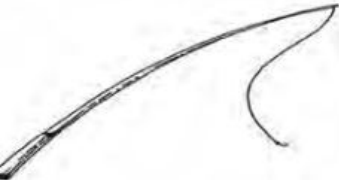
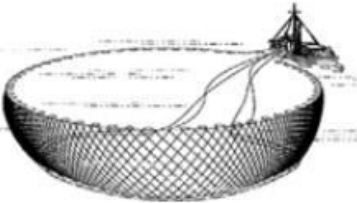
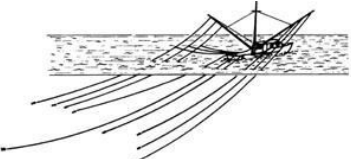
FOR NGO STAFF MEMBERS AND OTHER ACTORS

0	<b>Name and position</b>	
1	What is the historical and socio-economic context of fishery?	
2	When and how is the fish present during the year?	
3	Where does the fish go ?	
4	What do you think of the state of tuna resources?	
5	How do you build your knowledge on this subject?	
6	Do you think there is/there is no overfishing? Why?	
7	How do you need to promote your positions?	
8	Could you perceive tuna fishery as providing a regional identity because of its movement within the region?	
9	Would you have an interest in a regional fishery?	
10	What would be the drivers and/or obstacles to a regional fishery	

### Appendix 3: Sample of codes and main trends derived from the Atlas ti. analysis

Chapters	Sample of main codes	Major trends
State of tuna resources	<ul style="list-style-type: none"> <li>- StateOfRes_less</li> <li>- StateOfRes_less_narr</li> <li>- StateOfRes_SameOrMore</li> <li>- StateOfRes_Unknown</li> </ul>	<ul style="list-style-type: none"> <li>- Less resources</li> <li>- Narratives about reduced resources</li> <li>- Same or more resources</li> <li>- We cannot know</li> </ul>
Access politics	<ul style="list-style-type: none"> <li>- Access2Cap_StateHelp</li> <li>- Access2Cap_BoatOwn</li> <li>- Access2Know_Exp</li> <li>- Access2Lab_Patron</li> <li>- Access2Market_LocMar</li> <li>- Access2Market_viaInt</li> <li>- Access2Tech_Handline</li> <li>- Access2Tech_FAD</li> <li>- LegalAccess_RoleOfPo</li> <li>- EconoBenef_Price</li> <li>- MatOfFish_Species</li> <li>- MatOfFish_Interaction</li> </ul>	<ul style="list-style-type: none"> <li>- Importance of state subsidies</li> <li>- Individual investment in boats</li> <li>- Fishing experience to build knowledge</li> <li>- Role of patronage in labour</li> <li>- Importance of local markets</li> <li>- Role of intermediaries</li> <li>- Use of handline in local fishing</li> <li>- Use of FAD in various segments</li> <li>- Role of policy in legal access</li> <li>- Price of tuna sold locally</li> <li>- Role of species diversity</li> <li>- Interaction between segments as fish moves</li> </ul>
Regionalism	<ul style="list-style-type: none"> <li>- RegColl_geopolitics</li> <li>- RegColl_betwCountries</li> <li>- RegColl_betwFishers</li> </ul>	<ul style="list-style-type: none"> <li>- Regionalism is linked to geopolitics</li> <li>- Regional collaboration between countries</li> <li>- Regionalism between fishers</li> </ul>

#### Appendix 4: Description of gears catching tuna in the WIO

Gear Type	Gear description	Illustration	Segment of the fishery
Gillnet	A wall of netting that hangs in the water column, typically made of monofilament or multifilament nylon		Small-scale or semi-industrial
Handline	Handlines may be used with or without a pole or rod. For fishing in deep waters the lines are usually operated using reels. The gear includes the jiggling lines, operated by hand		Small-scale
Longline	A mainline and snoods with baited (occasionally unbaited) hooks at regular intervals and which is set, in general, on or near the bottom		Semi-industrial or industrial
Pole and Line	A hooked line attached to a pole. Fishing rods/poles are made of wood (including bamboo, also constructed of split cane) and increasingly of fiberglass		Small-scale or semi-industrial
Purse seine	Long wall of netting framed with floatline and leadline (usually, of equal or longer length than the former) and having purse rings hanging from the lower edge of the gear, through which runs a purse line made from steel wire or rope which allow the pursing of the net		Industrial
Trolling	A line with natural or artificial baited hooks and is trailed by a vessel near the surface or at a certain depth. Several lines are often towed at the same time, by using outriggers to keep the lines away from the wake of the vessel. The line are hauled by hand or with small winches.		Small-scale or semi-industrial

Source: Compilation from FAO 2020 and Gillet 2011