Scoping socio-economic indicators across Coastal States in the Indian Ocean: Summary and next steps

Megan Bailey and Scott Schrempf
Dalhousie University, Marine Affairs Program
April 2025

"The success or otherwise of an allocation process has the potential to permeate almost all other decisions taken by an RFMO, and thus has the potential either to secure or to undermine the primary conservation regime…"
Lodge et al., 2007

Executive Summary
RFMOs have the responsibility to help fishing states towards agreement on "participatory rights such as allocations of allowable catch or levels of fishing effort" [1]. Despite this recognition in international law, allocations within RFMOs remain contentious, due to disagreements or different interpretations of what equitable sharing agreements vis-à-vis allocations should look like[2].

Allocation refers to a process of determination of how catch or benefits from a fishery should be shared. Over the past nine years, a subset of developing Coastal States in the Indian Ocean have held several small gatherings to discuss the notion of an equitable allocation. Socio-economic dependency has come up year after year, with States having an interest in understanding what the concept might mean in the context of IOTC tuna fisheries. Additionally, the vulnerability context facing developing Coastal States has also been repeatedly discussed in these gatherings.

The United Nations Fish Stocks Agreement Article 24[3] lends rationale to dependency and vulnerability being included in allocation decisions, and in this document, we summarize indicators discussed by developing Coastal States as potentially relevant for allocation criteria. This document is not a set or agreements, nor does it represent decisions by any State, but rather is presented here to the Working Party on Socioeconomics (WPSE) to help move conversations forward around the types of data and indicators that have been discussed, specifically with regards to allocation.

Introduction

The management and governance of shared fish stocks is one of the most fundamental challenges to sustainable fisheries[4], as shared stocks remain highly susceptible to the tragedy of the commons[2]. Shared stocks are those that are transboundary (spending time in more than one exclusive economic zone (EEZ)), and those that are straddling or highly migratory (spending time in more than one EEZ and in the high seas), and it is generally agreed that cooperative management is essential for sustainability of such stocks. Highly migratory species are particularly problematic, and for all intents and purposes, this refers to tuna and tuna-like species[3].

As the challenge of sustainable shared stocks management became increasingly clear, the United Nations Fish Stocks Agreement (FSA), building on the United National Convention on the Law of the Sea, put forward the "duty to cooperate", essentially admonishing fishing states to seek cooperative management through regional fisheries management organizations (RFMOs)[3]. RFMOs have the responsibility to help fishing states towards agreement on "participatory rights such as allocations of allowable catch or levels of fishing effort"[2]. But even with this recognition in international law, allocations within RFMOs remain contentious, due to disagreements or different interpretations of what equitable sharing agreements should look like[2].

Allocation refers to a process of determination of how catch or benefits from a fishery should be shared. Generally speaking, allocations often start as their baseline with some calculation based on a record of historical fishing[5]. For some developing Coastal States that have a smaller history of fishing and for countries that did or do not have institutional and financial resources to record artisanal and small-scale fisheries, these baseline allocations based on historical catch can have disproportionate impacts. This idea of "disproportionate burden" is also a part of the FSA, such that developing nations should not be required to bear a disproportionate burden for conservation and management actions[6]. So how can RFMO allocation approaches properly account for socioeconomic dependency and vulnerability (SEDV), thus avoiding disproportionate burdens and contributing to equitable allocations?

Allocation in tuna RFMOs

It is impossible to ignore the issue of allocation in fisheries management. Fully open access fisheries quickly became poster children of the tragedy of the commons and prisoner's dilemma, where self-interest trumps the collective good. In almost all cases, a 'race to fish' has continued to dominate global fisheries, and overfishing and overfished stocks have become the norm. A move to catch shares (or quotas or allocation) then took place, where the limits to effort and/or catch were further broken up into access rights or privileges, giving each harvester or vessel, or in the case of internationally shared fish stocks, each country, a

proportion of the total catch and/or effort. Not surprisingly, the process by which access is allocated is extremely contentious, certainly within a country, but perhaps even more so, between countries[7].

There are many different criteria or principles for allocation determination, but allocation is usually negotiated based on the amount of fishing that a nation has historically participated in, in addition to considerations for Coastal States. The historical catch criteria almost always disproportionately benefits distant water fishing nations (DWFNs), as historically they developed their fishing capacity earlier and thus have larger records of historical catch, at least when historical catch is attributed to the Flag State.

In a recent review of RFMO allocation processes, the criteria occurring in policy and conservation and management measures related to allocation were compiled across four tuna RFMOs[8]. The criteria were grouped under the categories of legitimacy, citizenship, and equity (Figure 1), and it is this third principle that concerns us in this document.

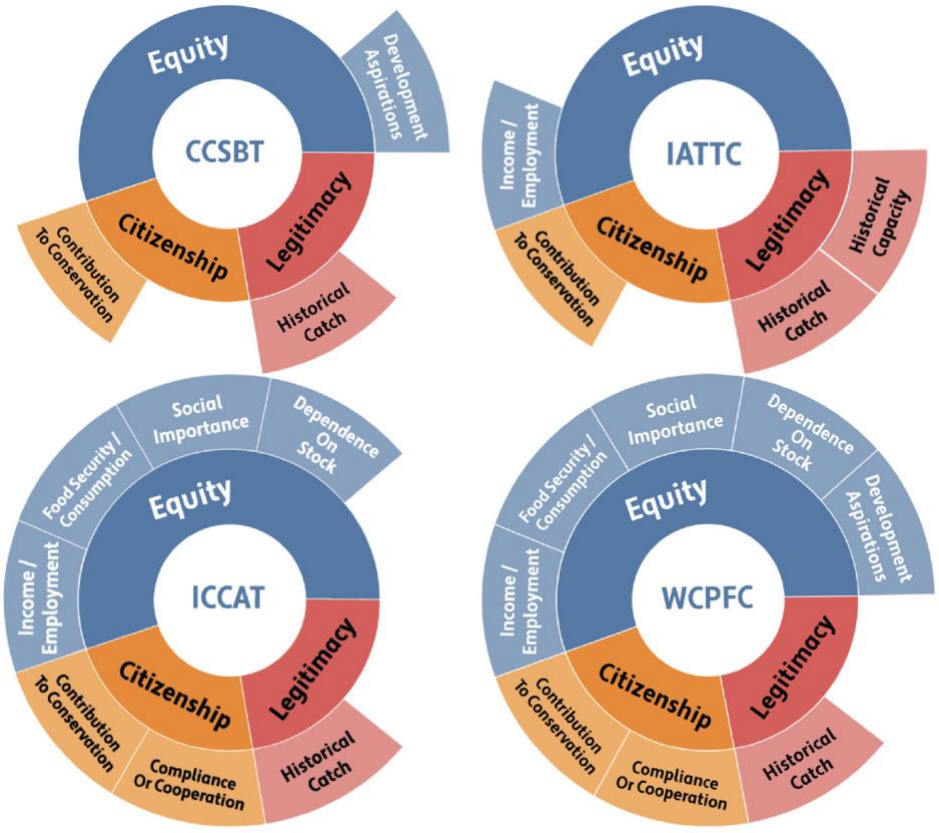

Figure 1. Sunburst plot of allocation principles defined across four tuna RFMOs[13].

There are five tuna RFMOs, and none of them explicitly incorporate social or economic considerations into allocation *determination* (Table 1). Convention text for the International Commission for the Conservation of Atlantic Tuna (ICCAT) includes a list of criteria to be considered for fishing allocations, which includes SEDV in the following ways[9]:

- Criteria C: Relating to the Status of the Qualifying Participants
    - 8. Interests of artisanal, subsistence and small-scale fishers
    - 9. Needs of coastal fishing communities dependent on fishing
    - 10. Needs of States whose economies are overwhelmingly dependent on fishing
    - 11. Socio-economic contribution of the fisheries to developing States and territories
    - 12. Respective dependence on the stocks of the coastal States
    - 13. Economic and social importance of the fishery for States who have habitually participated in fishing in the area
    - 14. Contribution to national food security/needs, domestic consumption, income from exports, and employment

However, these are criteria, akin to the principles on which IOTC is currently forwarding allocation discussions. There is nothing here to define or measures things like "overwhelmingly dependent". States can agree to language like this, but it stalls when actually trying to put into practice these kinds of vague considerations. As the newest RFMO, WCPFC also specifically makes mention in its convention text that when allocations are put in place, things like the needs and aspirations of small-island developing states and the needs of dependent coastal states be taken into account, in a similar vein to ICCAT, but again, no formal way of defining, measuring, and incorporating these factors currently exist[10].

Table 1. Summary of current allocation methods across tRFMOs and consideration for socioeconomic factors.

	Allocation in Convention text?	Current allocation method	Determined through:	Socioeconomic considerations in practice?
CCSBT	No	Tri-annual fixed percentages of TAC	Negotiation driven by historical catches	No
IATTC	Yes; in Antigua Convention	Setting capacity limits	Negotiation driven by historical catches	No
ICCAT	No; in Resolution 15-13	Quotas based largely on historical catch	Negotiation driven by historical catches	No
IOTC	No	None currently	N/A	No
WCPFC	Yes	Total allowable effort and catch limits	Negotiation driven by historical catches	No

The IOTC allocation process to date

In this section, the history of the allocation process in the IOTC, including formation of the Technical Committee on Allocation Criteria (TCAC) and proposals on allocation for the first decade of allocation negotiations are reviewed (Figure 2)[11]. In the Indian Ocean Tuna Commission agreement (adopted on 25 November 1993 and entered into force on 27 March 1996), article V(2j) – objectives, functions and responsibilities of the Commission states

"to keep under review the economic and social aspects of the fisheries based on the stocks covered by this Agreement bearing in mind, in particular, the interests of developing coastal states;"

It was this attention to economic and social aspects that prompted, or at the very least, underlined the first discussions around socio-economic indicators in the IOTC in 2013. These discussions came with proposals from the Seychelles (Proposal C) and Iran (Proposal D)– to the 2nd Session of the IOTC TCAC negotiations – almost 20 years after the adoption of the agreement. Seychelle's proposal noted the development of a verifiable socio-economic criteria for disadvantaged coastal States and Iran's proposal noted the importance for the TCAC to start developing a record of socio-economic indicators such as *"the number of fishermen, vessels, fishing harbours, processing centers, cold storage, refrigerator facilities"*.

In 2017, Seychelles submitted a proposal to the 21st Session of the Commission to develop a working party on the socio-economic aspect of the fisheries in the IOTC area of competence to advice the Commission on the socio-economic consequences to CPCs,

arising from the implementation of conservation and management measures. The proposal was not adopted due to concerns around the lack of socio-economic data available to the Commission.

In 2018, Maldives supported by 9 other coastal States submitted a proposal to 4th Session of the TCAC, which included the need to develop four types of indicators

- Social dependency of relevant developing coastal States (which may include employment, food security needs, etc.)
- Economic dependency of relevant developing coastal States (which may include export value and fisheries as a proportion or rank of GDP)
- Cultural dependency of relevant developing coastal States (criteria for which will be determined)
- The development status of developing coastal States

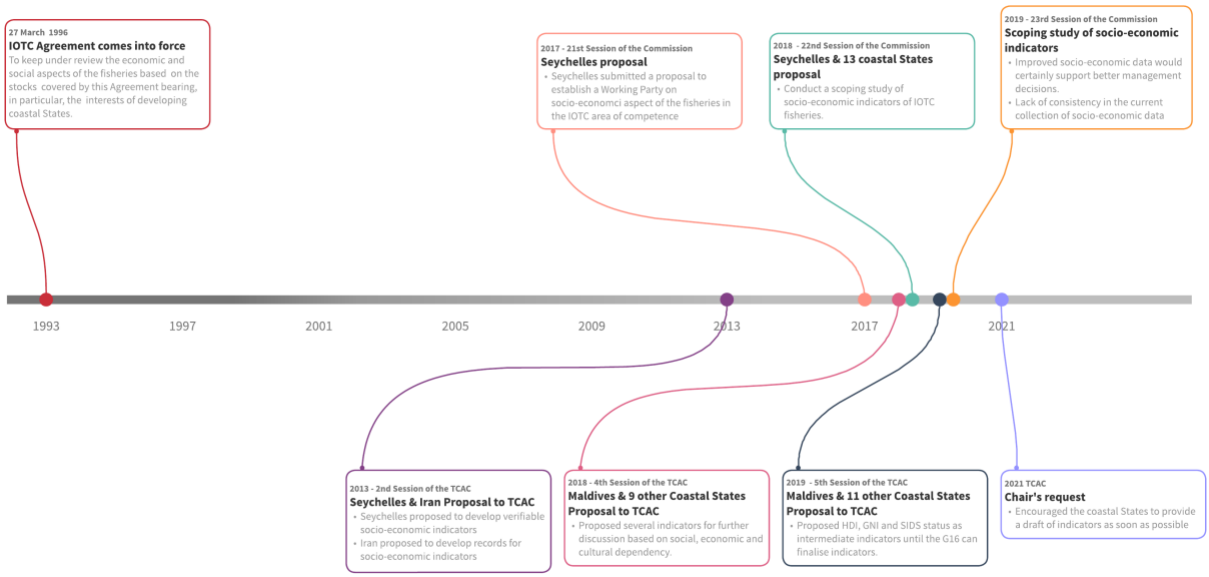

Figure 2. Milestones in the IOTC allocation process, including around socio-economic dependency, up to 2021.

Also in 2018, Seychelles with 13 other coastal States submitted a proposal for a scoping study of socio-economic indicators of IOTC fisheries to the 21st session of the Commission, which the Commission adopted. In 2019, the consultants presented a report on the scoping study of socio-economic data and indicators to the 23rd Session of the Commission. The report noted that improved socio-economic data would certainly support better management decisions. However, it was also noted that the current collection of both economic and social data by CPCs is patchy and lacks consistency. The consultants recommended at least a basic set of prioritised data would be a good starting point.

However, the report noted that CPCs consulted as part of the scoping study were not unanimously in favour of expanding data collections.

In 2019, Maldives with 11 coastal States submitted a proposal to the 5th Session of the TCAC which includes, three broad criteria in the absence of socio-economic indicators: Coastal State CPCs, Developing Coastal State CPCs (HDI GNI, SIDS); and EEZ proportion. The proponents noted that they will report back once there is progress on the indicators.

With the appointment of a new independent chair in 2020, the Chair had asked the G16 to report back on the progress of the development of the indicators. In 2021's Chair's summary of the proceedings, she states

"In terms of the coastal State allocation criteria, the Chair acknowledged the desire on the part of a number of coastal States to develop alternative indicators for the developing status of coastal States to those currently provided in Annex 3, and encouraged coastal States to share a draft of these as soon as possible for all delegations to consider during the next session of the TCAC".

It is in response to this desire that the current document has been prepared. Notably, IOTC is only marginally 'behind' other RFMOs in its implementation of an allocation approach. IOTC is still working on defining principles, and thus is still a ways from implementation and evaluation, but all RFMOs are struggling.

In 2024, the IOTC Secretariat presented allocation simulations based on three main components: baseline allocation, Coastal State allocation and catch-based allocation. In focusing on the Coastal State allocation, it considered three sub-components: equal share (35-45% of this component), socioeconomics (47.5-55%) based on HDI, GNI and/or SIDS designation, and national jurisdiction area (0-17.5%). Similarly, the newly appointed independent chair presented a framework revolving around three primary categories: baseline allocation, catch history or biomass, and special requirements or development quota. To feed into the special requirements component, the TCAC is looking towards the WPSE for advice on indicators that could feed into the allocation regime, proposed to be adopted in 2027.

Rationale for socio-economic indicators in allocation criteria

What is being discussed in this report is allocation in relation to the socio-economic benefits that arise from the fishery. But an equally relevant conversation here, is allocation in relation to the burden that arises from fisheries management decisions. It is this language of conservation burden that has found its way into the mainstream in negotiations in the WCPFC. In the case of something like yellowfin tuna in the IOTC, conservation and management measures put in place to help rebuild or protect the stock are likely to mean

conservation burdens must be borne by different nations. These can also be thought of as allocation, that is, putting a management measure in place means that costs will have to be taken on, and those costs will be allocated to different nations depending on the nature of the management measure.

Costs or burdens in this sense can be direct, for example, a reduction in access or licensing fees, or monitoring and enforcement expenses. They can also be more indirect and broader, for example, forgone employment and forgone food security options. The common thread between allocating benefits and allocating burdens, is the idea of fairness and equity. But this presents another challenge, and that is the fact that equitable allocation is itself contextual and controversial. Here the principle of 'common but differentiated responsibility' becomes important. This principle recognizes that while nation states need to share responsibility for conservation, states are not necessarily similarly capable of contributing to conservation[12]. So what this ultimately means is that conservation and management by RFMOs will allocate benefits through fishing opportunities and burdens through management measures, and that these benefits and burdens need not be equally allocated across states.

But what needs to be taken into account in relation to the distribution of burdens and benefits? We turn to UNFSA Article 24 to understand the language used in common but differentiated responsibilities in relation to developing Coastal States. Article 24(2) of UNFSA[3] states that "in giving effect to the duty to cooperate in establishment of conservation and management measures for straddling fish stocks and highly migratory fish stocks, States shall take into account the special requirements of developing States, in particular (Figure 3):

a) the vulnerability of developing States which are dependent on the exploitation of living marine resources, including for meeting the nutritional requirements of their populations or parts thereof;
b) the need to avoid adverse impacts on, and ensure access to fisheries by, subsistence, small-scale and artisanal fishers and women fishworkers, as well as indigenous people in developing States, particularly small island developing States; and
c) the need to ensure that such measures do not result in transferring, directly or indirectly, a disproportionate burden of conservation action onto developing States."

Developing Coastal States took the above rationale in numerous meetings to discuss the development of indicators associated to each of these sub-articles. Attaching indicators to UNFSA language could create enabling conditions for incorporating dependency and vulnerability into allocations.

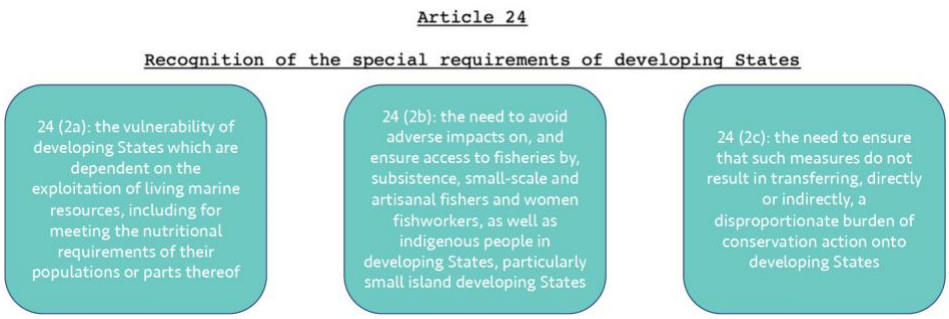

Figure 3. UNFSA Article 24 (2).

Incorporating SEDV Indicators

Different countries have different interests, and see their dependence manifest itself in different ways. Indicators are a way of trying to measure things, making them more objective and comparable in a relative way, even if the interests themselves differ. In the context of allocations, we can think about indicators around socio-economic dependency and vulnerability as things that could support equitable distribution of benefits and burdens.

When we talk about benefits and burdens (dependency) for fishing countries, communities, households, etc., what are we talking about? What does it mean to be dependent, to be vulnerable? How do we measure that dependence? In this section, potential indicators will be reviewed.

Notably there is a spectrum of dependency and vulnerability that is representative of the variation and diversity across Coastal States (Figure 4). This approach recognizes that there are States that are neither vulnerable nor dependent, those that are only vulnerable (not dependent), only dependent (not vulnerable) and both dependent and vulnerable. One position, in theory, might be that these latter States should be those receiving the most allocation for the SEDV criteria from the equity standpoint.

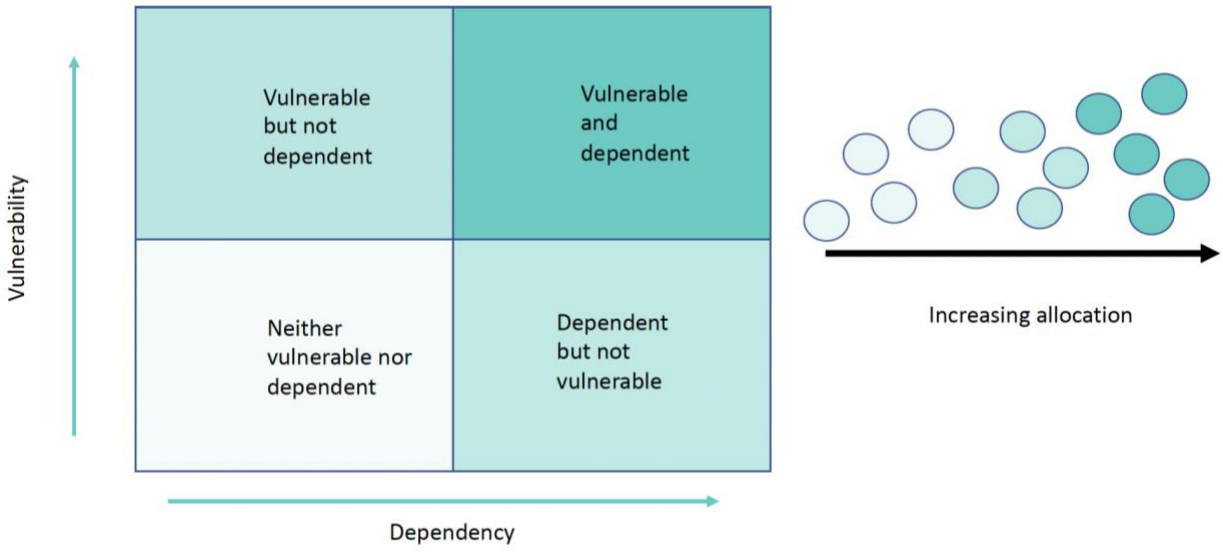

Figure 4. Relative socio-economic dependency and vulnerability across Developing Coastal States.

Here we return to the three components of Article 24(2) in UNFSA, and discuss indicators that Coastal States discussed as options to account for these sub-articles.

Article 24(2a): Vulnerability

Vulnerability can be thought of as referring to the potential for harm, and is relative. Where that potential is large, a country might be thought to be more vulnerable than another country. In their development of a vulnerability index for SIDS, a UN expert group agreed that vulnerability should reflect 'relative economic and ecological susceptibility to exogenous shocks." They also agreed that vulnerability indicators should be "easy to comprehend and intuitively meaningful, and suitable for inter-country comparisons or reflecting relative vulnerability of SIDS and non-SIDS."[13]. The sub-article goes on to specify that dependency on the resource is an important pre-determinate of vulnerability, with a specific mention to nutritional needs (something we may more broadly refer to as food security).

From UNFSA: ***the vulnerability of developing States which are dependent on the exploitation of living marine resources, including for meeting the nutritional requirements of their populations or parts thereof;***

Suggested indicators to include:

- **Contribution of fish to food security |** According to the FAO, food security refers to having adequate access to safe and nutritious food that meets the dietary needs and food preferences of a given population. There is another less oft referred to component of the food security debate, which is about food sovereignty. Food

sovereignty is the right of peoples to culturally appropriate foods that are ecologically sound, and their right to define their own food systems. If food is to be a component of allocation, as has been argued for[24], then sovereignty and security both will be important concepts to put forward, as will more granular indicators around nutrition and micronutrient availability. For many SIDS, consumption of fish remains vital for food security and sovereignty, and the costs of replacing fish protein with alternatives are untenable. Additionally, some alternative forms of protein production (such as cattle farming), may have disproportionately high environmental costs, when compared to fishing. **Indicator to be used here: Per capita fish consumption (available through FAO).**

- **Commonwealth vulnerability index |** The Commonwealth defines the vulnerability of a country as "the risk of being affected by exogenous shocks of various form, origin and intensity, the effect of which is contingent on a country's specific characteristics and features, including its ability to respond to shocks as reflected in its level of resilience" [14] (p vii). **It is suggested that the Commonwealth Universal Vulnerability Index be used here. It is available for all developing coastal States in the IOTC.** This combination of vulnerability and resilience is used to reflect a country's relative ranking according to the following:

Classification of Vulnerability in the UVI

UVI > 1.5:	Vulnerability significantly greater than resilience:	Extremely Vulnerable
1.5 < UVI > 1:	Vulnerability somewhat less than resilience:	Highly Vulnerable
1 < UVI > 0.5:	Vulnerability partially matched by resilience:	Vulnerable
UVI < 0.5:	Resilience significantly exceeds vulnerability:	Resilient

Article 24(2b): Small-scale, artisanal, and Indigenous fishworkers

There is often a dichotomy made between small-scale and large scale fisheries[15]. Small-scale fisheries are often 'inefficient', meaning more labour is required to catch the same amount of fish. However, this inefficiency is often socially positive, when contribution of a fishery to employment, for example, is considered.

The current FAO definition for small-scale fisheries is inadequate to deal with the complexity of the sector today. Many small-scale fisheries supply to export markets, for example, despite their gear being classified as small-scale. Each country has its own way of defining the scale of operations, and most, if not all, likely license operations differently based on scale. A major barrier to operationalizing 24(2b) however, remains that small-scale and artisan tuna operations often remain data-poor.

From UNFSA: ***the need to avoid adverse impacts on, and ensure access to fisheries by, subsistence, small-scale and artisanal fishers and women fishworkers, as well as indigenous people in developing States, particularly small island developing States;***

With the added emphasis here of SIDS requiring special attention, this particular criterion (SIDS country or not) will need to be taken into account here for equity concerns.

- **The indicator that is suggested here is the proportion of the country's fleet that is made up of small-scale and artisanal vessels (under 24 m long).** Some countries have this data, others may need support from FAO to provide estimates.

Because small-scale fisheries are often underreported, it may be important to rely on catch reconstruction methods, like through the Sea Around Us, or other alternative metrics for estimating their contribution (FAO's Hidden Harvest program). For countries who know that the small-scale sector is important, but do not currently have strong data collection and reporting protocols in place, this could be an important area to invest in the near future.

The particular reference to SIDS in 24 2(b) need not be forgotten, and **it was agreed that including this as a simple yes or no would suffice for capturing one aspect of special considerations of SIDS.**

Article 24(2c): Avoiding disproportionate burden

Disproportionate burden continues to be an important but undefined concept in RFMO governance. An attempt to develop and provide a framework for calculating it was undertaken in Hawaii in 2014, led by the Western Pacific Regional Fishery Management Council. At this meeting, a formal way of defining disproportionate burden was developed [16] . The biggest challenge here is that disproportionate is relative to something, namely a proportionate burden. This is equally relevant for the issue of socio-economic dependency and likely something that should be seen in relative terms.

From UNFSA: ***the need to ensure that such measures do not result in transferring, directly or indirectly, a disproportionate burden of conservation action onto developing States***

The issues that came up in the Hawaii workshop that are pertinent here, are that to determine proportionality (and in this case, dependency), several things must be considered. These are listed below and the word "dependency" has been inserted here for relevance to the current issue, whereas in the original document, this would have been referring to disproportionate burden.

- Whose costs and benefits count? While we may calculate economic dependency for all members using costs and benefits, is there a sub-section of members for whom dependency is deemed more important? (*Note: Based on UNFSA, developing States and SIDS are deemed more important);*
- Who has the responsibility to demonstrate dependency?
- What is the baseline (this is a similar issue to window for historical catch)? (*Note: this is important from the perspective of aspirations, which has been used in other RFMOs as part of equity considerations in allocation conversations*);
- What and how do we measure for dependency?

Two indicators related to disproportionate burden that could be included in allocation criteria now are:

- **Fisheries contribution to GDP |** On average, fisheries contribute between 0.5-2.5% to national GDPs, meaning they appear to be only a minor economic sector[31]. However, this is not the case for all countries, and for those countries for whom fisheries constitute a disproportionately large amount to national GDP, an argument for dependency and vulnerability to shocks may be possible. It is also important to note, however, that solely relying on GDP as an indicator of dependency is largely inappropriate. Firstly, contribution to GDP largely ignores the economic contribution of the post-harvest sector and the importance of exports. Secondly, a national level indicator such as GDP may not adequately account for more regional or local dependencies. Countries may need support from other agencies to support reporting of this.

- **Fisheries exports as a proportion of total exports |** Available through the UN Comtrade database for most countries, the contribution of fisheries exports to total exports is suggested as an indicator to address potential for disproportionate burden. Inclusion of this criterion also works towards accounting for the economic benefits of the value chain, however, it shares a similar gap to GDP-based indicators that cannot account for regional or local dependencies.

Conclusion

Socio-economic dependency and vulnerability need not mean the same thing in each country, but indicators can be a way to get at the relative nature of dependency and vulnerability across IOTC developing States. In this paper we have reviewed the rationale for including dependency and vulnerability in allocation conversations, and outlined for the WPSE a small suite of indicators that were identified as 'of interest' to a subset of developing Coastal States through a series of meetings over the past nine years.

It is clear from the directions that many tuna RFMOs are taking (ICCAT, WCPFC, and the IOTC itself), that allocation remains an important and contentious issue. The SEDV of member States has been recognized in Convention texts and meeting documents, but formalization of its inclusion in allocation formulae remains to be seen. In this way, IOTC could take a leading role in forwarding a transparent and replicable process moving forward, by developing the methodology and application of socio-economic dependency and vulnerability in allocation approaches. In moving forward, IOTC members could define socio-economic dependency and vulnerability, agree on a list of measurable variables to include in its calculation, and decide how to use this information to more equitably allocate fishing opportunities in the IOTC convention area.

[1] *Lodge, M. et al. 2007. Recommended Best Practices for Regional Fisheries Management Organizations.*

[2] *Hardin, G. 1968. The Tragedy of the Commons. Science (80-.).* ***162,*** *1243–1248; Bailey, M., Sumaila, U. & Lindroos, M. 2010. Application of game theory to fisheries over three decades. Fish. Res.* ***102,*** *1–8.*

[3] *UN. 1995. Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling .*

[4] *Grafton, R. Q., Hannesson, R., Shallard, B., Sykes, D. R. & Terry, J. 2010 in Conservation and Management of Transnational Tuna Fisheries 155–162. doi:10.1002/9780813820262.ch9*

[5] *Davis, R. A. et al. 2022. Who Gets the Catch? How Conventional Catch Attribution Frameworks Undermine Equity in Transboundary Fisheries. Front. Mar. Sci.* ***9****, 263.*

[6] *Hanich, Q. & Ota, Y. 2013. Moving beyond rights-based management : a transparent approach to distributing the conservation burden and benefit in tuna fisheries. Int. J. Mar. Coast. Law* ***28,*** *135–170; Hanich, Q. 2012. Distributing the bigeye conservation burden in the western and central pacific fisheries. Mar. Policy* ***36,*** *327–332.*

[7] *Bailey, M., Ishimura, G., Paisley, R. & Sumaila, U. 2013. Moving beyond catch in allocation approaches for internationally shared fishstocks. Mar. Policy* ***40,*** *124–136.*

[8] *Seto, K., Galland, G.R., McDonald, A. et al. 2021. Resource allocation in transboundary tuna fisheries: A global analysis. Ambio* ***50****, 242–259. https://doi.org/10.1007/s13280-020-01371-3*

[9] *ICCAT. 2015. Draft Resolution by ICCAT on Criteria for the Allocation of Fishing Possibilities.*

[10] *Parris, H. & Lee, A. 2009. in Navigating Pacific Fisheries: Legal and Policy Trends in the Implmentation of International Fisheris Instruments in the Western and Central Pacific Region (eds. Hanich & Tsamenyi) 250–283 (ANCORS University of Wollongong); Hanich, Q., Campbell, B., Bailey, M. & Molenaar, E. 2015. Research into fisheries equity and fairness—addressing conservation burden concerns in transboundary fisheries. Mar. Policy* ***51,*** *302–304.*

[11] *IOTC Secretariat. On allocation of fishing opportunities for IOTC species (from 9 coastal States) | IOTC. https://iotc.org/documents/allocation-fishing-opportunities-iotc-species-9-coastal-states.; IOTC Secretariat. Proposal H Rev1 - on socio-economic indicators - Seychelles et al | IOTC. https://iotc.org/documents/proposal-h-rev1-socio-economic-indicators-seychelles-et-al.; Poseidon. Scoping study of socio-economic data and indicators of IOTC fisheries | IOTC. https://iotc.org/documents/scoping-study-socio-economic-data-and-indicators-iotc-fisheries; Maldives et al. On the allocation of fishing opportunities for IOTC species | IOTC. https://iotc.org/documents/TCAC/05/PropA_E.; IOTC Secretariat. Report of the 9th Technical Committee on Allocation Criteria | IOTC. https://iotc.org/documents/report-9th-technical-committee-allocation-criteria.*

[12] *Sinan, H., Bailey, M., Hanich, Q. & Azmi, K. 2022. Common but differentiated rights and responsibilities in tuna fisheries management. Fish Fish.* ***23****, 202–212.*

[13] *UN Secretary General. 1998. Development of a vulnerability Index for SIDS. http://islands.unep.ch/d98-vul.htm#III. Conclusions and recommendations.*

[14] *Commonwealth. 2021 The Commonwealth Universal Vulnerability Index. 80.*

[15] *Jacquet, J. & Pauly, D. 2020. Funding priorities: Big barriers to small-scale fisheries. Conservation Biology vol. 22 832–835 (2008).; Willis, C. & Bailey, M. Tuna trade-offs: Balancing profit and social benefits in one of the world's largest fisheries. Fish Fish.* ***21****, 740–759.*

[16] *West Pacific Fisheries Management Council. 2014. Addressing Disproportionate Burden: A framework for implementation. Summary Report of a Workshop Convened in Honolulu, Hawaii, September 18-20, 2014.*