The paradox of sustainable tuna fisheries in the Western Indian Ocean: between visions of blue economy and realities of accumulation

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Abstract

For many coastal nations in the western Indian Ocean (WIO), and notably the islands of Madagascar, Mauritius and Seychelles, the tuna fishery is considered one of the main pillars of economic development, providing jobs and substantial revenues whilst ensuring food security. But these fisheries are also an illustration of the paradox behind the idea of the blue economy, where economic growth and sustainable use of resources are promoted as jointly achievable. We show that a sustainability narrative, in which the idea of fishing within ecological limits is present within government policy, public discourse and practices, is however, in contradiction with the realities of accumulation and growth that prevail in the fishery. When measures towards ecological preservation are to be taken, geopolitics of access to the sea and tuna enter the stage and change the position and narrative of the same actors, governments and industrial actors, that promote sustainability. We emphasize the difficult and nearly impossible path of practicing sustainability in the current model of growth-driven tuna fisheries. We argue for the need to repoliticize the practice of sustainability through the questioning of what we see in tuna fisheries: a hegemonic narrative of sustainability and implicit growth, without positive socio-ecological transformations.

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1. Introduction

The western Indian Ocean (WIO) contributes to 12% of the approximate four million tons in annual global catch of tuna (Poseidon 2014). Tuna fisheries in the WIO include the principal commercial species such as albacore (*Thunus alalunga*), bigeye (*T. obesus*), skipjack (*Katsuwonus pelamis*), and yellowfin (*T. albacares*), mainly caught by industrial fishing, as well as coastal tuna such as bullet tuna (*Auxis rochei*) and frigate tuna (*A. thazard*) that are mainly caught by small-scale fishers and as bycatch in industrial fishing (van der Elst 2015). 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 2015) (IOTC 2015a).

Coastal countries have recently put sustainability high in their tuna fishery agendas, as shown by their policies, pronouncements, and practices. This is due to two trends summarized under the 'blue economy' concept. First is a global trend of concern over ocean sustainability in the past 10 years. This has been apparent with the growing number of marine conservation initiatives, the increase in fisheries' certification and in 2015 the adoption of a specific sustainable development goal for the ocean and its resources (Bailey et al. 2018; Bennett 2018). Second is the increasing attention given to ocean-based activities as key to national economies (World Bank 2017; Bennett 2018). Indeed, tuna fisheries play a key role in the current blue economy movement that countries in the Indian Ocean have embraced (UNECA 2014; IORA 2015; World Bank 2017). As used by the World Bank (2017), 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" (p. 6). It also "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" (ibid). Under this framing of sustainable use and economic growth, tuna fisheries are expected to continue their contribution to the economies of coastal states, with an emphasis on the need for a more sustainable industry.

In this paper, we investigate the sustainability paradox that countries of the WIO encounter, especially in the three coastal states of Madagascar, Mauritius and Seychelles. We will show that while current state policies and public discourses claim and boast of being sustainable, state practices in the fishery promote an intensive and growth driven exploitation that poses serious challenges. For one, coastal communities see their livelihood and food security put at risk by a continuous exploitation of resources by foreign industrial actors that impact the availability of resources. This generates local claims of unfairness in resource access and lack of equity on the benefits gained from the fishery. It also brings in geopolitical struggles at the national scale as coastal countries have to negotiate access and management of the resources with economically and politically stronger countries, that are also major development aid donors in the region. Second, the tuna resource shows signs of being at best at the limits of a level of exploitation that is sustainable . Harvest levels are high, and, as mentioned before, since 2015, yellowfin tuna has been assessed as overfished in the Indian Ocean (IOTC 2017). This paradox is not uncommon in global tuna fisheries. It is also present in other oceans where industrial fishing takes place. In the Pacific for example, state actors, while tracing their way towards sustainability mainly through certification, confront the challenge of balancing economic development with sustainability goals and resource management (Barclay 2010; Kirby et al. 2014).

We argue that tuna fisheries illustrate the problematic and yet hegemonic concept of sustainability that currently prevails, one in which growth predominates over real transformations to address the socio-ecological crisis including in tuna resources. This is in line with the argument of Gómez-Baggethun and Naredo (2015) that current international sustainability policy has not addressed the conflict between growth and ecological limits. Current sustainability policy remains firmly rooted in the tradition of 'ecological modernization' pushed by the Brundtland Commission in 1987 and resurrected at the 'green economy' at the Rio+20 conference, which in its simplified version sees economic growth as the solution for rather than as the cause of unsustainability (Hajer 1995; Bailey and Caprotti 2014). As examined by the literature on degrowth (Gómez-Baggethun and Naredo 2015; Kallis 2017; Hadjimichael 2018), this dominant framing of sustainability obscures conflicts between economic growth, social equity and ecological limits. Our argument also follows the one of Asara et al. (2015) who discuss the contribution of the degrowth movement into sustainability science and practice. They contend that sustainability needs to be repoliticized by debating "the existing contradictions between growth, the environment and social well-being" (ibid, p. 381). Our goal is then to provide an empirical case to illustrate this debate by looking at sustainability practices in the WIO tuna fisheries. We aim to unveil the current contradictions between the adoption of sustainability in public discourses and practices and the realities of access and accumulation.

The contribution of this paper is then two folds. We provide a specific case study (WIO tuna fishery) of challenges to the mainstream blue economy sustainability discourse. This includes the following elements: the documentation of the incremental putting-in-place of 'blue economy/sustainability' promises and practices by state actors, and the identification and analysis of three 'analytical windows' that expose challenges or contradictions to this

discourse: geopolitics, crisis management, and local perspectives. At a conceptual level, these 'windows' are interesting in that they are different and yet provide simultaneous scalar configurations of the discourse and its contradictions. We demonstrate how the power of dominant economic and political actors acts through multiple scalar moments, disrupting the simplified scalar win-win stories of the main discourse of sustainability.

The paper proceeds as follows: after a presentation of our approach, we document the arrival of the sustainability narrative in WIO tuna fisheries through an analysis of government reports and fishing agreements. We then investigate the three 'analytical windows' mentioned above, showing the complexity of achieving sustainability in the current path taken by tuna fisheries. We conclude with insights on how the current case of tuna fisheries might inform and repoliticize sustainability in other blue economy projects and initiatives.

2. Approach

Our critical analysis of 'sustainability' in the blue economy, and specifically of the discourse and reality of 'sustainability', takes its inspiration from political ecology. This field has a long tradition of critical analysis of the *ideas* that animate how people interact with natural resources (Peet and Watts 1993; Escobar 1998; Adger et al. 2001; Forsyth 2003). Without denying the reality of environmental problems, the field of political ecology demonstrates how the ideas and explanations upon which resource management policies are based are infused with biases (epistemological, ideological, post-colonial, gendered…) and lead to only partial solutions, at best (Robbins 2012). For instance, political ecologists have chronicled the origins, impacts, and consequences of ideas like wilderness (Neumann 1998), desertification (Davis 2016), healthy rangelands (Sayre 2017) and ecosystem services (Kull et al. 2013; Lele et al. 2013). Furthermore, political ecology studies have highlighted that

126 mainstream discourses on environmental problems have often unjustly burdened resource
127 users and do not address other important factors such as global production systems or
128 colonial history (Bryant 1998; Campbell 2007;Vaccaro 2013).
129
130 The strength of the field comes from the geographical and historical grounding of these
131 analyses, in particular case studies, and moving beyond abstract critiques. Typically, political
132 ecological studies of particular environmental ideas and discourses take seriously the
133 genealogy and contextualized production and translation of those ideas. At the same time,
134 social relations of access and power are considered along with the ecology or other
135 biophysical realities of the resource. While initially being largely terrestrially focused,
136 political ecology has also questioned dominant narratives in ocean and fisheries management
137 (Bennett 2019). This has included, for example, exploring economic diversity in capitalist-
138 dominated fisheries (St. Martin 2005), investigating the use of genetics and scientific
139 knowledge in marine conservation (Campbell and Godfrey 2010), documenting the use of
140 overfishing as a narrative in industrial fisheries (Mansfield 2011), or exposing how the
141 concept of blue economy has emerged in global international governance (Silver et al. 2015).
142
143 In our investigation of the adoption and realities of 'sustainability' in WIO tuna fisheries, we
144 take the existence of a global 'blue economy' and 'sustainability' discourse as a starting
145 point. We investigate (section 3) how this discourse is translated into policy statements,
146 management measures, and certification schemes by the main governmental institutions. We
147 then confront (section 4) these sustainability 'discourses-written-into-policies' with particular
148 realities and practices. Specifically, we outline three uniquely *scaled* ways in which the
149 realities of national interests, economic growth, and capital accumulation challenge the
150 veracity of the blue economy sustainability discourse. These three 'analytical windows' are

151 'scaled' in the political ecological sense of Rangan and Kull (2009), where scale is a means
152 through which resource management issues are made political. The 'tuna resource' whose
153 sustainability is being sought has particularly fluid and challenging scalar manifestations.
154 Following Steinberg and Peters' (2015) call for a "wet ontology", the tuna windows are
155 different moments or assemblages in the multi-species, multi-actor, three-dimensional,
156 territorialized yet flowing space of the ocean.
157
158 The first analytical window (see 4.1) is geopolitical, and focuses on multilateral catch
159 allocation negotiations in the Indian Ocean Tuna Commission (IOTC). We show how
160 national interests at the scale of nation states (and unrelated to tuna sustainability) shape
161 ocean-wide catch allocation outcomes. Political ecology has only recently engaged in a
162 fruitful conversation with geopolitics (e.g. Bigger and Neimark 2017, Childs 2018),
163 highlighting the role of state interests and large geopolitical institutions in environmental
164 change and in the adoption of management measures. As Havice (2018) astutely
165 demonstrates in the case of South Pacific tuna fisheries (the big brother to our WIO case,
166 source of 60 percent of the world's tuna), struggles over rich yet mobile tuna resources are an
167 illuminatory window into how states and other actors exercise power and enact sovereignty.
168 This is done in ways different to those captured by traditional two-dimensional territories and
169 boundaries. In our case, the structure of catch negotiations facilitates the irruption of nation
170 state geopolitical and political-economic concerns into regional fisheries management.
171
172 The second analytical window (see 4.2) is about crises. The yellowfin tuna crisis is
173 exemplary of how scale makes ecology political, *sensu* Rangan and Kull (2009). Part of the
174 issue here is an ontological one of identifying 'what is tuna' and what is at crisis, which is a
175 product of not just the mobile materiality but fundamentally also of social relations (Acton et

al. 2019). What seems like simply a technical exercise of stock assessment is also ontological and scalar, in the sense that 'what is tuna' and 'what is overfishing' are in flux. Which tuna is in crisis (the vaguely defined group of species, a particular species, a regional population of that highly mobile species)? What temporality qualifies to establish a crisis (yearly reports, tuna life cycles, cycles of human activities such as boom years in the aftermath of an episode of Somali piracy – Andriamahefazafy and Kull 2019)? How is crisis scaled and communicated ('overfishing', IOTC 'stock status' color codes, IUCN red list categories, Kobe plots)? What is the reaction (what percentage reduction in fishing effort is enough to rebuild stocks? what baseline numbers are used?). The particular conjunctures of such empirical, observational, and interpretive scales produce a particular crisis and reactions to it.

The third analytical window (see 4.3) is about local perspectives. Political ecology has long documented a scalar mismatch between dominant discourses regarding degradation and/or sustainability (at the global, national, NGO, or administrative scales) and local knowledge and experiences (Peet and Watts 1993; Scales 2011). Leach and Fairhead (2000) argue that local people rarely have opportunities to challenge dominant discourses, as their interactions are situated in particular personal and historical contexts. In our case, local tuna fishing actors' narratives are not centered on explaining or defending the sustainability of their own actions, but instead on calling out overfishing by industrial actors. We will show how this counter narrative is constructed and challenge assertions by state actors.

The study focuses on three island countries: Madagascar, Mauritius and Seychelles. The three countries were chosen for their importance in Western Indian Ocean industrial and small-scale fisheries. Each country has distant water fishing nations (DWFNs) fishing in its waters with purse-seine and longline vessels, and each country has landing ports and tuna canneries.

Industrial fishing by DWFNs started in the 1980s, first with trials from the Japanese fleet and then the arrival of the European fleet, which since has dominated the fishery (Campling 2012). The establishment of canneries in the three islands, in collaboration or with funding from DWFNs has also justified the current industrial exploitation that provides tuna to those canneries. The three countries also have small scale fishers that catch tuna either as target or non-target catch, and locally flagged longline vessels participating in what is known as semi-industrial tuna fishing (GoS 2016; GoMu 2017; GoMa 2017). Tuna fisheries have different places in the economy of the three countries. In Madagascar, a country heavily focused on agricultural cash crops, the contribution of tuna fisheries to the economy is almost 10% of the GDP (Breuil and Grima 2014). In Mauritius, the fishery contributes to less than 2% of the GDP and constitutes around 20% of exports (COFREPECHE et al. 2016; GoMU 2017). In Seychelles, tuna fisheries are at the centre of the economy, with a contribution of approximately 20% of the GDP in 2011 and more than 90% of exports (Marsac et al. 2014). The European Union is also an important actor that we encounter in these three case studies, as the main DWFN fishing tuna in the WIO region. Specifically, the French and Spanish fleets catch annually around 200,000t of tuna, more than 60% of the catch in the industrial sector (POSEIDON et al. 2014; IOTC 2017).

The paper is based on three main methods: document analysis, semi-structured interviews, and observation. First, document analysis aims to illustrate the construction of the narrative of sustainable tuna fisheries. We analysed 6 documents that present the blue economy policies and visions of the three countries, locating the role of tuna fisheries within the blue economy and the countries' approach to sustainable use of resources. We also analysed the use of the concept of sustainability in the Sustainable Fisheries Partnership Agreements (SFPAs) that the EU concludes with countries in the WIO in order to gain access to fishing

grounds. Finally, to discuss the realities of accumulation, the state of tuna resources, and the level of exploitation in the WIO, we analysed the scientific reports of the IOTC between 2012 and 2018.

Our second method included semi-structured interviews undertaken in 2017 and 2018 with 76 key actors based in the three island countries. These including government officials (15), semi-industrial (7) and local small-scale fishers (45), representatives of processing companies (3), and intermediaries (6) in the three countries. Interviewees were chosen based on their considerable involvement (more than 5 years) in their respective role in the fishery. Approached in their offices or at port, actors were interviewed based on pre-established questions with open responses. First , they were asked to describe their perspective on the state of the resources in the past five years. Then, they were asked, under each perspective, to provide a justification for their responses and the potential drivers of the situation. Answers were analysed through coding with Atlas.ti software and grouped under major categories based on the most frequent responses (**Table 3**).

[Insert table 3 here]

Our third method involved the use of observation at the 22nd meeting of the Indian Ocean Tuna Commission. Meetings of the commission take place every year for two main reasons. First it is used as a reporting mechanism, during which the work of different sub-committees are presented to the members. It is also a decision-making mechanism where various conservation and management proposals are tabled, debated and adopted as binding resolutions for all its members. Two of the authors were observers and one was a country delegate at the meeting. We 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 (Büscher 2014; Corson et al. 2014). Three elements were thoroughly recorded: interventions and speeches from key actors – here the delegates from the three countries studied and from DWFNs, reactions of actors during debates on management measures, and the general setting of the meeting – including the setting and timing of different agenda items and the turns of speakers. The objectives of this observation was to document the geopolitical interactions between member countries. It was specifically to understand how members present and promote their position, and what narratives convince parties to come to a decision or not.

3. Sustainability in tuna fisheries as co-constructed by State actors

The narrative of sustainable tuna fisheries has been produced and performed by a variety of state actors at different levels. We illustrate this through our analysis of blue economy policies in the three countries studied and in the analysis of the evolution of SFPAs. We emphasize how governmental institutions position sustainable tuna fisheries in their policies. We then explore how the idea of sustainability has been put into practice by these actors.

3.1. The anchoring of sustainable tuna fisheries in fisheries policy

Through an exploration of government policies, namely those that promote blue economy and those that specifically concern tuna exploitation, we present how institutions shape the idea of sustainability for tuna fisheries and make it an activity central to the countries' economies. In the three island nations, tuna fisheries have been accorded a specific place in policy and accompanying documents, especially as a contributor to the development of the blue economy. 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 considered as a priority (GoMa 2015). In Mauritius, tuna fisheries fit within "traditional ocean sectors" and

276 are especially praised for their contribution to employment in the country through the cannery
277 as the "single largest employer" (Cervigni and Scandizzo 2017). In Seychelles, tuna fisheries
278 are considered a "mature" activity within the blue economy. In the *Blue Economy Roadmap*,
279 a Commonwealth report produced for the government of Seychelles, a mature activity is
280 defined as one providing "high levels of value addition and employment" (Commonwealth
281 Secretariat 2015). For these three island countries, tuna fisheries are a well-established ocean
282 activity that countries want to sustain (or to develop for the case of Madagascar).
283
284 Commitments to sustainability for tuna fisheries have been high in the agenda for these
285 countries. Countries have articulated the goal of aligning the fisheries with ecological and
286 environmental concerns. In Madagascar's tuna fisheries strategy, for example, the
287 government outlines the objective of the strategy as "to ensure a sustainable exploitation of
288 tuna resources in Madagascar's waters by reconciling the preservation of the environment
289 and the development of the sector" (GoMa 2015). In Mauritius, an analysis of the potential of
290 the blue economy in the country by the World Bank established that fostering blue economy
291 innovation and development required measures towards sustainability. In the tuna sector,
292 those measures include a continued effort towards sustainable management of tuna through
293 international cooperation (Cervigni and Scandizzo 2017). Promoting environmental
294 sustainability is also set as a core value in achieving responsible fisheries for Mauritius (ibid).
295 Similarly, in Seychelles' *Blue Economy Roadmap*, it is stated that the future of tuna fisheries
296 depends on the ability of the sector to adopt sustainable practices. The various scenarios for
297 blue economy futures place tuna fisheries as a first provider of food and nutrition
298 (Commonwealth Secretariat 2015).
299

300 The EU has been at the forefront of using the concept of sustainability in its policy, and has
301 fully integrated sustainability as part of its economic growth narrative (Ertör and Ortega-
302 Cerdà 2017; Hadjimichael 2018). The EU has been undertaking tuna fishing in the region
303 since the 1980s through agreements which allow EU vessels to fish in coastal countries'
304 waters according to the Law of the Sea (UNCLOS, Art. 62). These initially questionable
305 agreements have evolved over the years to comply with the needs of the Common Fisheries
306 Policy (CFP) but also in response to critiques of fairness, equity and sustainability (Gagern
307 and van den Bergh 2013; Le Manach et al. 2013; Gegout 2016). As a result, over time the EU
308 has adapted its agreements with coastal countries both in the presentation and the contents. At
309 their start in the 1980s, the agreements were labeled as 'fishing access agreements', focused
310 mainly on access to the resources (Le Manach 2014). In the 2000s, they evolved to 'fisheries
311 partnership agreements', essentially putting more emphasis in the mutual benefits for the
312 parties involved. In the last reform of the CFP in 2014, the agreements were relabeled as
313 'sustainable fishing partnership agreements' (SFPAs) with a strong emphasis on the benefits
314 host countries get from the agreements but also on the need for sustainable use of the
315 resources (EU 2015; Macfadyen et al. 2015; Hadjimichael 2018). The 2015 leaflet of SFPAs
316 describes them as "a transparent, coherent and mutually beneficial tool that enhances (1)
317 fisheries governance for sustainable exploitation, (2) fish supply and (3) development of the
318 fisheries sector in SFPA partner countries" (EU 2015). It is important to note the implication
319 that these three distinctive components are considered achievable in parallel.
320
321 In terms of content, one illustrative example is the EU agreements with Madagascar (**Table**
322 **1**). The content of these agreements has evolved to include different clauses related to
323 management measures such as restriction of industrial fishing zones, clarified targeted
324 species, reporting requirements on bycatch, and prescriptions regarding fish aggregating

devices (FADs). This evolution of the EU access agreements shows how institutions such as the EU have adopted the narrative of sustainability and adapted it to reframe an originally questionable policy tool.

[Insert Table 1 here]

3.2. Sustainability as practiced by state actors

What are the governments in the three countries doing to put their sustainability discourses into practice? At the level of the IOTC, the coastal states of the Indian Ocean (including the three countries studied) have adopted measures that aim at improving the management of tuna fisheries and maintain a healthy level of tuna stock. These measures include obligations to submit data regarding national tuna fisheries (IOTC 2015), harvest control rules for skipjack (IOTC 2016) or the reduction of the number of Fishing Aggregating Devices (FADs) and support vessels allowed (IOTC 2016a, 2018). Since 2016, the commission adopted and updates yearly the rebuilding plan for yellowfin, assigning catch limits for different gears and setting measures in case of over catch (IOTC 2016a, 2019d). The implementation of these measures are monitored by the IOTC through its compliance committee, to which countries must submit reports. As of their 2019 reports, the three countries studied are considered as mostly compliant to the resolutions linked to management standards of the IOTC. However, the three countries also presented common issues of repeated non-compliance such as the lack of data reporting on coastal tuna fisheries, the lack of implementation of conservation measures regarding other marine species or appropriate FADs' management plans (this latter applicable only to Mauritius and Seychelles) (IOTC 2019 a,b,c).

The government of the Seychelles is also leading a second type of effort to operationalize sustainability, namely the preparation of a fisheries improvement plan (FIP) for the tunas of the Indian Ocean. This was launched in 2016 in partnership with the government of Mauritius, European industrial fishing associations and the main processing companies in the region (WWF 2016). A FIP is one pathway towards the Marine Stewardship Council (MSC) certification of a fishery. An MSC certification consists of an assessment of a fishery by an accredited third-party certification body against the MSC standard, which is based on three principles: the status of the target fish stock, the impact of the fishery on the ecosystem, and the performance of the fishery management system. The MSC certification also includes a Chain of Custody standard, which aims to trace products from landing to sales (Foley 2012; Ponte 2012). The label has gained high recognition in both the industry and the market (Miller and Bush 2015; Ponte 2012; Borland and Bailey 2019; Foley 2012). The FIP led by the Seychelles covers skipjack, yellowfin and bigeye tuna species caught by French, Italian, Spanish, Mauritian and Seychelles-flagged purse seiners fishing in the WIO (WWF 2016). The goals of the FIP include a range of actions, including the rebuilding of the decreased stock of yellowfin, a maintenance of healthy levels of the other tuna species' stocks, the establishment of harvest control rules, and a strategy for an improved management of other species and the ecosystem impacted by the fishery (ibid).

The analysis of blue economy policies in the three island countries, of EU fishing agreements, and of management measures and market-based endeavors, including the MSC certification, shows that the idea of sustainable tuna fisheries is currently strongly entrenched in policies. The idea of sustainability is also harnessed by governmental institutions as a key tool for the development of the blue economy and the improvement of tuna exploitation. The following sections will show how a variety of realities and practices challenge this discourse

374 of hand-in-hand economic growth and sustainable use of the resources, echoing the degrowth
375 critique raised in the introduction.
376
377 ## 4. The realities of accumulation in the WIO tuna fisheries
378 We have shown in the previous sections that "sustainable" tuna fisheries are now a well-
379 established idea that has been translated into various practices. We will now explore how
380 these discourses and practices rub up against the challenging realities of the WIO tuna
381 resource. We approach this from three illustrative angles, what we call analytical windows:
382 geopolitics, crisis management, and local perspectives. First, we show how national interests
383 not related to tuna fisheries influence regional fisheries negotiations. Second, we show how
384 neither the state of the tuna resource, nor the responses to recent crises, match ideas of
385 sustainability. Third, we show how local perceptions of the situation, which describe a much
386 less sustainable situation, are often less heard in the sustainability discussions.
387
388 ### 4.1. Tuna geopolitics
389 One of the arenas where the discourse of sustainability is not realized in practice is within the
390 IOTC negotiations regarding catch allocations. There has been a move in all tuna regional
391 fishery management organizations towards some kind of system that first sets a limit on tuna
392 catches (or efforts) and then allocates that catch (or effort) to different member states (Seto et
393 al. in review). In the IOTC, allocation has been discussed for the past 8 years, formalized
394 through the Technical Committee on Allocation Criteria (TCAC). Discussions of allocations
395 have been led by coastal countries since 2011 with meetings of members within the TCAC
396 and then at the commission. The negotiations have been slow to progress, as there is a
397 substantial divide between the members (Abolhassani 2017; Sinan and Bailey 2019). On one
398 side there is a group of DWFNs, mainly led by the EU. On the other side, there are the 21

399 coastal states of the Indian Ocean, gathered under the G16 (named after Article XVI of the
400 IOTC agreement, acknowledging the sovereign rights of coastal states over living resources
401 in their EEZs) (IOTC 1993) and currently led by countries like Maldives, South Africa and
402 Seychelles. The two sides have highly distinctive proposals for a systematic allocation
403 mechanism. The EU proposes to allocate 85% of the catch based on historical catch in the
404 Indian Ocean, 6% on correctional factors such as level of investment, financial contribution
405 to science, effective monitoring, control and surveillance mechanisms, fisheries trade related
406 factors and development and social factors, 1% for new entrants and 8% for Least
407 Developing Countries and Small Island Developing States (IOTC 2018a). DWFNs would be
408 the most entitled with the EU proposal (around 91% as most of the correctional factors are
409 skewed towards DWFNs). The G16 proposal, led by Maldives and co-sponsored by 11 other
410 coastal states, attributes the catch based on four distinctive criteria: a baseline for all coastal
411 states, historical catch, and supplementary allocations for catch on the high seas and for small
412 island states and developing coastal states (IOTC 2018b). The fundamental differences in the
413 proposals have made both sides highly antagonistic, with coastal states claiming sovereignty
414 over the resources and DWFNs demanding a more cautionary approach to the subject, and
415 continually highlighting their historical investment in the fishery (IOTC 2018d). During the
416 2018 meeting, as early as when all the proposals were only presented to the commission,
417 DWFNs expressed their concern over the allocation proposal by the G16 with statements
418 such as:

419 "What about the simulations? If we do not see the exact effects of the proposals we
420 cannot discuss this" (Intervention by a delegate of a DWFN).

421 or

422 "We […] are surprised why this is even on the table as a proposal because the issues
423 are too complex and there are no simulation. We are happy to have a work

programme. There is scope to have a roadmap in order to have two finalized proposal next year. The pre-conditions were the simulations" (Intervention by a delegate of a DWFN).

To respond to DWFNs, some of the co-sponsors within the G16 attempted to make counter arguments. For instance:

"We have not made progress since 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 […] This has been a request of coastal States for 8 years. It will make access reasonable" (Intervention by a delegate of a coastal state).

and

"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 a delegate of a coastal state).

No formal allocation decisions have yet been made. At the 2019 commission meeting, the Maldives tabled the G16 proposal again. However, lack of consensus within the commission and reluctance from DWFNs lead to the deferral of the proposal to 2020. In the past five years and due to increased collaboration of G16 members at IOTC, coastal states have started to voice their concerns, notably on sovereignty over tuna resources within their EEZs, within the context of allocation negotiations (Sinan and Bailey 2019) . However, with regard to the other measures, there has been limited involvement of coastal states. Most coastal states have limited means to engage in proposal writing and reviewing, considering especially the complexity of some proposals. In the past 5 years, the European Union has submitted 31 proposals and has managed to get a consensus for 20 of those proposals (**Table 2)**. This is a

449 significant number compared to the proposals submitted by the coastal states and shows the
450 negotiation power of the European Union.
451 [Insert Table 2 here]
452
453 Within the allocation negotiations, Madagascar, Mauritius and Seychelles have had different
454 positions. The Seychelles was a leading sponsor of the G16 proposal, Madagascar joined as a
455 co-sponsor only since the 2019 commission meeting and Mauritius is not a co-sponsor. These
456 positions can be explained by three factors. For Madagascar, as a developing coastal state
457 reliant on development aid, confronting IOTC members such as the EU is potentially
458 dangerous due to long term geopolitical and development aid relations (Andriamahefazafy et
459 al. 2019). The recent change of position can be associated with a stronger willingness from
460 the new government in country to collaborate with coastal countries. In the case of Mauritius,
461 it has often used the IOTC as a forum for a non-tuna related goal: claiming sovereignty
462 (Havice 2018) over the Chagos archipelago. It systematically submits statements of
463 revindication to the commission during negotiations. Due to this, Mauritius does not align
464 with the G16 countries on the grounds that any allocation proposal might assign catches to
465 the United Kingdom. This would provide legitimacy to the UK as a coastal state through
466 Chagos. In contrast, the Seychelles, however, positions itself as a leader in the blue economy
467 of the WIO (Schutter and Hicks 2019) and showed during the negotiation of allocation its
468 commitment to the interests of the coastal states.
469
470 In a context where more sustainable approaches to tuna fisheries are a widely accepted goal,
471 this dilemma on allocation is problematic on two fronts. First, it shows that DWFNs and
472 especially actors like the EU have contradictory stances: strongly promoting sustainability
473 and benefits to coastal states in public discourse but also claiming a larger share of the

allocation pie to the detriment of coastal states that they are also supporting through SFPAs. Second, the G16 proposal was not co-sponsored by all members of the G16, and so the lack of unanimity within the G16 on the proposal also shows the reluctance of some coastal states like Mauritius to associate with such stringent management initiatives. Geopolitical links between some countries and DWFNs that also provide large amount of foreign aid can render access to resources problematic. National economic interests are in competition with the need for better management and ultimately sustainability. These interactions also show the perpetuation of political domination by DWFNs within RFMOs (Miller et al. 2014; Sinan 2018), generating social unbalance, with aid-dependent coastal countries less willing to negotiate management measures.

While WIO nations and industrial fishery actors proclaim to follow a sustainability approach and make rhetorical commitments, the adoption of measures for social and ecological sustainability is then debated, contested and hindered by geopolitical machinations in favor of DWFNs and manifestly opposed to a sustainability agenda. With the aim to shed light on the current contradictions within the practice of sustainability (Asara et al. 2015) as expected within a degrowth discussion, we have demonstrated that with the current level of political engagement of actors into tangible ecological change, governmental actors in tuna fisheries are embracing a 'thin sustainability' (Miller 2013). Sustainability becomes a concept that only conveys agreement between stakeholders without addressing the complexities and contradictions it presents (ibid). Repoliticizing sustainability therefore requires an investigation of the political interests that often prevent actors to put in practice their sustainability discourse. These interests lead to the adoption of contradictory stances, often in favor of a more intensive use of the resources, especially when politically and economically stronger actors are involved.

499

500 **4.2. Tuna crisis and management**

501 The story of a tuna crisis in the WIO provides another challenge to the attempts of key actors
502 to portray a clear move towards a sustainable tuna fishery. The critique comes not just from
503 the simple existence of the crisis, but also in its documentation and in management responses
504 to it. As mentioned earlier, the ontological existence of a tuna crisis depends on scalar
505 choices (spatial, temporal, population-species-tribe, levels of alert). Is there a one bad year in
506 which yellowfin stocks are low, or is the whole tuna resource generally overfished for several
507 decades? Here, we discuss the case of one of the most commercially valuable tuna species,
508 yellowfin, the only one that has not been officially considered as stable. Reported harvests of
509 yellowfin steadily grew from around 50,000 t/year in the 1980s to around 400,000 in the
510 2000s (IOTC 2018c). Largely due to security issues linked to Somali piracy, catches
511 declined between 2006 and 2010, but rebounded to even higher levels from 2010
512 (Andriamahefazafy and Kull 2019).

513

514 The IOTC scientific committee has produced numerous reports on the state of yellowfin tuna
515 over the past decade, including stock assessments in 2012, 2014, 2015, 2016 and 2018. Stock
516 assessments are based on models that use catch data submitted by members of the IOTC, as
517 part of their obligations. The assessment results are then presented under a stock status
518 trajectory plot (called the Kobe plot) which shows the probability of overfishing. Between
519 2012 and 2014, yellowfin tuna was assessed neither as overfished (when the spawning
520 biomass is below the spawning biomass level that would provide maximum sustainable yield)
521 nor as subject to overfishing (when fish mortality is above the fishing mortality level at which
522 it would provide maximum sustainable yield). While there was an increase of catch during
523 those years (**Figure 1**), scientific reports have stated that "it is difficult to know whether the

stock is moving towards a state of being subject to overfishing" (see for example IOTC 2013, p. 108 or IOTC 2014 p. 134). The species was then assessed as overfished and subject to overfishing since 2015 (IOTC 2015a, IOTC 2018c). The causes of the overfishing were attributed to the pressure on the biomass from the "substantial increase in longline, gillnet, handline and purse seine effort" (IOTC 2015, p. 84). In 2016, the IOTC members agreed on a plan to rebuild the stock of yellowfin tuna with different levels of reduction of catches, notably 15% reduction from 2014 levels for purse seiners, 10% reduction for longliners, 10% for gillnets and 5% for other gears (IOTC 2016a).

[Insert Figure 1 here]

The 2018 report of the SC reaffirmed a 94% probability that the yellowfin stock was overfished, while also mentioning that the decline of the stock was still not well understood due to various uncertainties (IOTC 2018c). One of the identified drivers of this overfishing status was the lack of success in rebuilding the stock through the reduction measure (IOTC 2018c, p.39). The lack of success of the rebuilding plan had various causes. First, the Scientific Committee's original recommendation was that catches be reduced by 20% in order to have a 50% chance of recovery by 2024 (IOTC 2016a). However, the highest limitation adopted in 2016 was 15% for the purse seine fleet (IOTC 2016a). Worse yet, following that, the Seychelles government submitted a proposal in 2017 to lessen its reduction in catch by changing its reference year. In the end, the implementation of the rebuilding plan lead 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, p.39). According to the report, countries subject to the reduction measures exceeded their limit, notably by 7% for the Seychelles

549 flagged purse seiners, by 33% for Iranian gillnets, and by 1% for handliners from the
550 Maldives[1]. The EU only managed to reduce its catch by 5% despite its obligation of 15%
551 reduction (IOTC 2018c).
552
553 This brief look at the yellowfin crisis and its management measure demonstrates a dogged
554 persistence of a continuous trend of high levels exploitation of yellowfin tuna in the Indian
555 Ocean, partially facilitated through the way in which a crisis was identified and minimized,
556 and partly through non-compliance by actors more interested in near-term profits and
557 revenue. The crisis of yellowfin tuna over-exploitation in the WIO and the hijacking of stock
558 rebuilding plans by national interests seriously undermine the sustainability narrative. The
559 constant and continued exploitation of yellowfin has been justified by uncertainty about the
560 data, which evolved through the years, as well as uncertainty in the projections and models
561 used by the IOTC. Ontological concerns over what can be known, how it can be known, and
562 at what scales systematically justify continued exploitation by economically-motivated
563 actors. This illustrates the complexity of adopting limitation of catches in intensive resources
564 exploitation such as tuna fisheries, ultimately dependent on 'uncertain' scientific models and
565 driven by capitalist accumulation strategies by fishing operators. In our call to repoliticize
566 sustainability, it is important, as we have demonstrated here, to question the political and
567 economic interests behind the science of assessments as well as behind the implementation of
568 management measures.
569

[1] 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).

570 **4.3. Local narratives of overfishing**

571 A third analytical window providing a different view of the realities of assertions of
572 sustainability in the WIO tuna fishery is the perceptions of local users **(Table 3)**. By local
573 users, we include fishers of the three countries studied, their fisheries' department
574 representatives, local intermediaries and representatives of processing companies based in
575 country. Of the 76 interviewees, 29% of respondents (22) perceived that tuna resources were
576 either stable, have increased or that there was not enough knowledge on the subject (**Figure**
577 **2**). These views were mainly from fisheries' department representatives (10), a few local
578 fishers (8) and intermediaries (4). They emphasized the benefits that tuna fisheries have
579 brought in. Five out the 8 local fishers with this view commented that "there is a higher
580 revenue from tuna fishing even for local fishers". Two fisheries' department representatives
581 in each country emphasized that "tuna fishing is key to the economy of island states because
582 of canneries and ports".
583
584 On the other hand, the other 71% of respondents (54) talked forcefully of a decrease in
585 fishing resources in general and of tuna in particular (**Figure 2**). These were mainly local
586 fishers (44), representative of processing companies and intermediaries (5) and a handful of
587 fisheries' department representatives (5). Amongst those who perceived a reduction of the
588 resources, the impact of industrial fishing on the resources was seen as a major contributor.
589 50% of interviewees (38) mentioning the role of licenses to purse seiners and longliners in
590 the overfishing of resources, as well as the use of FADs and support vessels. Illustrative
591 typical phrases from small-scale and semi-industrial fishers interviewed included "they catch
592 everything and not only tuna" or "they catch too much, they have very good equipment for
593 that". Two processing companies' representatives out of the three interviewed with this view
594 noted the reduction in catch they found in their landing data. Five data collectors within the

595 fisheries' departments expressed that they had noticed a reduction in the size of fish. Bleak
596 comments regarding the future of the fishery included indicative statements from local fishers
597 such as "if we are not careful, there will be a big collapse of the tuna resources", "there is a
598 future in tuna fishing but not for the small-scale fishers" or "if we increase the number of
599 purse seiners, there won't be any fish left in our waters". A smaller number of respondents
600 (16) attributed the reduction of resources to pollution of the ocean (5%), increased numbers
601 of tuna fishers (4%) or climate change (12%). The narrative of overfishing by industrial
602 vessels was strongly present in Seychelles and Mauritius where fishers had a more advanced
603 knowledge on the involvement of DWFNs in their national waters, compared to Madagascar
604 (Pers. Obs).
605 [Insert Figure 2 here]
606
607 Those local perceptions of overfishing emphasize the likely impact of industrial fishing as a
608 major threat to marine resources. This counter narrative of industrial overfishing, while
609 joining the global overfishing narrative, challenges the bureaucratic assertions of
610 sustainability promoted by IOTC actors and government fisheries managers. The statements
611 of some local actors also highlight a situation of unequal access to the tuna resources between
612 the industrial and small-scale segments of the fishery, as the former is both extensive in its
613 geographical reach and intensive in its methods and technologies (Boonstra et al. 2018).
614 Quotes by local fishers such as "they catch too much" and "they have very good equipment"
615 illustrate the impact of technology used by the industrial fleet on access to the resources. As
616 expressed by one interviewee: "there is a fundamental problem of access with the big purse
617 seiners as before they leave the port, they already know where to go to fish and how much
618 there is, they have appropriated the fish already, it is more harvesting than fishing" (Pers.
619 Comm, Member of a fishing association in Seychelles). If part of sustainability includes local

development, particularly by actors based in less wealthy countries, this clearly is not being achieved.

The current system for tuna exploitation in the WIO privileges large scale industrial fishing, often by distant water fishing nations. Local fishers see a lack of fairness and equity in their access to the resources. This reflects the status quo in many other global fisheries, where less attention is given to small-scale fisheries, along with their perspectives on the resources (Pauly 2018). Giving more voice to alternative stories from local fishers is crucial as local users are ultimately more dependent on the tuna and marine resources in general, and will be highly affected by the current level of exploitation in the longer term. Repoliticizing sustainability entails giving voice to local narratives often contradictory to dominant ones. Ensuring the continuation of prosperous livelihoods of coastal communities represents a key part to real and positive socio-ecological change that the degrowth movement aims to achieve. In the current situation of tuna fisheries, these livelihoods are put at risk.

5. Tuna fisheries as a reality check within blue economy

Despite the strong public discourse of sustainability fronted by coastal states and supported by industrial actors, the situation in the WIO demonstrates that tuna fisheries continue to be an example of accumulation through intensive exploitation favoring industrial actors over both the tuna resource and local users. We have used three 'analytical windows' to show how national, geopolitical or economic interests, ontological struggles over the existence of a crisis, and weakness of local perspectives uncover the not-so-hidden politics behind the veneer of the auto proclamations of sustainability. First, the geopolitics of access to the resources, particularly dominated by the influence of DWFNs but also by unrelated national interests, cause management measures to be very difficult to achieve. Second, crises in state

of the resources are difficult to establish and management measures hardly implemented. Third, countervailing local views are overridden by the dominant narrative of sustainability pushed by national governments working with the industrial fishery. This situation could perpetuate a lack of social equity, marginalizing further small-scale actors involved in the fishery.

For tuna fisheries of the Western Indian Ocean, there is an urgency to realign the current public discourse with the realities of achieving sustainability especially within the IOTC. Coastal states within the IOTC need to face the contradictions posed by their sustainability commitments and their growth aspirations for the WIO tuna fishery. Despite the challenge it presents, it will become a necessity to adopt politically difficult and possibly less profitable measures in order to achieve their commitments and sustain the resource as well as the people dependent on it.

The case of tuna illustrates an important paradox that blue economy initiatives will continue to face, especially those based on a similar model of intensive exploitation of the resources. In line with other debates on blue growth, we have shown that tuna fisheries still illustrate a highly growth-oriented exploitation, with simultaneous claims that sustainability is achievable. Stakeholders involved in blue economy projects need to ensure that the qualification of activities as sustainable is questioned, that activities without effective measures towards real socio-ecological transformation are challenged, and that political and economic interests are given attention for their impacts on resource management. Repoliticizing sustainability in tuna fisheries entails such questioning and especially paying attention to the impacts on the resources and their local users. It also demands an equal consideration of neglected local perspectives. What we currently see in tuna fisheries

represents a substantial warning about the hegemony of the use of the concept of 'sustainability' which might also occur in other sectors of blue growth (see Editorial and other articles in this Special Feature). It is also a reality check that can serve as a lesson learned. In a growth-oriented blue economy, achieving sustainability will be highly challenging and tainted by political and economic interests of powerful stakeholders. Those will be favored compared to small-scale actors and might reproduce similar cycles of overexploitation of resources.

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927

928 **Tables:**

929 **Table 1:** Content evolution of fishing access agreements between the EU and Madagascar for
930 management related clauses. Analysis of the authors from EU 2014, EU 2012, EU 2007.

	EU-Madagascar fishing access agreements		
Clauses	**2007**	**2012**	**2014**
Fishing zone	- beyond 12 nautical miles of the base lines of the Malagasy coast - 3 NM from local FADs	- beyond 20 nautical miles of the base lines of the Malagasy coast - 3 NM from local FADs, - not in the Leven and Castor Banks	- beyond 20 nautical miles of the base lines of the Malagasy coast - 3 NM from local FADs - not in the Leven and Castor Banks (stated as reserved for small-scale fishing)
Target species	- Highly migratory species (listed in Annex 1 to the 1982 UNCLOS)	- Highly migratory species (listed in Annex 1 to the 1982 UNCLOS)	- Tuna and similar species under the IOTC management mandate - Except: protected species by international convention

		- Except: some shark species [2]	- Except: some shark species (same as in 2012 agreement)
Bycatch	- No obligation from the vessel	- Vessel to report the quantity of bycatch to national authorities. - Vessels to comply with IOTC measures. - 200 tons/year of shark allowed on board	- Vessel to report the quantity of bycatch to national authorities. - Vessels to comply with IOTC measures. - 250 tons/year of shark allowed on board
Fishing Aggregating Devices (FADs)	No prescription on use of FADs	No prescription on use of FADs	- Prescription on the use of green artificial drifting FADs only - Prescription to comply with IOTC measures

931

932 **Table 2:** Analysis of proposals submitted and adopted within the IOTC in the past 5 years.

933 Analysis of the authors

Proposing country	Proposals submitted	Proposal adopted	Adoption %
Australia	4	2	0.50
European Union	31	20	0.65
France	2	2	1.00
Indonesia	1	0	-
Japan	3	3	1.00
Kenya	1	1	1.00
Maldives	13	6	0.46

[2] Alopiidae and Sphyrnidae families and species of Cetorhinus maximus, Rhincodon typus, Carcharodon carcharias, Carcharhinus falciformis and Carcharhinus longimanus (EU 2012, EU 2014)

Mauritius	12	7	0.58
Mozambique	1	0	-
Seychelles	6	5	0.83
South Africa	2	2	1.00
Tanzania	1	0	-
United Kingdom	5	2	0.40

934

935 **Table 3:** Categorization of responses from interview questions, based on most frequent

936 responses received

Interview questions	**Q1: What do you think about the state of tuna resources in the past 5 years?**	**Q2: Why do you say so ?**	**Q3: What are the drivers behind this situation?**
Categories emerging from each interview question	There are less resources	• Reduction in quantity and quality of catch • Further distance and longer time of fishing • Increase of tuna prices	• Overfishing by the industrial vessels • Climate change • Pollution of the ocean • Increased number of fishers
	The resources have remained stable	• Stable level of catch in general • Increase of catch some years • Good availability of tuna	• Reduction of effort by industrial vessels • Good productivity of WIO waters
	We cannot know the state of the resources	• Not enough data and knowledge on tuna • Catches fluctuates with good and less good years	• Productivity is variable • Limited means to gather data

		• Tuna is migratory and difficult to know	• Knowledge only at the regional Indian Ocean level
	There are more resources	• Good catch level in general • Higher catch level in the past 5 years	• Tuna reproduces fast • Production is consistent with effort • Good productivity of the WIO waters

Figures:

Figure 1: Evolution of catch level from 2010 to 2017, as presented in the different Scientific Committee reports between 2012 and 2018 (Source: Analysis by the authors from IOTC reports)

Figures:

Figure 1: Evolution of catch level (in metric tons) in seven reports (2012 to 2018) of the IOTC Scientific Committee (Source: Analysis by the authors)

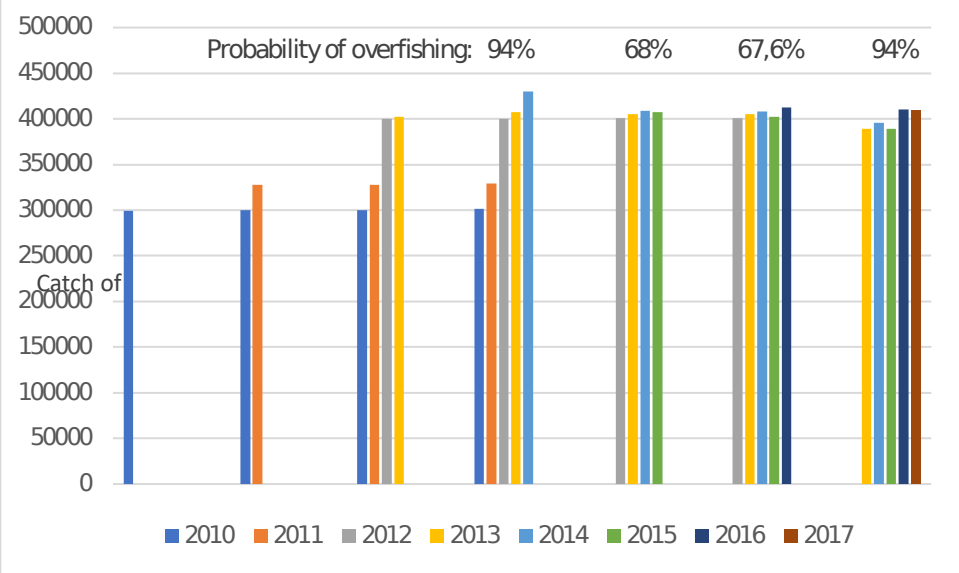
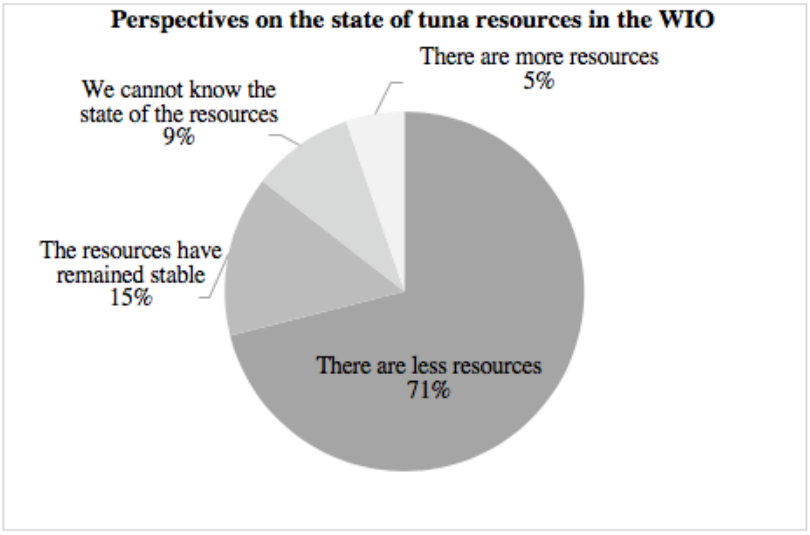


Figure 2: Results of interviews regarding respondents perspective on the state of tuna resources in the western Indian Ocean, with justification and drivers presented by respondents

We cannot know the state of the resources			
Justification (Q2)	**Number of respondents**	**Perceived drivers (Q3)**	**Number of respondents**
Not enough data and knowledge on tuna	3	Productivity is variable	2
Catches fluctuates with good and less good years	2	Limited means to gather data	3
Tuna is migratory and difficult to know	2	Knowledge only at the Indian Ocean level	2

There are more resources			
Justification (Q2)	**Number of respondents**	**Perceived drivers (Q3)**	**Number of respondents**
Good catch level in general	3	Reduction of effort by industrial vessels	3
Higher catch level in the past 5 years	1	Good productivity of WIO waters	1



The resources have remained stable			
Justification (Q2)	**Number of respondents**	**Perceived drivers (Q3)**	**Number of respondents**
Stable level of catch in general	6	Tuna reproduces fast	5
Increase of catch some years	3	Production is consistent with effort	4
Good availability of tuna	2	Good productivity of the WIO waters	2

There are less resources			
Justification (Q2)	**Number of respondents**	**Perceived drivers (Q3)**	**Number of respondents**
Reduction in quantity and quality of catch	29	Overfishing by the industrial vessels	38
Further distance and longer time of fishing	21	Climate change	9
Increase of tuna prices	4	Pollution of the ocean	4
		Increased number of fishers	3

948