

Ocean Stewardship Horizon Scan 2022: Eight science, policy and practice developments

Over the past year, enabling conditions to support progress towards ocean stewardship have emerged in the form of significant international policy developments as well as novel monitoring technologies. New frameworks for corporate reporting on biodiversity are rapidly taking shape, and benchmarks are emerging to track this progress across companies. At the same time, climate change is resulting in fundamental changes to Earth's systems, with new science on tipping points underscoring the need for urgent and ambitious climate action.

1

International policy developments

WTO Fisheries Subsidies Agreement: In June 2022, the World Trade Organization (WTO) agreement on fisheries subsidies was adopted, following more than two decades of negotiation. This becomes the WTO's first binding, multilateral agreement related to ocean sustainability, and will enter into force when two-thirds of its members deposit "instruments of acceptance". Four key elements of the agreement are: (1) mandatory disclosure by governments of subsidies granted to their fleets and operators; (2) a ban on subsidies for vessels/operators involved in IUU fishing; (3) a ban on subsidies for fishing in areas beyond national jurisdiction if the operations fall outside the jurisdiction of a RFMO; (4) limits on funding targeted to fishing stocks classified as overfished. The agreement did not, however, resolve a range of issues related to subsidies that support overfishing and overcapacity.

Read more: https://www.wto.org/english/tratop_e/rulesneg_e/fish_e/fish_e.htm

UN Plastics Treaty: In March 2022, the international community agreed in the context of the UN Environment Assembly to create an international legally-binding agreement by 2024 to end plastic pollution. The agreement is expected to "reflect diverse alternatives to address the full lifecycle of plastics, the design of reusable and recyclable products and materials, and the need for enhanced international collaboration to facilitate access to technology, capacity building and scientific and technical cooperation".

Read more: <https://www.unep.org/news-and-stories/press-release/historic-day-campaign-beat-plastic-pollution-nations-commit-develop>

CBD post-2020 biodiversity framework: In December 2022, states will convene in the context of the Convention on Biological Diversity (CBD) for the UN Biodiversity Conference in Montreal, Canada, where they are expected to adopt the "post-2020 global biodiversity

framework". This framework marks a continuation from the previous Strategic Plan for Biodiversity 2011-2020 and associated Aichi Targets, and an articulation of the international community's approach to biodiversity conservation for the next decade. A draft framework is available in multiple languages, and includes 21 action-oriented targets to 2030. While all targets are of relevance for SeaBOS, Target 15 is of particular note: *"All businesses (public and private, large, medium and small) assess and report on their dependencies and impacts on biodiversity, from local to global, and progressively reduce negative impacts, by at least half and increase positive impacts, reducing biodiversity-related risks to businesses and moving towards the full sustainability of extraction and production practices, sourcing and supply chains, and use and disposal."*

Read more: <https://www.cbd.int/conferences/post2020>

Deep-Sea Mining Code: The International Seabed Authority (ISA) is empowered to both regulate and enable mining of the international seabed. Exploratory mining licenses have been granted for large portions of the seafloor, and while regulations that would enable commercial mining operations to begin have not been finalized, a two-year timeline has been imposed to force finalization by June 2023. Significant gaps exist related to the environmental impacts of seabed mining. For instance, although significant overlap exists between the spatial extent of mining exploration contracts and RFMOs, including the WCPFC, ICCAT, IATTC and IOTC, the long-term implications of seabed mining for marine foodwebs and commercial fishing operations are unknown.

Read more: <https://www.sciencedirect.com/science/article/pii/S0308597X22000537>

2

The new reality of climate change

A new normal of unprecedented extreme weather events has been front-page news in 2022, including record temperatures, rainfall, drought and heatwaves, both on land and in the ocean. Collectively, these events are closely aligned with over 30 years of reports published by the Intergovernmental Panel on Climate Change (IPCC). The most recent – its Sixth Assessment Report (AR6) – was published in three parts in late 2021 and early 2022, with a Summary for Policymakers concluding: *"The cumulative scientific evidence is unequivocal: Climate change is a threat to human well-being and planetary health. Any further delay in concerted anticipatory global action on adaptation and mitigation will miss a brief and rapidly closing window of opportunity to secure a liveable and sustainable future for all. (very high confidence)"*

Read more: https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_SummaryForPolicymakers.pdf

Climate tipping points. The impacts of climate change are not linear, and in some cases are expected to result in abrupt and irreversible changes that will fundamentally change conditions for life on Earth. A study published in September 2022 synthesized the latest knowledge on climate tipping points associated with more than 1.5°C warming, identifying nine "core" tipping elements. Six of these irreversible tipping points are likely to be reached at warming levels in line with the Paris Agreement (i.e. between 1.5 and

2.0°C warming), including the collapse of key ice sheets in Greenland and the Western Antarctic. The study provides further evidence for the need to keep warming within 1.5°C.

Read more: <https://www.science.org/doi/10.1126/science.abn7950>

Increased scrutiny of corporate climate pledges.

Climate targets and emissions reporting have become a key expectation of ESG reporting (see #5 below), and the number of such targets has grown rapidly in recent years alongside an increasing sense of urgency around the need for climate action. In parallel, researchers and analysts are increasingly scrutinizing the content and reporting on corporate climate pledges. A recent study, for instance, looked at the climate actions by 25 of the world's largest companies, and found that only 3 of the 25 had made clear commitments to rapid and significant decarbonization (Maersk, Vodafone and Deutsche Telekom). While 13 of the 25 companies had net-zero commitments towards 2050, the analysis found that on average, their plans would reduce emissions by just 40%.

Read more: <https://www.nature.com/articles/d41586-022-00366-2>

3

Labor abuses and IUU fishing

Designing monitoring and evaluation frameworks for labor abuses. The International Labour Organisation (in partnership with the Walk Free Foundation and the International Organization for Migration) has updated the global estimates of modern slavery incidence. These are an update on the estimated 2016 and relate to 2021 incidence. They note a rising number of workers in forced labor and estimate that 128,000 workers are in conditions of forced labor in the wild capture segment of seafood (they concede this is an underestimate). Several new and proposed legal and regulatory frameworks have also emerged in the last year. For example, in Norway, new legislation aims to ensure respect for decent working conditions and to create transparency for due diligence in supply chains. Another example is a proposed pan-EU standard in forced labor that, among other things, proposes an import ban on products made from forced labor. Recent research has focused on understanding key elements of actions needed to mitigate labor abuses in supply chains. Worker engagement in the design of policy and tools to address labor abuses is fundamental. In addition, worker-driven principles and monitoring are increasingly highlighted as being part of the package of tools or processes that aim to address labor abuses. Worker-driven social responsibility models are now being piloted in UK fisheries and elsewhere, and may offer valuable models for SeaBOS companies. Additionally multi-sector analyses of social auditing and ethical certification suggest reforms including worker-led monitoring and verification systems as well as broader support for the synergistic potential of worker-driven and state-led solutions.

Read more: <https://www.sciencedirect.com/science/article/pii/S0308597X22000914>
<https://www.restructurelab.org/the-briefs>

IUU fishing products in regulatory frameworks. FAO and many civil society organizations have been focusing on trying to establish regulatory frameworks and processes that reduce IUU fishing. FAO Voluntary Guidelines for Transshipment were adopted in September 2022, creating a framework for better transshipment practices. The objective of these voluntary Guidelines is to assist States, RFMOs, and other intergovernmental organizations “by providing standards for developing their policies and regulations that govern transshipment, with a view to integrating these in regulatory frameworks for sustainable fisheries management.”

Read more: <https://www.fao.org/newsroom/detail/sustainable-fishing-endorsement-of-transshipment-guidelines-marks-a-key-move-against-illegal-unreported-and-unregulated-fishing/en>

Reviewing IUU fishing literature and setting a future research agenda. A systematic review recently highlighted that while the economic and environmental costs of IUU fishing are well understood, the social costs, such as possible job losses and labour abuses are much more difficult to quantify with few studies seeking to address these issues. Moreover, while the issue of IUU fishing is relatively well defined at global scales, the volume and distribution of IUU fishing at national scales – those relevant for management and regulatory reform – are much less well understood. Findings also show that the amount of government spending to combat IUU fishing is substantially lower than the value of the activities themselves. In closing, the authors outline key steps required to make management decisions and/or undertake relevant regulatory reform, including conducting a risk assessment. This framing aligns with the current approach developed by the science team and applied in collaboration with SeaBOS companies, where the risk assessment process is responsive to the level of detail in each company's procurement data.

Read more: <https://www.sciencedirect.com/science/article/pii/S0308597X2200080X#sec0055>
<https://www.sciencedirect.com/science/article/pii/S0308597X22002597#sec0035>

Reducing IUU fishing in supply chains. Many companies rely on third-party certifications to ensure the environmental sustainability of products in their supply chains. Some of these certifications were not originally designed to monitor IUU fishing or avoid IUU fishing products entering their supply chains. The Marine Stewardship Council (MSC) certification process can help to incentivize improvement towards better harvesting practices and facilitating public-private sector cooperation. The MSC program requires certified fisheries to report on target species catches, bycatch and other ecosystem impacts, and governance effectiveness, creating mechanisms that can help to address aspects of IUU fishing, even if indirectly. However, IUU fishing remains a key challenge that prevents fisheries from being certified, particularly on the High Seas, or in lower-income countries with weak governance. Fishery Improvement Projects will vary in their focus on addressing IUU fishing or labor-related issues, and have had mixed success overall on environmental sustainability.

Read more: <https://www.frontiersin.org/articles/10.3389/fevo.2021.637228/full#conf1>
<https://gedb.se/upl/files/182711>

4

AMR occurrence and spread through value chains

A shift from screening for antibiotic residues to AMR genes is currently underway, driven by the steadily decreasing costs of screening for resistant genes. While testing for antibiotic residues remains the main way to trace antibiotic use in aquaculture, it is well known that these tests can be circumvented by withholding disallowed substances in the weeks running up to harvest. In response, there are ambitions to shift from antibiotic residue testing towards screening for AMR genes. This would limit risks for consumers and ensure that antibiotic use is avoided throughout the whole farming cycle, and in surrounding environments, aligning with a One Health approach. The resource consuming processes of running AMR gene arrays have, however, largely limited the number of AMR gene studies on aquaculture to academic publications. Rapid advances in sequencing techniques are in the meantime making gene screening ever more available. A recent study in *Nature*, for example, demonstrated that CRISPR could be used to make the detection of AMR genes inexpensive, fast, and reliable, and mobile AMR test kits are under development.

Read more: <https://www.nature.com/articles/s41598-022-13315-w>

These advancements, in parallel with more new monitoring technologies, such as using oxygen isotopes to trace fish origins, will increase the pressure

on seafood corporations to ensure responsibly produced animals. This, in turn, calls for an urgent need to understand and control the whole value chain, especially since AMR contamination also can occur at processing plants.

Read more: <https://onlinelibrary.wiley.com/doi/full/10.1111/faf.12703>
<https://pubmed.ncbi.nlm.nih.gov/23462087>

Screening for AMR genes is already available to anyone who is willing to buy a seafood product and pay one of many labs to analyze the product. This has already happened in Canada, where a news outlet had shrimp samples analyzed and publicly criticized the frequency of AMR genes detected. By piloting similar tests among the SeaBOS members, we are given a chance to identify value chains of concern and increase our collective understanding about the links between antibiotic use and AMR. This would allow us to target those value chain actors that are most likely to contaminate products with AMR and effectively reduce consumer exposure to AMR genes.

Read more: <https://www.cbc.ca/news/canada/shrimp-antibiotics-resistance-amr-marketplace-1.5055101>

5

Integration of sustainability concerns into financial reporting governance

International financial reporting requirements are set by a not-for-profit public interest body (the IFRS Foundation) whose purpose is to develop high-quality, understandable, enforceable and globally accepted accounting disclosure standards. The International Accounting Standards Board (IASB) regulates this area of corporate disclosures. In the past year, the IFRS Foundation has extended its scope to include the development of sustainability standards through the International Sustainability Standards Board (ISSB).

The ISSB creation was announced on 3 November 2021 at COP26 and has led to the consolidation of a

number of standard-setting processes that focus on the intersection of financial reporting matters and sustainability concerns. These include the Climate Disclosure Standards Board and the Value Reporting Foundation (itself made up of the consolidation of the Sustainability Accounting Standards Board, which primarily operated in the United States, and the International Integrated Reporting Council). Presently, the ISSB is focusing on consolidating existing guidance into new standards, in the first instance on climate and general sustainability-related financial disclosures. This work is also evolving alongside the Task-force on Climate-related Financial Disclosures (TCFD) and the

rapidly emerging Task-force on Nature-related Financial Disclosures (TNFD). This signals recognition in the finance community of the importance of sustainability issues for company value and for financial stability more generally. The advent of the ISSB may also give SeaBOS sustainability colleagues a new point of connection with the financial reporting function within their companies.

The Global Reporting Initiative remains a separate entity from the ISSB with its distinctive focus on articulating how companies impact upon the natural environment and affect social aspects of flourishing. This distinction is further explained in the following section.

Read more: <https://www.ifrs.org/>

6

ESG and corporate sustainability, and the emergence of “double materiality” and “dynamic materiality”

Environmental, social and governance considerations (ESG) have become a mantra for investors who are seeking to ensure that financial returns are safeguarded in the context of changing ecological conditions and societal expectations. ESG and sustainability are similar ideas but also differ from each other because they view ‘materiality’ differently. In short, materiality is all about the importance or significance of an issue and there are two sources of materiality (‘**inside-out**’ and ‘**outside-in**’ approaches).

An **inside-out** focus describes how companies and organisations impact society and the environment. This may result in (e.g.) corporate sustainability programmes on responsible sourcing addressing human/labour rights and the environmental impacts of supply chains and also how company action might make a positive impact, for example, by undertaking regenerative agriculture or being a living wage employer. This is also described as a sustainability-focused approach.

An **outside-in** focus is the basis of ESG. Here the question is how (e.g.) climate change will impact the company and the financial value of a company. Investors need to know this information to assess the value of the company, and to understand if a company’s sustainability response is robust. This understanding then guides investment decisions. Companies that consider both inside-out and outside-in approaches are described as adopting a **double**

materiality approach. A deeper consideration of how these two perspectives interact with each other indicates a step towards evaluating **dynamic materiality.**

Relevance to SeaBOS: The commitments pursued by SeaBOS members and using science to understand company operating contexts are aligned with a double or dynamic materiality focus. For example, this is evident in commitments to science-based target setting for greenhouse gas emissions (inside-out) as well as seeking to understand how ocean productivity will change in the face of climate change (outside-in). These directional considerations can also be described as *impact* and *dependence* focused where an impact is the ‘inside-out’ perspective and dependencies are an ‘outside-in’ perspective. Impact and dependence are words that are also being used in the various business and biodiversity standards/benchmarking developments.

Read more: <https://www.lancaster.ac.uk/pentland/news-and-events/blog/esg-and-sustainability-different-but-related-ideas>

7

Emergence of biodiversity reporting and benchmarking standards for business

IPBES Business and Biodiversity methodological assessment: The Intergovernmental science-policy Platform for Biodiversity and Ecosystem Services (IPBES) scoping assessment was completed during 2022 and approved by UN member governments in the middle of 2022. Currently, a call for nomination of experts to develop the full assessment is open with the full assessment likely to start early in 2023 and be completed later in 2024. The programme of work will seek to outline how business might measure their impact and dependence on biodiversity and nature's contributions to people. The assessment will likely identify criteria and indicators for measuring that dependence and impact, taking into consideration how such metrics can be integrated into other aspects of sustainability. These tools are also viewed as being useful for promoting business actions contributing to the conservation, restoration and sustainable use of biodiversity and to developing the business case for long-term sustainability. Tools and approaches are also important for promoting public accountability, informing regulatory agencies and guiding financial investments and in influencing consumer behaviour. The outcomes of this process are aimed at governments who might be expected to use the assessment to guide their country's corporate governance and corporate reporting requirements.

Read more: <https://ipbes.net/business-impact>

GRI 304: is a subject standard issued by the Global Reporting Initiative that focuses on biodiversity disclosures. The standard dates from 2006 and is currently being redeveloped given the critical nature of biodiversity loss and the increase in expectations that companies will address nature and biodiversity impacts and dependencies should they be material to their operations. It would be expected that SeaBOS member companies would have material biodiversity interactions and as such this standard will be important for corporate reporting. This is doubly the case given SeaBOS company commitments to GRI reporting. The previous standard in this area was very focused on operations that were close to protected areas of nature and was not especially applicable to SeaBOS companies. The new standard, however, is more expansive and will be equally

applicable to land and ocean-based industries. The GRI standard is going to be issued for consultation in Q4 of 2022 with the aim of being released in Q2 of 2023.

Read more: <https://www.globalreporting.org/standards/standards-development/topic-standard-project-for-biodiversity/>

Task Force on Nature-related Financial Disclosures (TNFD): is an investor-focused initiative that seeks to create guidance for how the financial risks that relate to biodiversity might be communicated to capital markets. Its naming and approach are built on an earlier initiative focused on climate-related financial disclosures (TCFD) which has proved influential (e.g. the United Kingdom Government has made TCFD reporting mandatory for large companies for financial years starting on or after 6th April 2022). The TNFD's mission is to create a risk management and disclosure framework for organisations to report and act on evolving nature-related risks, with the ultimate aim of supporting a shift in global financial flows away from nature-negative outcomes and toward nature-positive outcomes. The TNFD is developing rapidly with a v0.2 Beta Release of their 'risk and opportunity management and disclosure framework'.

Read more: <https://tnfd.global/>

WBA nature benchmark: This new World Benchmarking Alliance (WBA) benchmark has emerged during 2022 and will be applied to 1,000 companies across 22 industries between two initial research cycles, in 2022 and 2023 (when agricultural products and food and beverage companies will be evaluated). All SeaBOS companies (with the exception of Cermaq) are in scope (note – Mitsubishi is not covered by this benchmark). The benchmark considers two broad categories: governance and strategy, and ecosystem and biodiversity elements. The framing of the measures is similar to those initiatives identified above with a focus on impacts and dependencies around an array of topics areas (namely, state of nature under control; land and sea use change; direct exploitation of nature; pollution effects; invasive alien species; and social inclusion and community impacts).

Read more: <https://www.worldbenchmarkingalliance.org/nature-benchmark/>

8

Ocean equity

Increase in scientific attention

Ocean equity is increasingly on the scientific agenda, including through the publication of several scientific articles in the influential journals *Nature* (Cisneros-Montemayor et al. 2021), *Nature Sustainability* (Bennett et al. 2019), and *npj Ocean Sustainability* (Crosman et al. 2022, Frazão Santos et al. 2022). Ocean equity was also one of the background reports to the High Level Panel for a sustainable Ocean Economy. It is increasingly important that calls for sustainability include considerations that prioritize and mandate social equity concerns (including equitable processes and supporting equitable outcomes), as envisioned under a Blue Economy.

Read more:

Bennett et al. 2019 <https://www.nature.com/articles/s41893-019-0404-1>

Cisneros-Montemayor et al. 2021 <https://doi.org/10.1038%2Fs41586-021-03327-3>

Crosman et al. 2022. <https://www.nature.com/articles/s44183-022-00001-7#Bib1>

Frazão Santos et al. 2022 <https://www.nature.com/articles/s44183-022-00004-4>

Österblom, Wabnitz et al. 2021 <https://oceanpanel.org/publication/towards-ocean-equity/>

Policy promises yet to be delivered on

“Leave no one behind” is the central transformative promise of the 2030 United Nations Sustainable Development Goals (SDGs). It represents a commitment to eradicate poverty in all its forms, end discrimination and exclusion, and reduce the inequalities and vulnerabilities that leave people behind and undermine the potential of individuals and of humanity as a whole. The final report of the High Level Panel For a Sustainable Ocean Economy underlined the importance of “Ocean Equity” in their 2020 report “Ocean Solutions that Benefit People, Nature and the Economy”. However, the first progress report on the Ocean Panel “Tracking Blue: From Ambition to Action for a Sustainable Ocean Economy”, released September 21, 2022, underscores that action directed at improving ocean equity is still lacking, and needs to be made a priority by governments.

Read more: <https://oceanpanel.org/publication/ocean-solutions-that-benefit-people-nature-and-the-economy/>

Stockholm Resilience Centre
Sustainability Science for Biosphere Stewardship



Stockholm University

Beijer Institute
OF ECOLOGICAL ECONOMICS



KUNGL. VETENSKAPSKAD. AKADEM. 1734
THE ROYAL SWEDISH ACADEMY OF SCIENCES



GLOBAL ECONOMIC DYNAMICS AND THE BIOSPHERE
THE ROYAL SWEDISH ACADEMY OF SCIENCES

Pentland

Lancaster University

Stanford | Center for Ocean Solutions

WALTON FAMILY FOUNDATION

the David & Lucile Packard FOUNDATION

Authors: Robert Blasiak¹, Jan Bebbington², Patrik Henriksson^{1,3}, Elizabeth Selig⁴, Colette C.C. Wabnitz^{4,5}, Henrik Österblom¹

Affiliations: ¹Stockholm Resilience Centre, Stockholm University, ²Pentland Centre for Sustainability in Business, Lancaster University, ³Beijer Institute of Ecological Economics, Royal Swedish Academy of Sciences, ⁴Stanford Center for Ocean Solutions, ⁵Institute for the Oceans and Fisheries, University of British Columbia

Acknowledgements: The authors acknowledge support from the Walton Family Foundation and the David and Lucile Packard Foundation.

Graphics and layout: Evelina Jonsson/Azote