Sustainable Development Goal 14 in the Western Indian Ocean: a socio-ecological approach to understanding progress

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Abstract

The Sustainable Development Goals (SDGs) intend to "achieve a better and more sustainable future for all people in the world"[1]. They have become a key driver for policy and decision-making in many regions, including in the Western Indian Ocean (WIO) region. This paper analyses national and regional progress towards achieving SDG 14 in the WIO. Progress of four of the SDG 14 targets that were due in 2020 are analysed. SDG 14 has influenced regional and national policy agendas but current tools to measure this progress fail to provide a detailed picture of achievement towards each target for countries in the WIO. The paper highlights that the region has shown limited success in achieving the targets and SDG 14 targets are unlikely to be reached by 2030. The WIO region lags behind with regard to marine conservation related targets. More than half of the countries have low to average progress on SDG 14.2 on marine areas being covered by area-based management tools. Even more countries are far from achieving the 10 % coverage of marine protected areas under SDG 14.5. The region is performing better with regards to fisheries management targets with most countries classified as making average to good progress towards SDG 14.4 on sustainable stocks and SDG 14.6 on addressing harmful subsidies and IUU fishing. The diversity of the socio-economic and governance contexts in the WIO countries contributes to different levels of progress. The fairly positive ecological state of the WIO supports progress towards SDG 14. Understanding barriers to progress is fundamental to help with the prioritisation of the actions needed to meet the SDG 14 targets by 2030. Regional actors and policy-makers will need to increase their ambitions to meet the SDG 14 targets and ensure a healthy ocean and improved prospects for the region and its citizens. To account for barriers in progress towards SDG 14, the WIO region needs appropriate reporting and monitoring mechanisms and it should follow a holistic regional approach of ocean governance integrating conservation and sustainable resource use. It needs to build capacity and knowledge sharing for implementation of SDG 14 and ocean governance at various levels. Improved implementation of SDG targets will have social, economic and environmental benefits within the region.

Keywords: SDG 14, area-based management, marine protected areas, fish stocks, IUU fishing

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[1]   As highlighted by Resolution A/RES/71/313 adopted by the United Nations General Assembly on 6 July 2017

Introduction

Progress towards the achievement of the UN Sustainable Development Goal 14 (SDG 14) is important for the Western Indian Ocean (WIO) region considering the large number of coastal communities that rely on a healthy ocean for their livelihoods and food security (Obura *et al.*, 2017). The sustainable use of ocean resources is a priority for the blue economies of WIO countries (WIOMSA, 2018). This importance was emphasized at the UN Ocean Conference of 2022, which builds upon the first Ocean Conference of 2017, and mobilised global commitments towards funding and actions for SDG 14. Globally, the progress towards achieving SDG 14 is lagging, compared to other goals (Sturesson *et al.*, 2018; Salvia *et al.*, 2019), and there remains a substantive funding gap (Johansen and Vestvik, 2020). Despite progress on some of the different targets of SDG 14, none are close to being achieved (United Nations, 2019). For African countries, progress on SDG 14 is generally limited, with some instances of a decline in the indicators for sustainability (Salvia *et al.*, 2019). This is true for some WIO countries, where challenges to achieving sustainability remain (Sachs, *et al.* 2019). Studies on SDG 14 have mainly focused on national achievements (Recuero Virto, 2018; Rivera-Arriaga and Azuz-Adeath, 2019; Gulseven, 2020). In the WIO region, SDG 14 has primarily been assessed from the perspectives of blue economies and fisheries. Benzaken (2017) discusses the implementation of SDG 14 supporting the blue economy agenda of WIO countries including Kenya, Madagascar and Seychelles. She highlighted the opportunities for countries to achieve SDG 14 through activities such as marine-based tourism or energy. Obura (2020) highlighted how achieving other SDGs represent a means to progress in the implementation of SDG 14 in the WIO. He also presented a model for the assessment of the achievement of SDGs, which is based on a narrative approach, whereby explicit tangible interactions (such as the delivery of ecosystem services), can be used to measure progress, rather than measurement of progress based on indicators. Techera *et al.* (2020) looked at the implementation of SDG 14 from the perspective of small-scale fisheries in the Indian Ocean islands. They presented the progress made by Madagascar and Seychelles in fisheries management that can contribute towards the fisheries related targets of SDG 14. Wright *et al.* (2017) propose that most of the SDG14 targets can be achieved through regional initiatives that can increase ambition, learning exchanges, and coordination. They highlight that regional governance acts as a driver for the development of integrated approaches,

particularly in the context of small island developing states (SIDS) and least developed countries (LDCs), of which many of the WIO states are.

Using the example of the 10 countries of the WIO (Somalia, Kenya, Tanzania, Mozambique, South Africa, Comoros, Madagascar, Seychelles, Mauritius, France - covering Réunion and Mayotte), the paper assesses the progress of four SDG 14 targets that were due in 2020[2]. The paper has three objectives:

- It assesses the state of national achievements of SDG 14 in the WIO based on existing global databases that provide data of the four SDG 14 targets analysed according to the global indicator framework.

- It identifies the socio-ecological and political drivers behind success, or lack thereof, towards SDG 14 in the region. Using a socio-ecological system approach, the paper explores the common drivers and differences that drive progress nationally.

- It explores current literature to provide potential pathways towards improving achievement towards SDG 14 in the WIO region.

Current SDG 14 reporting is unreliable; in the past five years, countries of the WIO have submitted the voluntary SDG reviews on progress towards the targets sporadically or not at all (United Nations, 2022b). Limited availability of data prevents the effective monitoring of progress. This paper provides insights into improving regional indicator use, thereby contributing to the requirement of UN member states to develop and implement national and regional indicators to complement the global indicator framework.

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[2] SDG 14.2: By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans

SDG 14.4: By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and 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

SDG 14.5: By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information

SDG 14.6: By 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, eliminate subsidies that contribute to illegal, unreported and unregulated fishing and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the World Trade Organization fisheries subsidies negotiation

For practitioners, this paper provides an assessment of the achievement of SDG 14 at both the national level, and regional perspective that can help target actions towards ocean sustainability and identify the needs in the WIO. This is relevant given the upcoming SDG14 review at the UN High-level Political Forum (HLPF) on the SDGs. The paper also analyses the role of socio-ecological and political drivers in achieving global goals. This can be helpful to policy makers and practitioners working on the SDGs, ocean management and blue economies in Africa. It argues that achieving the targets of SDG 14 will require the adoption of a more integrated approach when implementing policies. The ecological and socio-economic context of each country or region has significant impacts on progress and should be reflected in their policies. Social, economic and ecological impacts of policy implementation should be better integrated into decision making, monitoring and reporting associated with SDG 14.

Materials and methods

The research was based on two methods. First, progress towards the four targets of SDG 14 that expired in 2020 was assessed. Under the UN framework[3], indicators are established for each of the targets. While the overall progress of SDG 14 is published in the annual SDG progress report by the UN, data regarding progress towards each indicator at the country level is more dispersed, either through the UN platforms (not always covering all indicators[4] or all countries[5]) or through Voluntary National Reviews submitted by countries (often not submitted by all countries[6]). Independent repositories of progress also exist, although they do not always precisely align with the UN indicators or do not cover all countries for all indicators[7]. To overcome these limitations and provide a clear picture at the country level, an analysis was undertaken of publicly available databases which provided data about the indicators of the four targets of SDG 14 which were interpreted according to UN related guidelines in the UNEP Global Manual for the indicators of SDG 14.2 and SDG 14.5.

For 14.2 (Indicator: Number of countries using ecosystem-based approaches), the UNEP Global Manual (UNEP, 2021) assesses two sub-indicators. Firstly, the level of implementation of ecosystem-based approaches for the management of marine areas. It aims to capture area-based, integrated planning and management schemes in place in waters under national jurisdiction (e.g., marine spatial planning, marine protected areas, marine zoning, sector specific management plans). For this indicator the level of marine spatial planning (MSP) implementation was assessed as the most comprehensive ecosystem-based approach (Douvere, 2008; Santos *et al.*, 2019). The IOC-UNESCO MSP online database was used that presents the status of MSP processes in different countries as of 2019 (IOC-UNESCO, 2021). For countries that do not have MSP in place yet, the compendium of existing and emerging cross-border and transboundary MSP practices was used that included Large Marine Ecosystem initiatives that countries were involved in as of 2020 (IOC-UNESCO, 2021). The second sub-indicator assessed ecological parameter schemes (e.g., state of biodiversity, water quality, habitat quality, ecosystem health). For this, the 2020 Ocean Health Index database was used which provides the state of ocean health based on 10 components ranging from marine biodiversity to clean water and food provision for each country (Ocean Health Index, 2021). The use of the sub-indicator provided an indication of the health of ecosystems and marine species.

For 14.4 (Indicator: Percentage of stocks within biologically sustainable levels), the FAO has put in place a national questionnaire that has been sent to all FAO member States on a biannual basis since 2019, collecting information on national fish stocks (FAO, 2021). Sustainability of stocks is defined as stocks with abundance that are at or greater than the level that produce the maximum sustainable yield (MSY). In 2021, less than 20 countries filled in the questionnaire related to their stocks. Considering this limitation, the reconstructed catch data produced by the *Sea Around Us* (Pauly *et al.*, 2020) was used to assess SDG 14.4 as it included all the WIO countries. The *Sea Around Us* provides an assessment of national stocks of countries through its stock status plots database. The stocks (i.e., species, genus or family level of taxonomic assignment) assessed for each country are those that have been reported on for at least five consecutive years over a minimum of a 10-year period and for which catch is greater than 1,000 tonnes. For each EEZ, stocks are categorised as developing (catches ≤ 50 %

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[3] Resolution A/RES/71/313 on the Global indicator framework adopted by the General Assembly

[4] See for example: https://country-profiles.unstatshub.org/

[5] For example for SDG 14.4: https://www.fao.org/sustainable-development-goals/indicators/1441/en/

[6] Available at: https://sustainabledevelopment.un.org/vnrs/

[7] See for example https://dashboards.sdgindex.org/map/goals/SDG14 or https://sdg-tracker.org/oceans

of peak catch and year is pre-peak, or year of peak is final year of the time series); exploited (catches ≥ 50 % of peak catches); overexploited (catches between 50 % and 10 % of peak and year are post-peak); collapsed (catches < 10 % of peak and year is post-peak); and rebuilding (catches between 10 % and 50 % of peak and year is after post-peak minimum) (Kleisner and Pauly, 2011). To conduct the assessment, the percentage of developing, exploited and rebuilding stocks (excluding overexploited and collapsed) for the year 2018 was combined to estimate stock sustainability. In addition to stock plots, the Marine Trophic Index (MTI) based on the *Sea Around Us* database of reconstructed catches for the period 1950-2018 was used as another indicator to measure the health of the marine resources. The MTI measures how fishing pressure in an EEZ changes the annual mean trophic level of the catch of large, exploited fishes (Pauly and Watson, 2005). The MTI indicates if high volumes of large pelagic fishes are within high trophic levels (>=3.5) or lower levels (<3.5), the latter showing that mean trophic level of the catch decreases over time.

For 14.5 (Indicator: Coverage of MPAs), the UNEP Global Manual (UNEP, 2021) also suggests two sub-indicators. First, is an assessment of the coverage of marine and coastal areas by protected areas. For this, the World Database on Protected Areas (WDPA) was used to assess each country (UNEP-WCMC and IUCN, 2022). Second is an assessment of various parameters, from coverage of important biodiversity areas to effectiveness of management, connectivity and equity within MPAs. For this second level, the key biodiversity areas database was used to determine the extent of MPAs that covered biologically important areas (BirdLife International, 2021).

For 14.6 (Indicator: implementation of international instruments to combat Illegal, Unreported and Unregulated [IUU] fishing), the FAO suggests using the degree of implementation of international instruments to combat IUU fishing as the indicator. This is based on self-reporting biannually by FAO members through an online questionnaire. The 2020 data indicates that half of the WIO countries did not fill in the questionnaire (United Nations, 2022a). To overcome this, the data from the IUU Fishing Index (IUU Fishing Index 2018); specifically the 2021 IUU Index scores relating to state action to combat IUU fishing (i.e. "response") was used. The response part of the IUU Index covers 17 indicators for countries in their capacity as coastal, flag and port states, including the

adherence to international agreements set out to combat IUU fishing, reflecting what is currently assessed by the FAO.

To assess the level of achievement of each of the four SDG 14 targets, a five-level classification from 'far from achievement' (class 5) to 'achieved' (class 1) was stablished. A five level scale provides a good picture of success and lack of achievement but also intermediate levels from low to good progress towards achievement. The five levels were set across the different types of scoring and level of assessment for each indicator (Table 1).

The second method is a literature review to collect data on socio-ecological drivers of achievement and recommendations. Socio-ecological drivers were divided into five categories adapted from the 'Press-Pulse Dynamics' framework (Collins *et al.*, 2011): ecological, socio-economic, governance, external drivers and events. Events can be press or pulse. Press events were adapted as not only ecological events but also socio-political ones that are sustained and sometimes chronic events that affect the system. Pulse events are discrete but quickly affect the socio-ecological system and its functioning (ibid). To find the relevant information, a search of papers and reports with the keywords "WIO" "governance" and "management" was undertaken. The following documents have been chosen as being recent publications covering both ecological and socio-economic aspects about the 10 WIO countries in their content:

- The WIO MPA Outlook 2021 (UNEP-Nairobi Convention and WIOMSA, 2021): A regional stock-taking of MPA coverage and management effectiveness showing the progress, governance and challenges regarding MPAs and area-based management tools.

- The SOLSTICE papers (https://solstice-wio.org/outputs/peer-reviewed-publications): A set of publications about ecological processes taking place in the WIO as a region and in individual countries.

- The 2021 IUU Index report (Macfadyen *et al.*, 2021): A global report on the state of IUU fishing at the global and regional levels. This report provided information on the state of IUU fishing and related challenges faced by countries and regions, including the WIO.

Table 1. Classification used to assess the achievement of SDG 14.

Progress towards SDG 14 targets	Classification	SDG 14.2	SDG 14.4	SDG 14.5	SDG 14.6
Achieved	1	MSP covering the entire EEZ is implemented OHI 85-95	>90% of stock sustainable MTI >4.5	MPAs >10% of EEZ, with 50% of marine KBAs covered	IUU index (response) 1-1.7[1]
Good progress / Near completion for SDG 14.5	2	MSP under development, complete/approved but not implemented yet OHI 75-85	60-90% of stock sustainable MTI 3.5-4.5	MPAs = 7,5 - 10% of EEZ, with at least 50% of marine KBAs covered, or MPAs >10% of EEZ but less than 50% of marine KBAs covered	IUU index (response) >1.7-2
Average progress	3	MSP under development OHI 65-75	>50% of stock sustainable MTI 3-3.5 or <50% of stock sustainable MTI >4		IUU index (response) >2-2.5
Low progress	4	MSP at pre-planning phase OHI 60-70	20-50% of stock sustainable MTI 3-4	MPAs = 2 - 7,5% of EEZ, no matter about the percentage of marine KBAs covered, or MPAs = 7,5 - 10%, but less than 50% of marine KBAs covered	IUU index (response) >2.5-3.0
Far from achievement	5	MSP at Pre-planning/ Pilot project phase OHI <60	<20% of stock sustainable MTI <3	MPAs = 0 - 2% of EEZ, no matter about the percentage of marine KBAs covered	IUU index (response) >3

[1]   Note that this target can never be truly "achieved", but that the national response to combat IUU fishing at this score range appears to be broad and very solid.

These documents were also complemented by general references to events and initiatives linked to the four SDG targets taking place in the WIO region.

Results and discussion

The assessment of the indicators of SDG 14 targets shows that WIO countries are still far from achieving SDG 14 (Fig. 1). Across the four targets analysed, only two targets, 14.5 and 14.6 were achieved by two countries (France and Mozambique). One country, the Seychelles, has seen good progress across all four targets. Two countries (Comoros and Somalia) show no to low progress towards achieving at least three of the targets assessed.

Achievement of marine protection targets (SDG 14.2 and SDG 14.5)

The majority of countries are far from achievement and show low progress towards marine conservation related targets. SDG 14.2 was assessed through the proportion of national exclusive economic zones managed using ecosystem-based approaches. The assessment of existing databases divided WIO countries into three groups - countries making low, average and good progress – but none of the countries have achieved this target (MSP implemented and high OHI score). While most WIO countries have fairly satisfactory ecological status according to the OHI, MSP processes are not well advanced with countries still developing or in the pre-planning phase of MSP. Four countries (France, Mozambique, the Seychelles and South Africa) have made good progress with the MSP process being complete, but not yet implemented, or MSP under development but with a high OHI score. Somalia is at the lowest classification for this target with the MSP process being at pre-planning stage and the ecological indicator being at an average level.
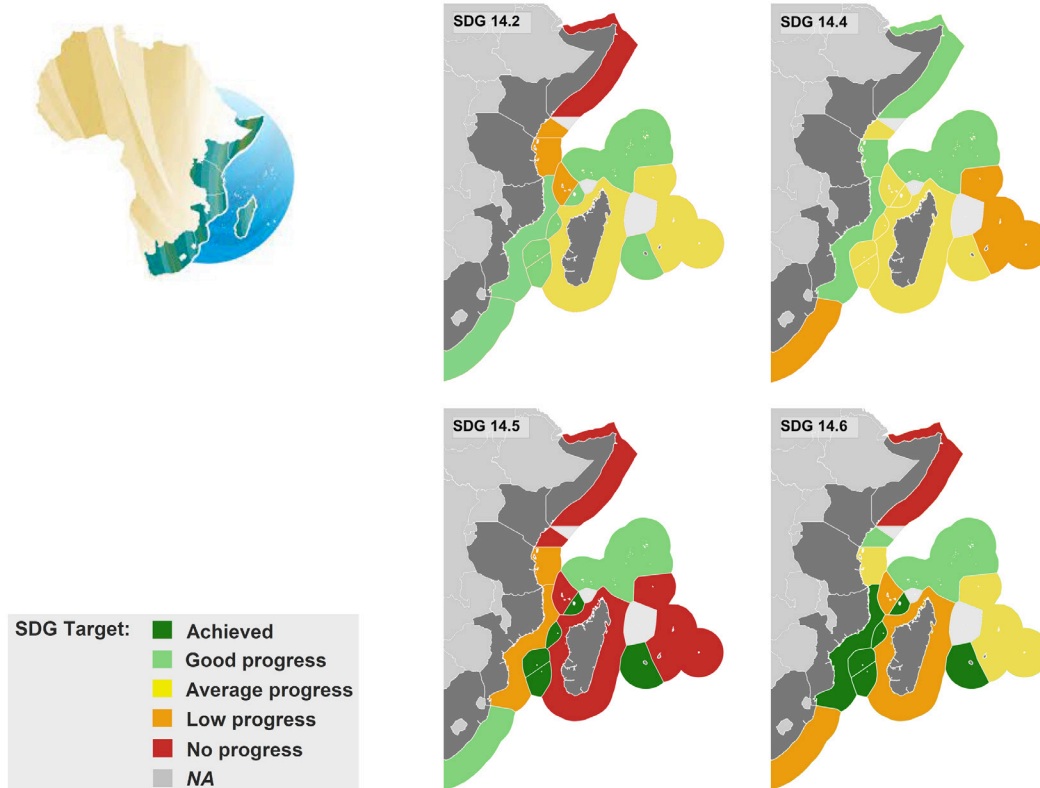
Figure 1. Map of progress on the four SDG 14 targets (14.2, 14.4, 14.5 and 14.6) in the WIO countries.

SDG 14.5 assesses the coverage of protected areas in relation to marine areas. One country (France) has achieved this target with 16,6 % of marine areas covered by protected areas including more than 50 % of marine key biodiversity areas. Two countries (the Seychelles and South Africa) are near completion having achieved more than 10 % marine protected areas coverage but with less than 50 % of marine Key Biodiversity Areas under the current coverage. The Seychelles has achieved a 32,8 % MPA coverage, France 16,6 % and South Africa 15,5 %. For France and South Africa, the protection of remote island territories has contributed to this achievement. However, they only cover between 30 and 47 % of marine Key Biodiversity Areas. Two countries (Mozambique and Tanzania) showed low progress with less than 5 % MPA coverage. The other half of WIO countries are far from achievement with less than 2 % MPA coverage. This SDG target is the one that has seen the lowest level of achievement amongst the four targets assessed.

Achievement of fisheries management targets (SDG 14.4 and SDG 14.6)

With regards to fisheries related targets, achievement of the WIO countries has been disparate with countries in all classifications from "achieved" to "far from achieved". Target 14.4 on fisheries regulation was assessed by the proportion of sustainable stocks and fisheries governance. The majority of countries (8) have been classified as making good or average progress meaning 60 to 80 % of national stocks were assessed as sustainable and with high MTI score (>3.5) (in the case of Mozambique, the Seychelles, Somalia and Tanzania) or with less than 70 % of stock being sustainable but having a MTI score (>4) (as for Comoros and France). Two countries have been classified as having made low progress towards this target as they had mainly low levels of sustainable stocks (<40 % for Mauritius and South Africa). The fish stocks of the region appear to be in a fairly good state although efforts are needed to lift all countries towards the achievement of this target. The SDG Tracker[8] highlights a decrease of 5 % of overexploited stocks in the WIO, which aligns to the overall average progress as reported in this study. Contrastingly, the SDG Index Dashboard[9] values for percentage of fish caught from overexploited or collapsed stocks showed better progress for all WIO countries but Mauritius.

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[8]   https://sdg-tracker.org/oceans

[9]   https://dashboards.sdgindex.org/map/indicators/fish-caught-from-overexploited-or-collapsed-stocks

based on 2018 year reference, stating that for most WIO countries, this target has been achieved. The approach of this study incorporates not only the percentage of sustainable stocks, but also the impact of fishing pressure on the state of marine trophic levels. This could explain the variations between the findings of this study and those of other reporting sites.

With regards to target 14.6 which assesses the progress by countries in the implementation of international instruments aiming to combat illegal, unreported and unregulated fishing, in 2021, two countries (France and Mozambique) have achieved this target and two others (Kenya and Seychelles) are making good progress. Another 50 % of the countries have been classified as making low to average progress which means that the level of implementation of international instruments to reduce IUU fishing has not been satisfactory and actions are still required such as establishing action plans or complying to management measures to provide enough response to fight IUU fishing. This SDG target has seen the most progress amongst the four targets assessed, however, it should be noted with caution that IUU fishing is difficult to monitor and record, and that the indicators for this target focus solely on whether the measures are in place rather than their implementation. When compared to the SDG Tracker for this target, six of the 10 countries had no data to track progress in 2020, highlighting the challenge of monitoring this target.

Socio-ecological drivers of progress

As SDG 14 targets are set to be the main global framework to assess ocean sustainability, understanding the drivers behind the current levels of achievement can improve the way forward for implementation of SDG 14 targets due in 2030. Some countries have made good progress towards SDG 14.5 and 14.6. For SDG 14.5, looking at ecological drivers, the countries with good progress all have good Ocean Health Indices and average levels of MTI. This aligns with research showing that areas with good protection status in the WIO also have increased fish productivity (Osuka *et al.*, 2021).

On the social drivers, three countries (France, the Seychelles and South Africa) have more favourable socio-economic contexts (all ranked highest in the Human Development Index in the region). Some key events such as the 2018 Debt Swap in Seychelles (SSCOE, 2018; UNEP-NC and WIOMSA, 2021) can constitute pulse events that foster the increase of

MPAs. The Great Blue Wall initiative (IUCN, 2021) will also be a pulse event, potentially fostering further marine protection through Other Effective Area-based Conservation Measures (OECMs) such as locally managed marine areas. Similarly, press events through long standing engagement and consistent political will towards marine conservation can help stimulate marine protection and the establishment of MPAs. This has been the case for the Seychelles, where leadership was committed to ocean conservation (State House, 2020). Similarly, press events such as the mobilisation of resources by the Nairobi Convention (the regional convention under the UNEP Regional Seas Programme) or production of data and knowledge through WIOMSA (the regional marine science association that functions as a network of marine scientists and as a regional advisory body) have contributed to the advancement of marine protection in the region. External drivers such as the increased drive towards ocean conservation, highlighted by the pledges of delegates from the 'Our Ocean' 2017 conference in Malta (IISD, 2017) and initiatives such as 30x30 campaign (Ocean Unite, 2021) can also promote and push for more actions towards marine protected areas.

Six out of 10 countries have made good progress in SDG 14.6. An ecological factor that can be considered is the state of fish stocks in the region, of which only a few are considered unsustainable (overfished or collapsed). Countries of the WIO have long benefited from support regarding fisheries governance. The 10 countries are part of the Southwest Indian Ocean Fisheries Commission (SWIOFC) where fisheries management and adoption of international frameworks are discussed and supported. Similarly, they are all party to regional fisheries management organisations such as the Indian Ocean Tuna Commission or the Southern Indian Ocean Fisheries Agreement which allow countries to implement management measures for shared fishing stocks and discuss the fight against IUU fishing. Pulse events, such as the existence of online platforms like Global Fishing Watch, allow countries to have a better oversight of fishing activities within their EEZs. Press events include past or existing regional surveillance and monitoring programmes such as Fish-i Africa (Stop Illegal Fishing, 2017) or the regional Indian Ocean Commission monitoring and surveillance programme (IOC, 2014). They provide countries of the WIO with resources to fight against IUU in the region. External drivers such as the global interest to fight overfishing (GEN, 2021) or the impact of harmful

subsidies in fisheries (Sumaila *et al.*, 2021) fuel existing development towards management efforts.

Regarding the limited progress made by some countries across the four targets, an ecological look at the WIO region through the OHI, the MTI and stock data show that while marine ecosystems and biodiversity in the WIO can be considered to be at a healthy level, the high level of exploitation of fish stocks in some countries (between 30 % to 80 % of stocks being over-exploited or collapsed) puts marine resources at risk. Threats such as climate change (Cerutti *et al.*, 2020; Jacobs *et al.*, 2021), increasing marine pollution (Burt *et al.*, 2020; Kerubo *et al.*, 2020) and overfishing of species such as tunas and sharks in the broader Indian Ocean (IOTC, 2016; IOTC, 2019) all put pressure on the ecological health of the WIO and the ability for ecosystems to deliver functioning services. The connectivity of the WIO with the high seas also means that fishing activity in the high seas affects the health of marine ecosystems within the WIO region (Popova *et al.*, 2019).

On the socio-economic drivers, for the developing countries of the WIO, socio-economic and political imperatives of development and blue growth often involve extraction of natural resources undermining conservation priorities (Kiswaa, 2020; Bennett *et al.*, 2021). External drivers, such as high demand for seafood and key commercial species like tuna, also have an impact on the level of exploitation of marine resources. The unsatisfactory results in governance in the WIO countries, despite the region being highly active and supported by various initiatives, suggest that the WIO region is struggling with both implementation and with monitoring progress. Countries that are struggling to perform well now are likely to struggle in the future given the limited means and resources to implement activities towards achieving SDG 14 (UNEP-NC and WIOMSA, 2021). Persistent lack of funding and limitations in number of staff and equipment and the need for capacity development hindered WIO countries implementing MPA management (ibid) as well as the fight against IUU fishing (Macfadyen *et al.,* 2021).

There have been serious impacts and implications of the COVID-19 pandemic on all 17 SDGs in the year 2020 (United Nations, 2020). For SDG 14 this had affected enforcement, resources and capacity, and limited the ability of nations to progress towards the targets. Pulse events such as political instability can also influence direction of governments towards marine actions as national interests often change with changing governments.

In view of the different initiatives happening in the WIO, it seems that monitoring of progress could be better recorded and therefore contribute to the achievement of SDG 14 targets. For example, as of January 2022, the IOC UNESCO portal on MSP only has records of five WIO countries involved in MSP (France, Kenya, Mauritius, Mozambique and Seychelles) (IOC-UNESCO, 2021). However, other countries (e.g., South Africa and Madagascar) and the WIO region are involved in the development of national and a regional MSP (MSP Secretariat, 2020; Lombard *et al.* 2021). Furthermore, national processes towards monitoring of the achievement of targets are still limited. MPA coverage is monitored through both national submission of data for the WDPA or by regional initiatives such as the WIO MPA outlook but, beyond MPAs, national reporting on SDGs including SDG 14 is currently based on the Voluntary National Reviews which is more a list of actions undertaken by countries. In the past five years, countries of the WIO have submitted these reviews sporadically or not at all (United Nations, 2022b).

Limited availability of data prevents effective monitoring of progress. This includes, for example, data regarding OECMs that could improve the coverage of marine areas protected and help achieve both SDG 14.2 and 14.5 (Gurney *et al.*, 2021; Estradivari *et al.*, 2022). Data on fish stocks for stock assessments is also limited. The number of available stock assessments remains limited globally and not only in the WIO region (FAO, 2020; Britten *et al.*, 2021). Knowledge about stocks are available through regional assessments of the FAO, regional fisheries management organisations or, as analysed in this study, from the available assessments made by the *Sea Around Us* project.

Some external drivers such as the difficulty to implement some targets have rendered implementation challenging, and not only for the WIO countries. Target 14.2 for example promotes the implementation of area-based management including MSP and Integrated Coastal Zone Management (ICZM). However, the operationalisation of MSP is still at the development stage for most countries globally while socio-economic, institutional and political challenges have now emerged from the process (Flannery *et al.*,

2018; Santos *et al.*, 2019; Frazão Santos *et al.*, 2021). ICZM processes, on the other hand, have been in place for a long time and have presented various limitations to implementation as well (Sowman and Malan, 2018; Sabai, 2021). The same applies to Target 14.4 which aims to achieve biologically sustainable fish stocks. National capacity to undertake stock assessment is still limited (Palomares *et al.*, 2021) and initiatives to improve this by the FAO have only been taken up since 2019 (FAO, 2019).

Potential ways of improving SDG 14 reporting and implementation towards achievement in the WIO

The results above represent a reality check for the region which has been the beneficiary of various projects, assessments and initiatives for many years. Based on the most recent literature the following adjustments and improvements are suggested to the WIO region and countries.

Better appropriation of SDG 14 monitoring

To improve achievement of SDG 14, the actions taking place in the WIO, at national and regional level, need to be recorded timeously and accurately and integrated into the overall monitoring of SDG 14 achievement. At the moment, SDG 14 achievement is assessed through the UN reporting mechanism or independent studies not facilitating appropriation of the process of monitoring by countries and regions. Structures like the Nairobi Convention can serve as a platform in this process to better coordinate actions and support low achieving countries. Scientific networks such as the WIOMSA could be mobilised to gather existing data that would better monitor the actions of the WIO region towards SDG 14. The following table provides an indication of the potential data needed for all SDG 14 targets and the sources of knowledge that could be mobilised within the WIO region. The data and knowledge gathered could be consolidated at the regional level and accessed by national focal points at the ministries in charge of fisheries and marine resources management that are periodically contacted to fill out UNEP or FAO questionnaires related to the progress of the different targets of SDG 14. Providing the information to national actors can also improve the submission of data for platforms like World Database on Protected Areas monitoring progress towards SDG 14.5 and it can help countries in the submission of their voluntary reports by providing key results on different targets.

A holistic approach towards achievement: Linking conservation and sustainable use

To achieve the goals of Agenda 2030, the region needs to increase its ambition. National and regional strategies towards improving progress towards SDG 14 should address not only the direct lack of progress, but also the root causes thereof. Increasing the coverage of marine protected areas requires a focus on establishing processes and providing resources for countries to implement and monitor the effectiveness of these marine areas (Failler *et al.*, 2020; Phang *et al.*, 2020). This requires the collaboration of various stakeholders, from governments establishing policy to civil society organisations and businesses involved in implementing actions, as well as researchers providing the needed evidence for policy and decision making. The WIO has platforms such as the Science to Policy dialogue to allow this collaboration and could be mobilised towards SDG 14 achievement. Alignment of different governance and marine management processes is necessary. For example, SDGs and the CBD post-2020 biodiversity framework cover targets addressing similar issues, such as the target for marine protected areas increasing from 10 % under SDG 14.5 to 30 % under the CBD post-202 biodiversity framework target 3. Better alignment is also needed between SDG 14 targets and national and regional blue economy strategies that are burgeoning in the region. To capture all these processes, a more narrative-based approach to present achievement might be useful as it could address different SDGs (Obura, 2020) or better align blue economy strategies with SDGs needs (Niner *et al.*, 2022).

Marine protection and fisheries management need to be addressed in a more holistic way. While the distinct fisheries and marine protection SDG 14 targets perpetuate the separation between marine protection and fisheries, reduction of marine resources through fisheries presents a real threat to the state of our oceans and its people (Okafor-Yarwood *et al.*, 2022; Marsac *et al.*, 2020). Achieving SDG 14 targets related to fisheries is therefore essential to achieve an effective marine protection. Similarly, better managed marine areas can lead to a more productive ocean that could benefit fisheries (Davis *et al.*, 2019; Marshall *et al.*, 2019). Monitoring these two targets and ensuring that actions address both topics have the potential to simultaneously achieve two or more SDG 14 targets and other related SDGs (e.g., SDG 2 on food security or SDG 13 on climate action). This, however, could require making trade-offs on other SDGs such as SDG

Table 2. Targets, indicator, data and sources to monitor SDG 14 progress in the WIO.

SDG 14 Targets	Indicator[1]	Data needed to monitor progress[2]	Potential data source for the WIO
Target 14.1: Reduce marine pollution	Index of coastal eutrophication and floating plastic debris density.	Level of eutrophication Plastic flow	WIO Marine Litter Monitoring Programme
Target 14.2: Protect and restore ecosystems	The proportion of national exclusive economic zones managed using ecosystem-based approaches.	Coverage of EEZ Effectiveness of EBAs	Marine Spatial Atlas for the Western Indian Ocean IOC-UNESCO MSP database SAPHIRE Project
Target 14.3: Reduce ocean acidification	The average marine acidity (pH) measured at agreed suite of representative sampling stations.	Data on marine acidity at sampling stations	MASMA Ocean Acidification project
Target 14.4: Sustainable fishing	The proportion of fish stocks within biologically sustainable levels.	Level of sustainability of all national stocks	*Sea Around Us* database FAO assessments IOTC stock assessments Global Fishing Index
Target 14.5: Conserve coastal and marine areas	The coverage of protected areas in relation to marine areas.	Evolution of marine protected area coverage	WDPA database WIO MPA outlooks
Target 14.6: End subsidies contributing to overfishing	Progress by countries in the degree of implementation of international instruments aiming to combat illegal, unreported and unregulated fishing.	Implementation level of IUU related instruments	SWIOFC reports IUU Index
Target 14.7: Increase the economic benefits from sustainable use of marine resources	Sustainable fisheries as a proportion of GDP.	Measurement of fisheries being sustainable, proportion of small-scale fisheries into DGP	N/A Needed: a measurable definition of sustainability To be collected: Information from fisheries departments and NGOs/ local fishers
Target 14.A: Increase scientific knowledge, research and technology for ocean health	The proportion of total research budget allocated to research in the field of marine technology.	Budget information	N/A To be collected: National budgets of research institutes
Target 14.B: Support small scale fishers	Progress by countries in the degree of application of a legal/regulatory/ policy/institutional framework which recognizes and protects access rights for small-scale fisheries.	Identification of instruments and Level of implementation of access rights related instruments	N/A To be collected: Information from COAPA Information from LMMA networks
Target 14.C: Implement and enforce international sea law	The number of countries making progress in ratifying, accepting and implementing through legal, policy and institutional frameworks, ocean-related instruments that implement international law, as reflected in the United Nations Convention on the Law of the Sea.	Identification of relevant legal, policy and institutional frameworks and level of implementation	IUU index Global Fishing Index

[1] According to Resolution A/RES/71/313 on the Global indicator framework for the Sustainable Development Goals and targets of the 2030 Agenda for Sustainable Development

[2] According to the Global Manual on Measuring SDG 14.1.1, SDG 14.2.1 and SDG 14.5.1 (UNEP 2021) and the SDG indicators metadata repository (available at: https://unstats.un.org/sdgs/metadata/)

2 on poverty (Singh *et al.*, 2018) or SDG 7 on energy (Nilsson *et al.*, 2018) for example, by limiting fishing efforts in specific biodiversity areas (Hilborn *et al.*, 2021) or establishing compensation funds from biodiversity loss from fisheries (Booth *et al.*, 2021).

A tailored approach to capacity development through mutual learning

While sharing the same part of the Indian Ocean, WIO countries are socio-economically diverse. This leads to different means, resources and capabilities in

both implementing SDG 14 actions and monitoring progress towards achievement. Some countries are advancing well in achieving SDG 14 and others are still struggling. Existing and future efforts in capacity development, from a regional perspective, need to consider the different needs in the region and tailor the actions needed towards SDG 14 accordingly. As regional initiatives such as the WIO Great Blue Wall (IUCN, 2021) and global funding such as from the Blue Action Fund (Blue Action Fund, 2022) continue to flow in the WIO, these need to look at the diverse and distinct needs of the WIO countries. This paper shows that WIO countries can be divided into three groups, each necessitating tailored capacity development:

- First are the high achievers such as France and the Seychelles. For these countries, capacity development in monitoring progress is key to ensure that results of projects and initiatives are counted towards achievement of SDG 14. Considering the diversity of the SDG 14 targets, coordination between various state departments is necessary and ensuring that capacity towards monitoring progress towards SDG 14 is reinforced.

- Second is the countries that are still far from achievement such as Comoros[10] or Somalia. These countries require capacity development at both implementation and monitoring levels. For implementation, as seen in the implementation of other global goals such as the CBD Aichi targets, capacity is needed at different levels from local community groups to national NGOs, governments and research entities that are often underfunded and understaffed leading to limited means available to implement actions (Phang *et al.*, 2020; UNEP-Nairobi Convention and WIOMSA, 2021). Here, investment in capacity development is needed in key processes, such as raising and maintaining financial capacity for MPAs and OECMs or increasing human resources capacity in the fight against IUU fishing. In terms of monitoring, capacity development in data production and collection remains paramount. Processes such as stock assessments or MSP are at the centre of SDG 14 and will require countries and initiatives in the region to invest in improving national capacity through supporting training.

- The third set of countries, representing more than half of the WIO, are countries that have been classified as making low to average progress, depending on the targets. For these countries, targeted actions will be needed in terms of implementation and monitoring of progress. All countries classified as displaying low progress towards achieving ecosystem-based area management (SDG 14.2), need to better record and monitor progress within initiatives such as MSP, Locally Managed Marine Areas (LMMAs) and ICZM actions. Regarding MPA coverage, most countries have not achieved this target which implies that more MPAs and OECMs are still needed within the WIO. However, ensuring effectiveness of existing MPAs/OECMs needs to remain a priority. It might also be time to question the relevance of this target for the region. While quantified targets can be useful to ensure robustness (Maron *et al.*, 2021), few countries globally achieve them – for example, biodiversity targets (Secretariat of the Convention on Biological Diversity, 2020). A more qualitative or narrative-based approach towards progress, as suggested by some authors (Rees *et al.*, 2018; Obura, 2020) could be beneficial in showing improvement of processes in marine management and protection.

Finally, regarding the sustainability of fish stocks, countries need to improve their capacity in undertaking stock assessments, support initiatives that rebuild stocks and phase out destructive fishing activities such as bottom trawling and other destructive gears. Current reporting of the IUU Index or the newly established Global Fishing Index (Minderoo Foundation, 2021) can also help countries and the WIO in targeting areas that require capacity development, such as improving monitoring, control and surveillance capacity. To coordinate these efforts, regional cooperation on ocean governance will be essential: countries making progress or those that have achieved the targets can share best practices with others and help pave the way for more SDG 14 progress in the region. Countries with average progress need to be more supported in their existing efforts. Countries far from achievement are highlighted so they can get more support from the region and the international community. This support should not be geared towards rushed achievement but better structured towards long-term improvement in all aspects of fisheries management.

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10 At the time of the revision of this paper, Comoros made the decision to expand its MPA network with three more sites, not accounted yet within the WDPA.

*A cross-scale intervention for inclusion
and social equity*

SDG 14 provides a framework for more ocean actions or more visibility of actions undertaken in the region. Implementation of SDG 14 requires action across scales from the local managers of marine areas or fishers to the governments and those involved in regional processes. As the pressure on governments towards ocean action increases, it is essential that local actors, that are most affected by the management of the WIO and its resources, remain at the centre of processes. Inclusion and social equity need to drive the achievement of SDG 14 in both implementation and monitoring of achievement. Involvement of local stakeholders needs to go beyond participation at meetings or being beneficiaries of projects. It should ensure that local views are taken into consideration and integrated into decision-making. Processes such as MSP, for example, can be a source of conflict when, despite participation local actors feel that their views are not reflected into the outcome of the process (Flannery *et al.*, 2018; Schutter and Hicks, 2019).

As various independent assessments are being undertaken, countries and stakeholders need to be fully engaged in the process of measuring progress rather than only being data providers. A fully engaged co-production of knowledge is necessary and can pave the way for positive and equitable socio-ecological transformation (Ertör and Hadjimichael, 2020; Chambers *et al.*, 2021). Achieving SDG 14 needs be seen as an opportunity for stakeholders to have dialogues and debates on how to best advance towards a sustainable ocean. The integration of SDG14 in the development of blue economy agendas in the WIO should result in a more inclusive process and enhance blue justice (Bennett, 2018; Armstrong, 2020), creating an opportunity for the region to be a model for the rest of the world.

Conclusion

The SDGs represent the global framework for sustainable development until 2030 and potentially beyond that. As more than five years have now passed since the adoption of SDG 14, this paper reflects on implementation, monitoring and potential ways to achieve the SDG 14 targets for the WIO region. Countries of the WIO have made limited progress towards the four targets of SDG 14 analysed in this paper. Countries have struggled to achieve targets related to marine protection and area-based management (SDG 14.2 and 14.5) while progress towards fisheries related targets (SDG 14.4 and 14.6) has been more encouraging with more

countries making good progress. Considering the various active projects and initiatives taking place in the region, this shows that either current efforts have been insufficient to achieve the global targets or that the region has not managed to convert its successes into the achievement of the SDG 14 targets. The paper shows the national challenges in achieving SDG 14 and how knowledge around the SDGs could be improved beyond global indicators. To achieve SDG 14, the WIO region needs to improve the monitoring of progress towards SDG 14 targets by mobilising existing data but also by potentially adapting the monitoring process to fit the diverse contexts in the WIO. In parallel to this, countries of the WIO could adapt the framework of SDG 14 targets to direct actions towards a more comprehensive approach - linking conservation and sustainable use, fostering mutual learning and ensuring inclusivity and equity in decision and policy making. As we have entered the UN Decade of Ocean Science for sustainable development that promotes science towards SDG 14, the WIO region is ideally equipped with its lively community of governments, practitioners and researchers to be a model towards SDG 14 achievement tailored to the needs and capabilities of the region.

Acknowledgements

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