

Abstract

In 2015, the international community adopted the United Nations Sustainable Development Goals (SDGs), a goal-setting governance strategy that aims to achieve sustainable development across social, economic, and ecological areas. SDG 14 (“life below water”) is directed to the sustainable use and conservation of the oceans and marine resources. Regional fisheries management organizations (RFMOs) are key institutions in managing international fisheries and thus have the potential to play a significant role in realizing the attainment of SDG 14. This paper aims to assess how RFMOs could contribute to SDG 14 by examining their treaty texts and implementation of conservation and management measures, or collaborative networks. The results of this paper highlighted the contribution of RFMOs to targets such as ending overfishing and indicated the need for further attention towards area protection. The findings of the network assessment showed that RFMOs mainly cooperate with other RFMOs or fisheries-related organizations, indicating a lack of cooperation with other maritime organizations. Moreover, the objective of most of these collaborations is sharing of information or data, while actions against problems such as the bycatch of non-target species are missing. Thus, this paper highlights how existing regional organisations have the potential to increase their contribution to SDG 14, by aligning more of their work to this goal. To support this process, we developed a list of considerations and actions.

Keywords: fisheries management, high seas, ocean governance, regional organizations, United Nations

1. Introduction

In 2015, all member states of the United Nations adopted the United Nations Sustainable Development Goals (SDGs), a list of 17 goals, supported by 169 targets, aimed at global sustainable development across various social, economic, and ecological issues. Through the SDGs, the international community applies a goal-setting approach, which is a different governance strategy to the otherwise common rule-making approach (Young 2017). Contrary to rule-making, goal-setting aims to voluntarily change the behaviour of actors (e.g. countries) and to measure the progress of these actors by using indicators (Biermann and Kanie 2017; Young 2017). An effective goal setting approach relies on an overarching goal with a small number of sub-goals, which should be hierarchically structured, as well as clearly identifying parties that are willing to cooperate to achieve these goals (Underdal and Kim 2017; Young 2017). Even though the SDGs lack most of the features for good goal-setting, such as a small number of goals or a clear hierarchical structure between the goals (Underdal & Kim, 2017), they offer the opportunity to raise awareness among the global community of the importance of sustainable development across social, economic, and ecological issues (Young 2017).

The SDGs built upon the Millennium Development Goals (MDGs), however, they are distinctly different. While the MDGs, which were established in the early 2000s, only applied to developing countries, the SDGs have universal application, applying to countries at all stages of development (Sachs 2012). The MDGs were the result of a political negotiation (Young 2017), whereas the establishment of the SDGs incorporated a much broader approach, which was influenced *inter alia* by social movements (Gupta and Nilsson 2017). Another important difference is the greater focus on environmental issues. While the MDGs had only one goal (goal 7) which focused on the environment, the SDGs have three goals (SDG 13 – climate actions; SDG 14 – life below water; and SDG 15 – life on land).

Notably, for the oceans, SDG 14 is titled “life below water” and is specifically directed to the marine environment. It acknowledges the importance of the oceans for human livelihoods and seeks to promote conservation and sustainable development of oceans, seas, and marine resources. Seven main targets and three sub-targets support SDG 14 and specifically address issues such as marine pollution,

sustainable management of fisheries, and conservation. Marine resources are important for the livelihoods and food security of millions of people around the world. For example, in 2018, the global fishing and aquaculture industry employed around 59.5 million people (FAO 2020) and contributed around US\$300 billion to the global economy in the year 2006 (Sumaila et al. 2016). As the world's oceans are a vital supplier of ecosystem services for human social and economic wellbeing and are intimately connected with terrestrial and atmospheric systems, they have been identified as playing a key role in achieving other SDGs (Singh et al. 2017).

To achieve the SDGs it is important that existing institutions support actions targeted towards the goals which fall within their mandate (Bernstein 2017). Regional fisheries management organizations (RFMOs) are key institutions for managing marine resources in the high seas and have mandates to pursue sustainable management of marine living resources and the environment. These organizations have the ability to play an important role in supporting SDG 14, not least because they also influence the management of fisheries of member states in waters under their national jurisdiction; and are key sources for gathering scientific data concerning fisheries management (FAO 2018).

Countries who fish in high seas areas are required under the 1982 United Nations Law of the Sea and the 1995 United Nations Fish Stocks Agreement to become members of these organizations or to cooperate directly with each other (United Nations 1982, 1995). RFMOs have the ability to enforce legally binding measures on their members (FAO 2019b). Contemporary RFMOs not only manage fish but also increasingly address wider marine ecosystem protection from fishing activities (Scanlon 2018), even though the mandate of RFMOs is limited to their target species, leaving around 95% of fish species without management (Ortuño Crespo et al. 2019). RFMOs could be useful in facilitating the implementation of the SDGs, as ecosystem considerations are an important aspect of the targets of SDG 14, and providing a framework for fishing industry engagement with the SDGs. However, it is important to note that some of their measures are weak and ineffective (Juan-Jordá et al. 2017) and the impact of fishing on non-target species is high (Gilman et al. 2014). Thus, to effectively support the attainment of the SDGs, RFMOs need to strengthen their measures (Haas et al. 2020) and increase cooperation with each other and also with other institutions in coordinating such work (Bernstein 2017). Improving

cooperation among different institutions that manage different ocean activities will strengthen ocean governance and minimise existing governance and regulatory gaps (Gjerde et al. 2016).

The aim of this paper is to examine how RFMOs could contribute to SDG 14 by assessing the existing work of RFMOs and their potential contribution to achieving the main targets of SDG 14. Little work has been done so far to assess how existing fisheries management organizations, such as the RFMOs, might engage with the implementation of the SDGs. To assist in filling this knowledge gap, we use document analysis to explore relevant RFMO treaty texts and conservation and management measures and determine their alignment with the different targets of the SDGs. Moreover, since cooperation is an important aspect of the achievement of the SDGs (Goal 17), we examined the RFMOs’ cooperation with other organizations and assessed the Memorandums of Understanding (MoU) these organizations have in place. MoUs are a key way RFMOs cooperate with different institutions and organizations (Rochette et al. 2015). There is a lack of work exploring how RFMOs can contribute to the SDGs. This paper contributes to the literature on the connections between the SDGs and regional organizations but might also help RFMOs to proactively shape their contribution to SDG 14, and thus to a sustainable ocean.

2. Methods

We selected 13 RFMOs that manage areas of the ocean beyond national jurisdiction and have an active commission in place (Pentz et al. 2018) (Tab.1). These two characteristics are important in selecting RFMO case studies because the aim was to study fisheries management at the high seas and to examine RFMOs which have the ability to enforce binding measures, thus need to have an active commission in place.

Tab. 1 Selected RFMOs

Acronym	Full name
CCAMLR*	Commission for the Conservation of Antarctic Marine Living Resources
GFCM	General Fisheries Commission of the Mediterranean
NAFO	Northwest Atlantic Fisheries Organization
NEAFC	Northeast Atlantic Fisheries Commission
NPFC	North Pacific Fisheries Commission
SEAFO	Southeast Atlantic Fisheries Organization
SIOFA	Southern Indian Ocean Fisheries Agreement
SPRFMO	South Pacific Regional Fisheries Management Organization

CCSBT	Commission for the Conservation of Southern Bluefin Tuna
IATTC	Inter-American Tropical Tuna Commission
ICCAT	International Commission for the Conservation of Atlantic Tuna
IOTC	Indian Ocean Tuna Commission
WCPFC	Western and Central Pacific Fisheries Commission

* CCAMLR has a broader mandate than the other organizations and is rather a conservation organization with fisheries responsibilities than an RFMO (Constable et al. 2000).

To assess the extent to which these 13 RFMOs are already engaging with the SDGs, we closely examined the meeting reports of their commission bodies and the scientific committees from 2014 onwards (i.e. the year before the SDGs were agreed). Through these records, we also identified key areas for RFMOs' contributions to the main targets of SDG 14 and established criteria which are linked to the specific targets of SDG 14. These criteria targeted conservation and management measures that would provide valuable contributions to meeting the respective target, Table 2 provides the criteria for target 14.4 as an example. We analysed the academic literature and websites of the RFMOs for relevant information on the assessment criteria (see Appendix 1). Following the framework by Cullis-Suzuki and Pauly (2010) and Pentz et al. (2018), each criterion could be answered with a 'yes' or 'no' response, which is discrete and not overlapping. To assess how much work organizations have already carried out towards implementing the different targets, we calculated the overall percentages for each target and RFMO.

Tab. 2 Assessment criteria for target 14.4

14.4 By 2020, effectively regulate harvesting, and end overfishing, illegal, unreported and unregulated (IUU) fishing and destructive fishing practices implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics.	Yes	No
Mentioned in the convention and/or is a resolution in place about IUU fishing?		
Do they have an IUU vessel list?		
Do they have vessels on their IUU vessel list?		
Do they have links to the IUU lists of other RFMOs?		
Do they have port state measures in place?		
Do they have trade measures?		
Do they have measures on a catch documentation scheme or a video monitoring system?		
Do they have a resolution on transshipment (Ewell et al. 2017)?		

However, the RFMOs' ability to deal with the targets varied and therefore, the number of criteria was different for each target. For example, while there were only four potential criteria with target 14.1 (i.e. marine pollution), target 14.4 (i.e. sustainable fisheries, see Table 2) had eight. To provide a clearer picture regarding the measures RFMOs have in place, we divided target 14.2 (i.e. sustainable

management) into criteria which are related to the precautionary approach for fisheries management and the ecosystem approach for fisheries management. Another change was made concerning target 14.7, which relates to small island developing states and least developed countries. To make it more applicable for all RFMOs we assessed their measures regarding developing countries in general. We also excluded target 14.3 (i.e. ocean acidification) and 14.6 (i.e. subsidies), since RFMOs do not have any measures in place which relate to these two targets. Ocean acidification is directly linked to climate change and to address these impacts it is important to have robust management in place that is able to respond to these uncertainties (Pentz and Klenk 2017; William W. L. Cheung et al. 2017; W. W. L. Cheung 2018). Management considerations are addressed by target 14.2 (i.e. sustainable management) and 14.4 (i.e. sustainable fisheries). In the context of subsidies, it is important to note that this topic has been addressed by the World Trade Organization (WTO). Moreover, subsidies are a national matter and thus are difficult to address in a regional setting.

To assess the extent to which RFMOs cooperate we assessed how many Memorandums of Understanding (MoUs) were signed between RFMOs and other organizations. We also analysed the objectives of these MoU to understand the areas of cooperation. The MoU partners were divided into ‘conservation’, ‘intergovernmental’, ‘science’, ‘NGO’, and ‘others’. ‘Others’ included groups which did not fit the description of the other groups, such as regional fisheries bodies. This information was gained from RFMO websites.

3. Results

From the analysis of the meeting records, of the 13 RFMOs examined, only seven mentioned the SDGs in either the commission meeting reports or the reports from the scientific committee (CCAMLR, GFCM, IOTC, NAFO, NEAFC, SIOFA, and WCPFC). This shows a distinct lack of engagement for RFMOs to specifically pursue the SDGs. However, the work RFMOs are already doing and the measures these organizations have in place can be matched to the targets of SDG14 (see Appendix 2 for an overall summary). Most of the measures in place related to issues relevant to target 14.4, sustainable fisheries (70.2%), followed by target 14.2 - ecosystem approach, and 14.7, developing

countries (64.7 % and 61.5 % respectively). The target assessed as having the lowest value was 14.5, area protection (35.7 %) (see figure Fig.1).

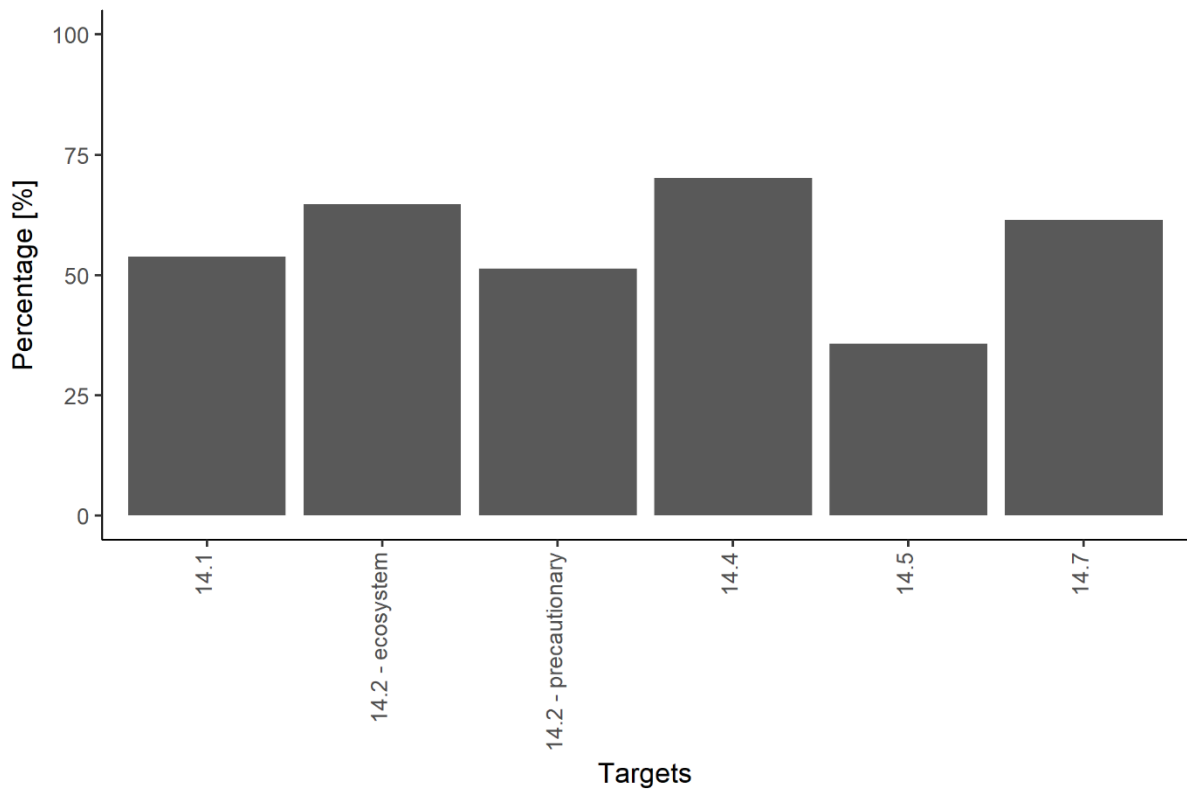


Fig 1 Percentage of measures in place for each of the targets over all RFMOs. Target 14.2 is divided into precautionary approach and ecosystem approach

There are also differences in place among the RFMOs. While general RFMOs (i.e. RFMOs which manage non-straddling and migratory species) and tuna RFMOs (i.e. RFMOs which manage tuna and tuna-like species) have on average almost the same amount of measures for target 14.1, marine pollution, 14.2 precautionary approach, and 14.7, developing countries, there were greater differences to observe for the three remaining targets (Fig.2). The greatest difference between tuna and general RFMOs was for target 14.5 (i.e. marine protected areas). While general RFMOs had on average 46.43% measures in place, the tuna RFMOs had only 11.43% (Fig.2). For target 14.2, ecosystem, the tuna RFMOs had more measures in place than the general RFMOs, 77.78% and 55.56% respectively.

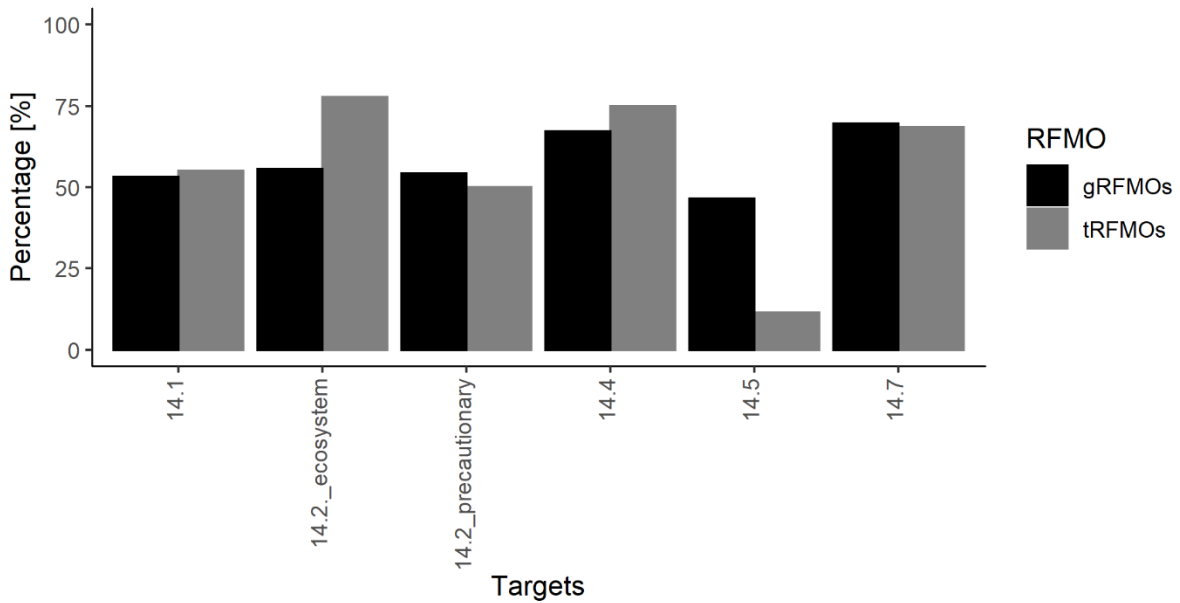


Fig. 2 Average percentage of measures in place for the targets, divided into general RFMOs (gRFMOs) and tuna RFMOs (tRFMOs)

Of the 41 criteria, only two criteria were represented across all RFMOs, namely, ‘Are the RFMOs applying an ecosystem approach?’ and ‘Do they have an IUU vessel list?’ (see A2). The lowest number of fulfilled criteria over all the RFMOs were found for target 14.5, for which only two criteria were addressed by the tuna RFMOs. These two criteria dealt with general habitat closures and habitat protection measures. Besides target 14.5, the tuna RFMOs did not officially acknowledge climate change, while none of the general RFMOs had trade measures established.

Most of the MoUs which were in place were between multiple RFMOs or other fisheries-related organizations, such as scientific institutions which provide data and knowledge to these organizations or conservation organizations which focus on species which are impacted by fisheries, for example, seabirds or turtles. The organization which had the most agreements was WCPFC, followed by CCAMLR, with 10 and 6 MoUs respectively (Fig. 3). On the contrary, the organizations with the fewest MoUs in place were NAFO and ICCAT (1 each). More than half (8) of the RFMOs had signed an MoU with the Agreement for the Conservation of Albatrosses and Petrels (ACAP) and the only RFMOs which did not have an MoU in place with ACAP were RFMOs located in the north (NAFO, NEAFC, NPFC) and ICCAT. The three RFMOs in the north and GFCM were also the only RFMOs which had

no contract for cooperation with other RFMOs. Moreover, GFCM was the only organization which had MoUs with NGOs (namely OceanCare and WWF) (Fig.3). The tuna RFMOs had on average slightly more MoUs than the general RFMOs (3.25 and 4.8 respectively, see Appendix 4).

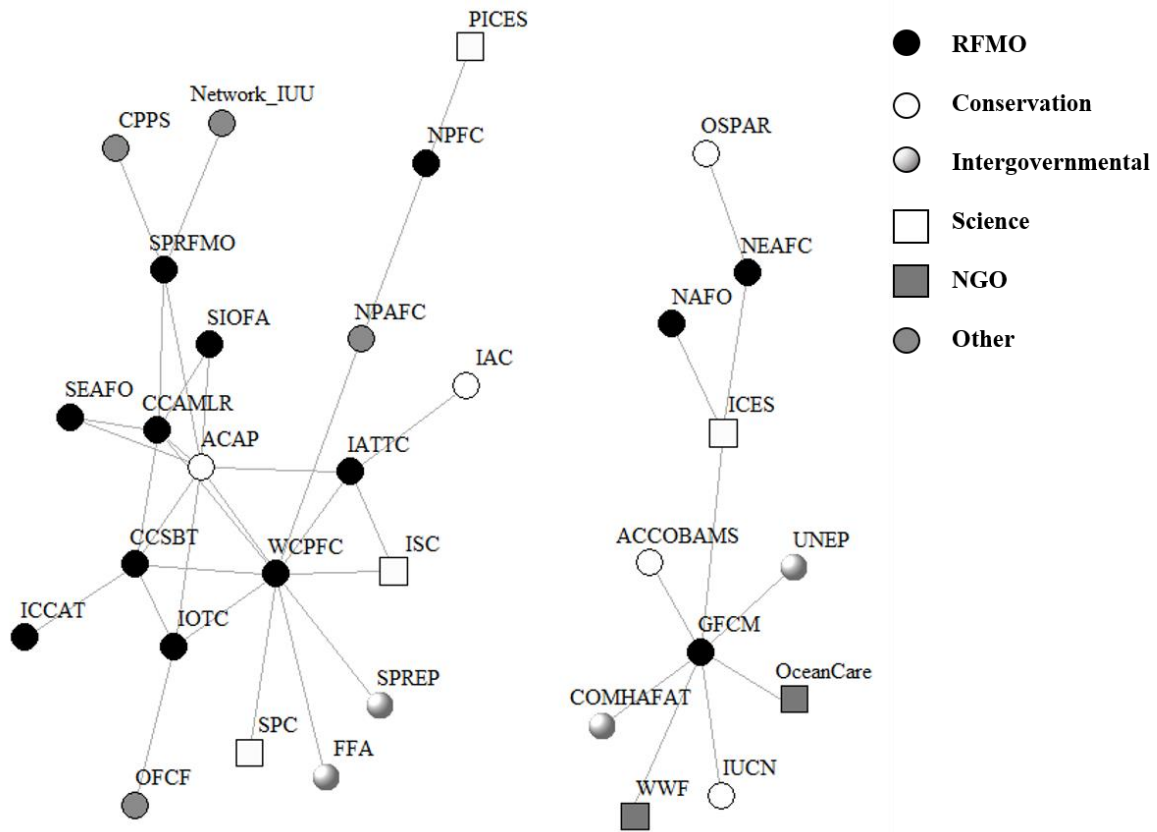


Fig. 3 Network of organizations which have signed a Memorandum of Understanding (see Appendix 4 for acronyms)

We also analysed the objectives of these MoU's and seven themes have been identified. The theme which appeared most was *sharing activities* (26) including, for example, the exchange of information, data, expertise or technique. Following this was the theme *educational activities* (15) describing activities such as the implementation of education and awareness programmes which was one objective in MoUs among RFMOs but also between RFMOs and conservation programmes. The theme *research activities* (12) included areas such as collaboration on research efforts, but also includes MoUs with institutions which act as science providers for RFMOs. Science providers such as the International Council for the Exploration of the Sea, provide RFMOs, for example, NEAFC, with stock assessment or other scientific information if requested. The theme *bycatch mitigation activities* (9) grouped

objectives which were mostly used in MoUs between RFMOs and conservation organizations such as the Agreement on the Conservation of Albatrosses and Petrels (ACAP) or the Inter-American Sea Turtle Convention (IAC). The three remaining themes, *harmonizing conservation and management measures*, *theme specific*, and *management improvement activities*, were less frequently used (six, five and four times, respectively). The theme *harmonizing conservation and management measures* was often applied for MoU among two RFMOs, while the theme *theme-specific* including MoUs which were established for a certain purpose, for example, the fight against IUU fishing (i.e. GFCM and the Ministerial Conference on Fisheries Cooperation among African States bordering the Atlantic Ocean (COMHAFAT)) or transshipment at sea (e.g. MoU between CCSBT and ICCAT). The last theme, *management improvement activities*, described aspects directly related to fisheries management, for example, the establishment of management plans based on the ecosystem approach (e.g. between GFCM and the World Wildlife Fund (WWF)).

4. Discussion

Achieving the SDGs will be an enormous challenge and relies on the political will of the actors and the cooperation and coordination of existing institutions which have the mandate to address certain goals and their targets (Bernstein 2017). RFMOs are key management institutions for fisheries management at the high seas, thus, are important to support the achievement of several targets of SDG 14. Despite this important role, RFMOs have not yet acknowledged their responsibility to support SDG14. Acknowledging this role could, for example, help to provide data for the different targets of SDG 14. This study aimed to analyse the potential contribution of RFMOs to the targets of SDG 14. It is important to note that it is not the intent of this study to assess the effectiveness of the conservation and management measures.

The above results showed that RFMOs have measures in place which might assist in meeting the different targets. Most of the measures have been linked to target 14.4, sustainable fisheries. Using fisheries resources in a sustainable way is stated as part of the objectives in the convention of many RFMOs. One part of target 14.4 aims to end overfishing and illegal, unreported and unregulated (IUU) fishing. Ending IUU fishing is on the agenda of all RFMOs and all RFMOs have established an IUU

vessel list which is mostly linked to lists of other RFMOs and is publicly accessible. Constraining IUU fishing is imperative for a sustainably managed ocean since it can have major impacts on the whole marine ecosystem and also weakens management measures and compliance (Lindley and Techera 2017; Ortuño Crespo and Dunn 2017) and this contribution depends fundamentally on cooperation between and among the RFMOs. Another important aspect of IUU fishing is transshipment, which allows vessels to bypass monitoring and control enforcement since they do not have to go back to port for resupply (Ewell et al. 2017). Except for three organizations (i.e. NAFO, NEAFC, SIOFA), all RFMOs have implemented a measure on transshipment. These measures require members to have, for example, an observer to monitor the transshipment activity (SPRFMO 2018) or to trans-ship only in ports with an exception for large scale tuna vessels (IOTC 2019).

The RFMOs also had a high number of measures in place which addressed the ecosystem approach for fisheries management (14.2 – ecosystem). Target 14.2 – ecosystem, deals with the impact of fishing on the marine environment and especially with bycatch of species such as seabirds and sharks. New environmental issues are constantly emerging and many RFMOs have either updated their conventions, adopted new measures or have updated old measures (FAO 2018). For example, the two oldest RFMOs, IATTC and GFCM, established in 1949 and 1952 respectively, updated and modernized their conventions to implement new issues such as the precautionary or ecosystem approach, which are key aspects for a sustainable fisheries management (de Bruyn et al. 2013; FAO 2019a). The organizations which had measures in place for most criteria were CCAMLR and WCPFC. Generally, CCAMLR is said to be one of the model organizations in the area of the precautionary and ecosystem approach (Hanchet et al. 2015). However other organizations have also made progress concerning the implementation of the precautionary approach (Miller and Slicer 2014).

The target with the lowest contribution was 14.5, area protection. While almost all RFMOs (10 out of 13) have installed one kind of closure, only five have installed an MPA and CCAMLR was the only one which established no-take zones (Pentz et al. 2018) and is committed to a representative system of MPAs (CCAMLR 2019). Generally, it is important to acknowledge that the mandate of RFMOs is restricted to fisheries and to the water column (Scanlon 2018), while the seabed is managed by the

International Seabed Authority. Contrary to the other RFMOs, CCAMLR has a much broader mandate with a greater focus on the conservation of the whole marine ecosystem (CCAMLR 1982). However, the other RFMOs still have the power to close areas to fisheries and to ban destructive fishing practices. The topic of area-based management tools, such as fisheries closures, and MPAs received considerable attention at the currently ongoing negotiations for a new international legally binding agreement on biodiversity beyond national jurisdiction (Wright et al. 2015b). While the outcome is uncertain at this point of time, having a treaty, which is open to all United Nations member states, might change the way area-based management tools and MPAs are implemented.

Target 14.5 had the greatest difference between tuna RFMOs and general RFMOs. The tuna RFMOs had measures in place for only two out of seven criteria. This might be due to the different fishing methods and different target species. Tuna fisheries fish primarily pelagic species, while general RFMOs also engage with demersal fish species and use gear such as midwater and bottom trawling that can have a greater impact on the ecosystem (Pusceddu 2014), leading to the designation of many ‘vulnerable marine ecosystems’ (VMEs) (Wright et al. 2015a) by these RFMOs. However, gaps remain due to, for example, inconsistencies between impact assessments and FAO Guidelines and UNGA resolutions, lack of use of cumulative impact assessments, lack of information on the status of stocks, and unwillingness of member states to close identified areas to bottom fishing (Gianni et al. 2016).

Another target which showed some differences between general and tuna RFMOs was 14.2 – ecosystem approach. Overall, tuna RFMOs had more measures in place which address the impact of fisheries on species such as mammals or seabirds. However, even though tuna RFMOs have measures in place which aim to mitigate the impact of fishing on bycatch species, Juan-Jordá et al. (2017) showed that these measures are lacking important features, such as pre-agreed operational objectives and indicators or pre-established reference points and performance standards.

To achieve the SDGs, existing institutions will have to cooperate and coordinate their work (Bernstein 2017). Currently, RFMOs are mainly cooperating only with other RFMOs or fisheries-related organisations (Fig.3). None of the RFMOs had an MoU or any kind of cooperation with institutions which deal with other ocean-related activities, such as the International Seabed Authority, the

International Maritime Organizations, or the International Labour Organization. The results also showed that the RFMOs in the southern area are much better connected than the organizations in the northern areas.

To achieve the SDGs it is important that the RFMOs are entering new areas of cooperations, especially with other actors in the ocean. There are several institutions which manage activities on the ocean and it is imperative to increase the communication among them and to align their mandates, otherwise, it impacts the effectiveness of ocean governance and enhances non-compliance behaviour of member states (Ban et al. 2014). Generally, cooperating with different stakeholders is an important aspect of sustainable fisheries management (Jentoft and McCay 1995; Pomeroy et al. 2001; Beddington et al. 2007; Bundy et al. 2017).

To support the achievement of the SDGs, RFMOs need to make a greater effort to cooperate with organizations outside their comfort zone but also expand the objectives of cooperation. Most of the MoUs are about sharing information, data, technology, or expertise. Even though this is important, for example, for the fight against IUU fishing (Hutniczak 2019), real actions are missing. Only a few MoU included activities such as implementing bycatch mitigation measures or the adaptation of management plans which are based on the ecosystem approach.

It is important that RFMOs enhance the objectives of the MoUs and include actions which are directly linked to emerging issues. One example is climate change, especially the aspect of shifting species due to warming water (FAO 2016; William W. L. Cheung et al. 2010; Pecl et al. 2017). Species will be found in different jurisdictional areas and therefore, it is important that RFMOs start to address this issue as soon as possible. The lack of an agreement can lead to international conflicts, which happened between the European Union, Norway, the Faroe Islands, and Iceland because of the change in the geographical distribution of the northeast Atlantic mackerel stock (Spijkers and Boonstra 2017). Supporting the achievement of the SDGs requires more of the RFMOs than the sharing of information and data.

Conclusion

The SDGs are a goal-setting strategy for social, economic, and ecological sustainable development. To achieve them it is important that existing institutions support the targets and goals which are linked to their mandate. The aim of this paper was to assess how RFMOs could contribute to SDG 14. We analysed the established measures of these organizations and linked them to the main targets of SDG 14. Furthermore, we mapped a network of institutional links between the different organizations based on the existence of MoUs and analysed the MoUs' objectives. The results showed that the framework of RFMOs provides an important contribution to several targets of SDG 14, especially sustainable fisheries. These organizations also cooperate with other organizations, however, primarily with other RFMOs, or fisheries-related organizations, and the pattern of cooperation noted was mostly on information sharing or the establishment of educational programmes. This paper contributes to the scholarly debate concerning the implementation of the SDGs as little work has been done so far to assess how existing fisheries organizations could engage with and contribute to these global goals. Overall, the results showed that even though RFMOs do not officially address SDG 14, the measures these organizations have in place can be linked to the specific targets of SDG 14. The list (see Appendix 1) developed to link the RFMOs work with the targets of SDG 14 could be used by RFMOs to start their proactive engagement with the SDGs and could also support the reporting towards the achievement of SDG 14

References

- Ban, N. C., Bax, N. J., Gjerde, K. M., Devillers, R., Dunn, D. C., Dunstan, P. K., et al. (2014). Systematic Conservation Planning: A Better Recipe for Managing the High Seas for Biodiversity Conservation and Sustainable Use. *Conservation Letters*, 7(1), 41-54, <https://doi.org/10.1111/conl.12010>.
- Beddington, J. R., Agnew, D. J., & Clark, C. W. (2007). Current Problems in the Management of Marine Fisheries. *Science*, 316(5832), 1713-1716, <https://doi.org/10.1126/science.1137362>.
- Bernstein, S. (2017). The United Nations and the Governance of Sustainable Development Goals. In N. Kanie, & F. Biermann (Eds.), *Governing through goals: sustainable development goals as governance innovation*. Cambridge, MA: MIT Press.
- Biermann, F., & Kanie, N. (2017). Conclusion: Key Challenges for Global Governance through Goals. In N. Kanie, & F. Biermann (Eds.), *Governing through goals: sustainable development goals as governance innovation*. Cambridge, MA: MIT Press.

- Bundy, A., Chuenpagdee, R., Boldt, J. L., de Fatima Borges, M., Camara, M. L., Coll, M., et al. (2017). Strong fisheries management and governance positively impact ecosystem status. *Fish and Fisheries*, 18(3), 412-439, <https://doi.org/10.1111/faf.12184>.
- CCAMLR (1982). Text of the convention on the conservation of antarctic marine living resources. <https://www.ccamlr.org/en/document/publications/text-convention-conservation-antarctic-marine-living-resources>. Accessed 6 May 2019.
- CCAMLR (2019). Marine Protected Areas (MPAs). <https://www.ccamlr.org/en/science/marine-protected-areas-mpas>. Accessed 25 January 2019.
- Cheung, W. W. L. (2018). The future of fishes and fisheries in the changing oceans. *Journal of Fish Biology*, 92(3), 790-803, <https://doi.org/10.1111/jfb.13558>.
- Cheung, W. W. L., Jones, M. C., Lam, V. W. Y., D Miller, D., Ota, Y., Teh, L., et al. (2017). Transform high seas management to build climate resilience in marine seafood supply. *Fish and Fisheries*, 18(2), 254-263, <https://doi.org/10.1111/faf.12177>.
- Cheung, W. W. L., Lam, V. W. Y., Sarmiento, J. L., Kearney, K., Watson, R. E. G., Zeller, D., et al. (2010). Large-scale redistribution of maximum fisheries catch potential in the global ocean under climate change. *Global Change Biology*, 16(1), 24-35, <https://doi.org/10.1111/j.1365-2486.2009.01995.x>.
- Constable, A. J., de la Mare, W. K., Agnew, D. J., Everson, I., & Miller, D. (2000). Managing fisheries to conserve the Antarctic marine ecosystem: practical implementation of the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR). *ICES Journal of Marine Science*, 57(3), 778-791, <https://doi.org/10.1006/jmsc.2000.0725>.
- Cullis-Suzuki, S., & Pauly, D. (2010). Failing the high seas: A global evaluation of regional fisheries management organizations. *Marine Policy*, 34(5), 1036-1042, <https://doi.org/10.1016/j.marpol.2010.03.002>.
- de Bruyn, P., Murua, H., & Aranda, M. (2013). The Precautionary approach to fisheries management: How this is taken into account by Tuna regional fisheries management organisations (RFMOs). *Marine Policy*, 38(Supplement C), 397-406, <https://doi.org/10.1016/j.marpol.2012.06.019>.
- Ewell, C., Cullis-Suzuki, S., Ediger, M., Hocevar, J., Miller, D., & Jacquet, J. (2017). Potential ecological and social benefits of a moratorium on transshipment on the high seas. *Marine Policy*, 81(Supplement C), 293-300, <https://doi.org/10.1016/j.marpol.2017.04.004>.
- FAO (2016). Climate Change implications for fisheries and aquaculture: Summary of the findings of the Intergovernmental Panel on Climate Change Fifth Assessment Report. In A. Seggel, & C. De Young (Eds.), *FAO Fisheries and Aquaculture Circular No, 1122*.
- FAO (2018). The State of World Fisheries and Aquaculture 2018 - Meeting the sustainable development goals. <http://www.fao.org/3/I9540EN/i9540en.pdf>. Accessed 2 November 2018.
- FAO (2019a). GFCM legal framework. <http://www.fao.org/gfcm/about/legal-framework/en/>. Accessed 18 September 2019.
- FAO (2019b). What are Regional Fisheries Bodies (RFBs)? <http://www.fao.org/fishery/topic/16800/en>. Accessed 9 March 2019.
- FAO (2020). The State of the World Fisheries and Aquaculture 2020. Sustainability in action. <http://www.fao.org/3/ca9229en/CA9229EN.pdf>. Accessed 9 June 2020.
- Gianni, M., Fuller, S. D., Currie, D. E. J., Schleit, K., Goldsworthy, L., Pike, B., et al. (2016). How much longer will it take? A ten-year review of the implementation of United Nations General Assembly resolutions 61/105, 64/72 and 66/68 on the management of bottom fisheries in areas beyond national jurisdiction. http://www.savethehighseas.org/wp-content/uploads/2016/07/DSCC-Review-2016_Launch-29-July.pdf. Accessed 13 May 2019.
- Gilman, E., Passfield, K., & Nakamura, K. (2014). Performance of regional fisheries management organizations: ecosystem-based governance of bycatch and discards. *Fish and Fisheries*, 15(2), 327-351, <https://doi.org/10.1111/faf.12021>.
- Gjerde, K. M., Reeve, L. L. N., Harden-Davies, H., Ardron, J., Dolan, R., Durussel, C., et al. (2016). Protecting Earth's last conservation frontier: scientific, management and legal priorities for MPAs beyond national boundaries. *Aquatic Conservation: Marine and Freshwater Ecosystems*, 26, 45-60, <https://doi.org/10.1002/aqc.2646>.

- Gupta, J., & Nilsson, M. (2017). Toward a Multi-level Action Framework for Sustainable Development Goals. In N. Kanie, & F. Biermann (Eds.), *Governing through goals: sustainable development goals as governance innovations*. Cambridge, MA: MIT Press.
- Haas, B., McGee, J., Fleming, A., & Haward, M. (2020). Factors influencing the performance of regional fisheries management organizations. *Marine Policy*, *113*, 103787, <https://doi.org/10.1016/j.marpol.2019.103787>.
- Hanchet, S., Sainsbury, K., Butterworth, D., Darby, C., Bizikov, V., Rune Godø, O., et al. (2015). CCAMLR's precautionary approach to management focusing on Ross Sea toothfish fishery. *Antarctic Science*, *27*(4), 333-340, <https://doi.org/10.1017/S095410201400087X>.
- Hutniczak, B. (2019). Coordination between RFMOs on mutual recognition of IUU vessel lists. *Marine Policy*, *107*, 103596, <https://doi.org/10.1016/j.marpol.2019.103596>.
- IOTC (2019). Conservation and management measures (CMMs). <http://www.iotc.org/cmms>. Accessed 25 January 2019.
- Jentoft, S., & McCay, B. (1995). User participation in fisheries management: lessons drawn from international experiences. *Marine Policy*, *19*(3), 227-246, [https://doi.org/10.1016/0308-597X\(94\)00010-P](https://doi.org/10.1016/0308-597X(94)00010-P).
- Juan-Jordá, M. J., Murua, H., Arribabalaga, H., Dulvy, N. K., & Restrepo, V. (2017). Report card on ecosystem-based fisheries management in tuna regional fisheries management organizations. *Fish and Fisheries*, *19*(2), 321-339, <https://doi.org/10.1111/faf.12256>.
- Lindley, J., & Techera, E. J. (2017). Overcoming complexity in illegal, unregulated and unreported fishing to achieve effective regulatory pluralism. *Marine Policy*, *81*, 71-79, <https://doi.org/10.1016/j.marpol.2017.03.010>.
- Miller, D., & Slicer, N. M. (2014). CCAMLR and Antarctic conservation: The leader to follow? In S. M. Garcia, J. C. Rice, & A. Charles (Eds.), *Governance of Marine Fisheries and Biodiversity Conservation: Interaction and Coevolution*: Wiley-Blackwell.
- Ortuño Crespo, G., & Dunn, D. C. (2017). A review of the impacts of fisheries on open-ocean ecosystems. *ICES Journal of Marine Science*, *74*(9), 2283-2297, <https://doi.org/10.1093/icesjms/fsx084>.
- Ortuño Crespo, G., Dunn, D. C., Gianni, M., Gjerde, K., Wright, G., & Halpin, P. N. (2019). High-seas fish biodiversity is slipping through the governance net. *Nature Ecology & Evolution*, *3*, 1273–1276, <https://doi.org/10.1038/s41559-019-0981-4>.
- Pecl, G. T., Araújo, M. B., Bell, J. D., Blanchard, J., Bonebrake, T. C., Chen, I. C., et al. (2017). Biodiversity redistribution under climate change: Impacts on ecosystems and human well-being. [Review]. *Science*, *355*(6332), eaai9214, <https://doi.org/10.1126/science.aai9214>.
- Pentz, B., & Klenk, N. (2017). The ‘responsiveness gap’ in RFMOs: The critical role of decision-making policies in the fisheries management response to climate change. *Ocean and Coastal Management*, *145*(Supplement C), 44-51, <https://doi.org/10.1016/j.ocecoaman.2017.05.007>.
- Pentz, B., Klenk, N., Ogle, S., & Fisher, J. A. D. (2018). Can regional fisheries management organizations (RFMOs) manage resources effectively during climate change? *Marine Policy*, *92*, 13-20, <https://doi.org/10.1016/j.marpol.2018.01.011>.
- Pomeroy, R. S., Katon, B. M., & Harkes, I. (2001). Conditions affecting the success of fisheries co-management: lessons from Asia. *Marine Policy*, *25*(3), 197-208, [https://doi.org/10.1016/S0308-597X\(01\)00010-0](https://doi.org/10.1016/S0308-597X(01)00010-0).
- Puseddu, A. (2014). Chronic and intensive bottom trawling impairs deep-sea biodiversity and ecosystem functioning. *Proceedings of the National Academy of Sciences*, *111*, 8861-8866, <https://doi.org/10.1073/pnas.1405454111>.
- Rochette, J., Billé, R., Molenaar, E. J., Drankier, P., & Chabason, L. (2015). Regional oceans governance mechanisms: A review. *Marine Policy*, *60*, 9-19, <https://doi.org/10.1016/j.marpol.2015.05.012>.
- Sachs, J. D. (2012). From Millennium Development Goals to Sustainable Development Goals. *The Lancet*, *379*(9832), 2206-2211, [https://doi.org/10.1016/S0140-6736\(12\)60685-0](https://doi.org/10.1016/S0140-6736(12)60685-0).
- Scanlon, Z. (2018). The art of “not undermining”: possibilities within existing architecture to improve environmental protections in areas beyond national jurisdiction. *ICES Journal of Marine Science*, *75*(1), 405-416, <https://doi.org/10.1093/icesjms/fsx209>.

- Singh, G. G., Cisneros-Montemayor, A. M., Swartz, W., Cheung, W., Guy, J. A., Kenny, T.-A., et al. (2017). A rapid assessment of co-benefits and trade-offs among Sustainable Development Goals. *Marine Policy*, 93, 223-231, <https://doi.org/10.1016/j.marpol.2017.05.030>.
- Spijkers, J., & Boonstra, W. J. (2017). Environmental change and social conflict: the northeast Atlantic mackerel dispute. *Regional Environmental Change*, 17(6), 1835-1851, <https://doi.org/10.1007/s10113-017-1150-4>.
- SPRFMO (2018). CMM 12-2018 - Conservation and Management Measure for the regulation of Transshipment and other Transfer Activities. <https://www.sprfmo.int/assets/Fisheries/Conservation-and-Management-Measures/2018-CMMs/CMM-12-2018-Transshipment-8March2018.pdf>. Accessed 25 January 2019.
- Sumaila, U. R., Bellmann, C., & Tipping, A. (2016). Fishing for the future: An overview of challenges and opportunities. *Marine Policy*, 69, 173-180, <https://doi.org/10.1016/j.marpol.2016.01.003>.
- Underdal, A., & Kim, R. E. (2017). The Sustainable Development Goals and Multilateral Agreements. In N. Kanie, & F. Biermann (Eds.), *Governing through goals: sustainable development goals as governance innovation* (pp. 241-258). Cambridge, MA: MIT Press.
- United Nations (1982). United Nations Convention on the Law of the Sea. http://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf. Accessed 16 March 2018.
- United Nations (1995). 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 Fish Stocks and Highly Migratory Fish Stocks. https://www.un.org/Depts/los/convention_agreements/convention_overview_fish_stocks.htm. Accessed 13 May 2019.
- Wright, G., Ardron, J., Gjerde, K., Currie, D., & Rochette, J. (2015a). Advancing marine biodiversity protection through regional fisheries management: A review of bottom fisheries closures in areas beyond national jurisdiction. *Marine Policy*, 61, 134-148, <https://doi.org/10.1016/j.marpol.2015.06.030>.
- Wright, G., Rochette, J., Druel, E., & Gjerde, K. (2015b). *The long and winding road continues: Towards a new agreement on high seas governance*. Paris, France: IDDRI.
- Young, O. R. (2017). Conceptualization: Goal Setting as a Strategy for Earth System Governance. In N. Kanie, & F. Biermann (Eds.), *Governing through goals: sustainable development goals as governance innovation*. Cambridge, MA: MIT Press.