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Integrating climate change impacts into SIOFA decisions

Deep Sea Conservation Coalition (DSCC)

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Abstract	
<p>There are growing concerns about the impacts of human-induced climate changes on Earth ecosystems, including the marine environment, and many RFMOs are undertaking work to incorporate response actions into their processes and decisions. This paper reviews the work undertaken by the Scientific Committees of several RFMOs and CCAMLR and makes recommendations on work for the SIOFA SC as well as advice to the MoP.</p> <p>The DSCC proposes that the Scientific Committee</p> <ul style="list-style-type: none">• review where the potential and observed impacts of climate change should be incorporated into its advice to the Meeting of the Parties (MoP).• Request the secretariat identify existing climate change information and gaps in knowledge.• Undertake work to<ul style="list-style-type: none">○ identify Scientific Committee processes and considerations where climate change information should be incorporated such as stock assessments for targeted stocks, management strategies, assessment of the health of non-targeted species, and fisheries and ecosystem reports,	

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- consider information required to incorporate climate change factors into those processes,
- review what climate change information is required to provide that advice.
- determine how such information might be routinely collected, and
- undertake a systematic identification of species and habitats particularly vulnerable to climate change impacts.
- inform the MoP of the potential implications of climate change on relevant science-based decisions, and
- recommends the MoP
 - adopts Climate Change as a standing agenda item.
 - initiates work to
 - develop a plan to promote climate-resilient fisheries management,
 - determine what regular advice it would like from the Scientific Committee, and
 - consider possible amendments to existing CMMs resulting from incorporation of climate change information.
 - require the incorporation of climate change factors into fisheries and ecosystem reports, BFAs (including existing BFAs) and proposals for any new or exploratory fisheries.
 - make funding available for climate research from 2025.
 - consider the role of climate change factors as part of its Marine Protected Area discussions.

Integrating climate change impacts into SIOFA decisions

Introduction

Many international initiatives have been established to respond to growing concerns about the impacts of human-induced climate changes on Earth's ecosystems, including through the United Nations Framework Convention on Climate Change, the Paris Agreement and the Food and Agriculture Organization's (FAO) Strategy on Climate Change 2022-2031.

The Intergovernmental Panel on Climate Change's (IPCC) Special Report on the Ocean and Cryosphere in a Changing Climate (2019) and Sixth Assessment Report (IPCC 2022) reported increased confidence in the latest science relating to the impacts of human-induced climate change on the world's oceans. Projected and observed impacts include sea level rise, acidification, more frequent and severe extreme marine events, marine heatwaves, loss of marine biodiversity, and impacts on fisheries and marine-based economies. Heron et al. (2018) suggested that 'half of the world's marine species may stand on the brink of extinction by 2100' and that 'an estimated 60 % of the world's marine ecosystems have already been degraded or are being used unsustainably.' Sweetman et al. (2017) suggested that benthic habitats could experience increased temperatures and acidification and decreased oxygen concentrations and nutrient loadings, leading to significantly deleterious impacts on deep-sea benthic ecosystems.

Many regional fisheries management bodies have now initiated action to address climate impacts in their sustainable fisheries and marine conservation decisions. It is time for SIOFA to take up this issue.

This paper proposes that the SIOFA Scientific Committee:

The Deep Sea Conservation Coalition recommends that the Scientific Committee initiate work to:

- Review current work plan and discussions to determine where the potential and observed impacts of climate change should be incorporated into its advice to the MoP.
- Request the secretariat identify existing climate change information and gaps in knowledge.
- Undertake intersessional work to
 - identify Scientific Committee processes and considerations where climate change information should be incorporated such as stock assessments for targeted stocks, management strategies, assessment of the health of non-targeted species, and fisheries and ecosystem reports,
 - consider information required to incorporate climate change factors into those processes,
 - determine how such information might be routinely collected, and
 - undertake a systematic identification of species and habitats particularly vulnerable to climate change impacts.
- Inform the MoP of the potential implications of climate change on relevant science-based decisions, and
- Recommend the MoP
 - adopts Climate Change as a standing agenda item.
 - initiates work to
 - develop a plan to promote climate-resilient fisheries management,
 - determine what regular advice it would like from the Scientific Committee, and
 - consider possible amendments to existing CMMs resulting from incorporation of climate change information.

- require the incorporation of climate change factors into fisheries and ecosystem reports, BFIAAs (including existing BFIAAs) and proposals for any new or exploratory fisheries.
- make funding available for climate research from 2025.
- consider the role of climate change factors as part of its Marine Protected Area discussions.

Observed and projected climate impacts within the SIOFA area

There is little published literature about observed or projected climate impacts specific to the Southern Indian Ocean Convention Area. In addition to the broader conclusions of the IPCC, research across the Indian Ocean basin reports observed changes such as rapid, uneven sea surface temperature increases, higher temperatures in the upper 700 metres of the water column, and intense marine heat waves, particularly in the southeastern Indian Ocean (Azarian et al. 2023; Roxy et al. 2020; Sharma et al. 2023).

Projections include increased frequency of extreme Indian Ocean Dipole (IOD) events, potential changes to the Indian Ocean Walker circulation, strengthening of ocean surface warming and impacts from changes on the Antarctic Circumpolar Current (Azarian et al. 2023; Roxy et al. 2020; Sharma et al. 2023).

Actions taken by other Regional Fisheries Bodies

RFMOs and regional bodies with fisheries responsibilities are increasingly taking measures to address climate change, including addressing the movement of fish stocks due to climate change (Goodman et al. 2022). Specific Scientific Committee tasks of these organisations are outlined below.

Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR)

The CCAMLR has a well-established process for receiving regular scientific updates relating to observed and projected climate impacts in its area of competency. Resolution 36/41 (2022) encourages Members to integrate climate change science across all CCAMLR activities and supports additional science and scientific collaboration.

CCAMLR's approach to fisheries management is based on a precautionary and ecosystem-based approach using the best science available. It has adopted a review process for active finfish fisheries that allows for annual or biennial adjustment in response to changes in targeted stock health and/or bycatch, and has frozen krill catch limits at a highly precautionary level until measures are adopted that can take rapid changes in krill populations and related ecosystems into account. CCAMLR fishery reports now contain a section on climate change, there is a work plan associated with the impacts of climate change on a fishery, and the Scientific Committee has incorporated climate change into its advice to the Commission.

International Convention for the Conservation of Atlantic Tunas (ICCAT)

ICCAT adopted Resolution 2022-13 on climate change which builds on assessments already undertaken by the Subcommittee on Ecosystems and Bycatch. It held a joint experts meeting in October 2023 that identified a number of tasks for their Standing Committee for Research and Bycatch to assist the ICCAT Commission determine strategies and tools to promote climate-resilient fisheries management. Another joint meeting is planned for 2024.

Indian Ocean Tuna Commission (IOTC)

The IOTC adopted Resolution 22/01 on climate change in 2021, which takes a holistic approach to addressing climate change (Karim 2023), drawing from assessment work already being undertaken by its Scientific Committee. The IOTC Scientific Committee is, upon request, to consider and where possible, advise on the potential impacts of climate change on highly migratory fish stocks and any

related impacts on the economies, food security and livelihood of Contracting and Cooperating Non-Contracting Parties (CPCs), in particular developing States including Least Developing States and Small Island Developing States. It is also to consider how climate change and fishing activities may be related and provide advice to the Commission on the potential implications for these relationships and for the conservation and management of tuna and associated stocks.

Inter-American Tropical Tuna Commission (IATTC)

The IATTC in 2023 adopted Resolution [C-2023-10](#) on climate change, which established climate change as a standing agenda item of the Commission, Scientific Advisory Committee (SAC) and Working Group on Ecosystem and Bycatch (EBWG). It provides for the EBWG to provide advice to the SAC and Commission regarding amendments to existing resolutions or proposed new resolutions that may be necessary because of climate change impacts on fisheries in the IATTC Convention area, and it also provides for the SAC to highlight and consider the best scientific information available on the relationships between climate change, target stocks, non-target species, and species belonging to the same ecosystem or associated with the target stocks. To the extent feasible, the IATTC scientific staff will endeavour to take climate change into consideration in stock assessments and management strategy evaluations. As a result of these discussions, the SAC should make recommendations to the Commission on how existing resolutions and proposed new resolutions can best promote resilience to climate change impacts on fisheries in the Convention area.

Like the IOTC, the IATTC takes an integrated approach to climate change. The IATTC Commission is to consider climate-related SAC and EBWG Recommendations in its deliberations, as well as any other considerations regarding climate change impacts on species under the purview of the Antigua Convention and any related impacts on the economies of CPCs, and the Director and Commission is to consider and present options to reduce the environmental and climate impacts of the activities of the Commission and its subsidiary bodies, such as by providing virtual meeting options for meetings (to avoid impacts of international travel).

North Atlantic Fisheries Organisation (NAFO)

The NAFO Scientific Council Standing Committee on Fisheries Environment (STACFEN) regularly updates the latest [ocean climate status information](#) on the NAFO website. In 2023, NAFO adopted [COM Doc 23-12](#), which requires the consideration of current and future impacts of climate change on NAFO-managed stocks, non-target species and associated ecosystems, including in its decision-making and through its Ecosystem Roadmap, using the best science available when developing management decisions, evaluating the effect of climate change on target and non-target NAFO-managed stocks and associated ecosystems, as well as fishing activities, considering possible mitigation actions, and requesting annual updates on the latest science from the Scientific Committee.

South Pacific Regional Fisheries Management Organisation (SPRFMO)

The 2024 SPRFMO Commission requested the Scientific Committee's Habitat Monitoring Working Group to develop an inventory of available climate data and models for SPRFMO fisheries to assess existing resources and gaps in knowledge, for SC advice on climate change to be stored in a single location on the SPRFMO website ([SPRFMO COMM12](#), Agenda Item 8).

Western and Central Pacific Fisheries Commission (WCPFC)

In 2019, the Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC) adopted [Resolution 2019-01](#), noting work that had already been undertaken by its scientists and policy makers to assess the impacts of climate change on target stocks, non-target species and dependent or associated species, threat to the livelihoods, security and wellbeing of many of its Pacific Island Members. Among agreed actions, the Commission requested its Scientific Committee provide ongoing science to improve understanding of the impact of climate change on species, interrelationships with other factors that affect these species, estimates of uncertainties, and interrelationships between climate change and fishing activities.

Since 2019, the Commission has established a standing climate change agenda item under which to consider incorporation of climate change factors into the management and conservation of its

fisheries and ecosystems, and has applied climate change issues to the development of a skipjack harvest strategy framework, developed an *Ecosystem and Climate Indicator Report Card*, which is updated and reviewed annually by the Commission and its subsidiary bodies. It has also directed its Scientific and Compliance Committees to submit an annual update on available climate change data, initiated consideration of requirements to undertake an assessment of active CMMs to determine specific CMM provisions that may be susceptible to climate change impacts, and initiated the development of a Commission work plan for addressing climate change on WCPFC fisheries in the its Convention area ([WCPFC 20-2023-12](#)).

International Workshop for Regional Fisheries Bodies

The Food and Agriculture Organisation (FAO) held a workshop in October 2023 entitled “Mainstreaming climate change into international fisheries governance - the case of Regional Fisheries Bodies in the Indo-Pacific region.” This workshop identified several initiatives to progress climate change discussions relevant to RFMO Scientific Committee work, including

- establishing a dedicated working group or permanent agenda item on climate change,
- incorporating climate change considerations into stock assessment processes,
- requiring fisheries-specific Decisions to be regularly reviewed,
- contributing to the development of overarching climate change policy or strategy, and
- undertaking research projects with a focus on climate change.

Discussion: Information required for providing advice

[The SIOFA Agreement](#) requires Parties to ensure the ‘long-term conservation and sustainable use of fishery resources in the Area’ (Article 2 Objectives) using best scientific evidence available and the precautionary approach, maintaining stocks at sustainable levels, protecting biodiversity and recognising the needs of developing State Members. Among its functions, the Meeting of the Parties must:

- (a) review the state of fishery resources, including their abundance and the level of their exploitation;
- (c) evaluate the impact of fishing on the fishery resources and on the marine environment, considering the environmental and oceanographic characteristics of the Area, other human activities and environmental factors; and
- (d) formulate and adopt conservation and management measures necessary for ensuring the long-term sustainability of the fishery resources, considering the need to protect marine biodiversity, based on the best scientific evidence available.

To effectively deliver these functions, the MoP would require specific Scientific Committee advice where such advice could reasonably be expected to be influenced by climate change decisions. To provide such advice the Scientific Committee would need to project or detect changes related to climate change in harvested, bycatch, dependent and related species, ecosystem relationships and vulnerable habitats, to incorporate climate change factors into models used for generating fisheries management advice decisions, and to identify data to be routinely collected to aid the monitoring of changes.

Conclusions

The Deep Sea Conservation Coalition recommends that the Scientific Committee initiate work to:

- **Review current work plan and discussions** to determine where the potential and observed impacts of climate change should be incorporated into its advice to the MoP.

- **Request the secretariat** identify existing climate change information and gaps in knowledge.
- **Undertake intersessional work** to
 - identify Scientific Committee processes and considerations where climate change information should be incorporated such as stock assessments for targeted stocks, management strategies, assessment of the health of non-targeted species, and fisheries and ecosystem reports,
 - consider information required to incorporate climate change factors into those processes,
 - determine how such information might be routinely collected, and
 - undertake a systematic identification of species and habitats particularly vulnerable to climate change impacts.

And

- **Inform the MoP** of the potential implications of climate change on relevant science-based decisions.
- **Recommend the MoP**
 - adopts Climate Change as a standing agenda item.
 - initiates work to
 - develop a plan to promote climate-resilient fisheries management,
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References

Azarian, C. et al. 2023. Current and projected patterns of warming and marine heatwaves in the Southern India Ocean. *Progress in Oceanography*, 215.

<https://doi.org/10.1016/j.pocean.2023.103036>

Food and Agriculture Organization. 2022. FAO strategy 9 on climate change. 2022–2023. FAO Rome.

Goodman C., Davis R., Azmi K., Bell J., Galland G.R., Gilman E., Haas B., Hanich Q., Lehodey P., Manarangi-Trott L., Nicol S., Obregon P., Pilling G., Senina I., Seto K. & Tsamenyi M. (2022).

Enhancing cooperative responses by regional fisheries management organisations to climate-driven redistribution of tropical Pacific tuna stocks. *Front. Mar. Sci.* 9:1046018. [https://doi: 10.3389/fmars.2022.1046018](https://doi.org/10.3389/fmars.2022.1046018)

Heron, S.F. et al. 2018. Impacts of Climate Change on World Heritage Coral Reefs: Update to the First Global Scientific Assessment. Paris, UNESCO World Heritage Centre.

IPCC. 2022. Summary for Policymakers [H.-O. Pörtner, D.C. Roberts, E.S. Poloczanska, K. Mintenbeck, M. Tignor, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem (eds.)]. In: Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 3–33, doi:10.1017/9781009325844.001.

IPCC. 2022. Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press. Cambridge University Press, Cambridge, UK and New York, NY, USA, 3056 pp. <https://doi.org/10.1017/9781009325844>.

IPCC. 2023. AR6 Synthesis Report: Climate Change 2023. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee & J. Romero (eds.)]. IPCC, Geneva, Switzerland, pp. 35–115. Accessed from <https://www.ipcc.ch/report/sixth-assessment-report-cycle/>

Karim, Md. 2023. Indian Ocean Tuna Commission Climate Change Resolution: A quiet interaction of ocean and climate change legal regimes. *Marine Policy*, 148. <https://doi.org/10.1016/j.marpol.2022.105434>

Roxy, M. et al. 2020. Indian Ocean Warming. In Krishnan R. et al. (eds.), *Assessment of Climate Change over the Indian Region* (pp. 191–206). Singapore: Springer.

Sharma, S., Ha, K.J., Yamaguchi, R., Rodgers, K.B., Timmermann, A., & Chung, E.S. (2023). Future Indian Ocean warming patterns. *Nature Communications*, 14(1), 1789.

Sweetman, A.K. et al. 2017. Major impacts of climate change on deep-sea benthic ecosystems. *Elem Sci Anth*, 5: 4. <https://doi.org/10.1525/elementa.203>

United Nations Framework Convention on Climate Change. May 9, 1992. S. Treaty Doc No. 102-38, 1771 U.N.T.S. 107. Accessed from https://treaties.un.org/pages/ViewDetailsIII.aspx?src=TREATY&mtdsg_no=XXVII-7&chapter=27&Temp=mtdsg3&clang=_en